

STUDIA LATINA STOCKHOLMIENSIA LXIV

# PETER ARTEDI

Reformer of 18th Century Zoology



VOLUME I

Peter Artedi's Life & Works

*Hans Aili &  
Theodore W. Pietsch*

# **Peter Artedi: Reformer of 18th Century Zoology Volume I**

## **Peter Artedi's Life and Works**

With Latin editions and English translations of

*Catalogus piscium maris Balthici*

*Manuscriptum ichthyologicum quod Petrus Artedi elaboravit  
in usum Thesauri Sebani*

*Idea institutionum Trichozoologiæ*

*Hans Aili & Theodore W. Pietsch*



**STOCKHOLM**  
UNIVERSITY PRESS

Published by  
Stockholm University Press  
Stockholm University Library  
Universitetsvägen 10  
SE-106 91 Stockholm  
Sweden  
[www.stockholmuniversitetspress.se](http://www.stockholmuniversitetspress.se)

Text © The Author(s) 2024  
License CC BY-NC  
ORCID: Hans L. G. Aili: <https://orcid.org/0000-0001-5511-3035>,  
Theodore W. Pietsch: <https://orcid.org/0000-0002-5638-8468>

Supporting Agency (funding): Published with generous financial support from:  
Helge Ax:son Johnsons Stiftelse, Sven och Dagmar Saléns Stiftelse, Kungl. Patriotiska  
Sällskapet, Magn. Bergvalls Stiftelse

First published 2024  
Cover design by Tom Grady  
Cover image: Rare Book Division, The New York Public Library. “Scorpaena  
volitans” from *Ichtylogie, ou Histoire naturelle: générale et particulière des poissons*  
(1785–1797) by Marcus Elieser Bloch. The New York Public Library Digital  
Collections. Creative Commons CC0.

Studia Latina Stockholmiensia (SLS) (Online) ISSN: 2002-472X

ISBN (Hardback): 978-91-7635-243-4  
ISBN (PDF): 978-91-7635-244-1  
ISBN (EPUB): 978-91-7635-245-8  
ISBN (Mobi): 978-91-7635-246-5

DOI: <https://doi.org/10.16993/bcm>

This work is licensed under the Creative Commons Attribution-NonCommercial 4.0  
International (CC BY-NC 4.0) License (unless stated otherwise within the content  
of the work). To view a copy of this license, visit <https://creativecommons.org/licenses/by-nc/4.0/> or send a letter to Creative Commons, 444 Castro Street, Suite  
900, Mountain View, California, 94041, USA. This license allows for copying and  
distributing the work, providing author attribution is clearly stated and that you are  
not using the material for commercial purposes.

Suggested citation:  
Aili, H. and Pietsch, T. W. 2024. *Peter Artedi: Reformer of 18th Century Zoology*  
*Volume I. Peter Artedi's Life and Works*. Stockholm: Stockholm University Press.  
DOI: <https://doi.org/10.16993/bcm>. License: CC BY-NC 4.0



To read the free, open access version of this book online,  
visit <https://doi.org/10.16993/bcm> or scan this QR code  
with your mobile device.

# Studia Latina Stockholmiensia

Studia Latina Stockholmiensia (SLS) (ISSN 2002-472X) is a peer-reviewed series of scholarly editions of Latin texts as well as monographs and anthologies of Latin studies. While continuing Stockholm University's tradition of Medieval studies, the series is also open to Latin from the Ancient and the Modern periods. The textual editions include an introduction, a critical apparatus and usually a translation. The literary, linguistic and other philological studies of Latin feature a range of methodological approaches, both modern and traditional. SLS includes *Ars Edendi Lectures* as a sub-series. Studia Latina Stockholmiensia was previously included in the series *Acta Universitatis Stockholmiensis* (ISSN 0491-2764).

## Editorial Board

- Maria Plaza, PhD, Associate Professor of Latin, Dept. of Romance Studies and Classics, Stockholm University, Sweden. ORCID: <https://orcid.org/0000-0003-1643-2660>
- Hans Aili, PhD, Professor emeritus of Latin, Dept. of Romance Studies and Classics, Stockholm University, Sweden.
- Erika Kihlman, PhD, Associate Professor of Latin, Dept. of Romance Studies and Classics, Stockholm University, Sweden. ORCID: <https://orcid.org/0000-0001-8081-1740>
- Elin Andersson, National Library of Sweden, Sweden (Email: [Elin.Andersson@kb.se](mailto:Elin.Andersson@kb.se))
- Sara Risberg, Docent, PhD, The Swedish National Archives, Sweden (Email: [Sara.Risberg@riksarkivet](mailto:Sara.Risberg@riksarkivet))

## Titles in the series published by Stockholm University Press

62. Barbara Crostini, Gunilla Iversen and Brian M. Jensen, eds. 2016. *Ars Edendi Lecture Series, vol. IV*. Stockholm: Stockholm University Press. DOI: <https://doi.org/10.16993/baj>

63. Erika Kihlman and Denis Searby, eds. 2020. *Ars Edendi Lecture Series, vol. V*. Stockholm: Stockholm University Press.  
DOI: <https://doi.org/10.16993/bbd>
64. Hans Aili and Theodore W. Pietsch. 2024. *Peter Artedi: Reformer of 18th Century Zoology Volume I. Peter Artedi's Life and Works*. Stockholm: Stockholm University Press. DOI: <https://doi.org/10.16993/bcm>

# Peer Review Policies

Stockholm University Press ensures that all book publications are peer-reviewed. Each book proposal submitted to the Press will be sent to a dedicated Editorial Board of experts in the subject area. The full manuscript will be reviewed by chapter or as a whole by two external and independent experts.

Hans Aili, who is also a member of the Editorial Board of *Studia Latina Stockholmiensia*, did not take part in any recommendations or decisions for this book.

A full description of Stockholm University Press' peer-review policies can be found on the website: <https://www.stockholmuniversitypress.se/site/peer-review-policies/>

## Recognition for reviewers

The Editorial Board of *Studia Latina Stockholmiensia* applies single-blind review during manuscript assessment. Many thanks to the reviewers involved in this process.

Special thanks to the reviewers who have done the peer review of the manuscript of this book:

- Johanna Svensson, Ph.D. in Latin, Lecturer at Centre for Languages and Literature, Lund University
- Raija Sarasti, Senior University Lecturer, University of Helsinki



# Table of contents

Preface ix

Peter Artedi's modern perspective 1

## **PETER ARTEDI'S LIFE AND WORKS 13**

### **1. Preamble: chronology of Peter Artedi's life 15**

Documented dates and events 15

Childhood 16

Education 16

Student years 16

In England and Holland 18

Peter Artedi, deceased 19

### **2. Introduction 21**

### **3. Peter Artedi's life and surviving works 25**

Peter Artedi's life 25

Family 25

Childhood and education 26

A decade at Uppsala University 27

A tale of friendship and competition 29

A scandal caused by alchemy 31

Leaving Uppsala University 32

England: a successful visit 34

Holland: the end of the road 35

*Post mortem* 41

The works of Peter Artedi 44

Surviving works 44

Contents of *Ichthyologia* 46

Linnaeus's contribution as editor 46



Part I. <i>Bibliotheca ichthyologica</i>	47
Part II. <i>Philosophia ichthyologica</i>	50
Part III. <i>Genera piscium</i>	62
Part IV. <i>Synonymia nominum piscium</i>	70
Part V. <i>Descriptiones specierum piscium</i>	72
Evidence of a failed coordination	74
Methods compared	79
Peter Artedi <i>Ichthyologia sive opera omnia de piscibus</i> . Leiden 1738	86
The printing of <i>Ichthyologia</i>	94
Peter Artedi: innovator of examination	98
Artedi and the tradition from Aristotle to Willughby	98
<i>Artedi in opposition</i>	98
Nybelin's observations	100
Artedi's project	106
Vocabulary	106
Three tiers of hierarchy: <i>Ordo, Genus, Species</i>	108
Artedi and the hairy animals	112
Summary	114
<b>4. Peter Artedi, <i>Catalogus piscium maris Balthici</i></b>	<b>117</b>
Latin edition, by Hans Aili	120
English translation, by Hans Aili	121
<b>5. Peter Artedi, <i>Manuscriptum ichthyologicum</i></b>	<b>159</b>
Introduction, by Theodore W. Pietsch	159
Latin edition, by Hans Aili	175
English translation, by Hans Aili	267
<b>6. Peter Artedi, <i>Idea institutionum Trichozoologiae</i></b>	<b>315</b>
Latin edition, by Hans Aili	316
English translation, by Hans Aili	317
Commentary, by Theodore W. Pietsch	391
<b>7. Bibliography</b>	<b>405</b>
<b>8. Appendices</b>	<b>417</b>
1. Peter Artedi's <i>Praefatio Authoris</i> , 1735, in <i>Ichthyologia</i> , 1738	417
2. <i>Methodus</i> : Artedi's methodical procedure	420
3. Acknowledgements	421

# Preface

By Hans Aili

This work in two volumes has been long in the making. The project, an English translation of Peter Artedi's *Ichthyologia*, began about 1995, when the Swedish journalist and TV reporter Olle W. Nilsson called me, then a senior lecturer of Latin at Stockholm University, querying why Latinists did not show any interest in Peter Artedi. Trying to formulate a good answer, I found myself rising to the challenge and started an active interest in producing such a translation and began translating small sections taken from different parts of *Ichthyologia*, just to test my capacity for translating a Latin text into a language not my mother tongue. The work proceeded slowly, as my duties as a teacher and researcher into other aspects of the Latin language demanded much of my active time. Some years into the new millennium, I was contacted by a small group of scholars chaired by Lars Ljunggren, head librarian of the Royal Academy of Forestry and Agriculture (Stockholm), inviting me to join them in producing a Swedish translation with commentaries on Artedi's position among the world's ichthyologists. This project effectively stopped my work on the English translation for the time being, until the appearance of Professor Theodore W. Pietsch's novel *The Curious Death of Peter Artedi* (2010, 2023) caused me to contact Ted, an act that led to a renewal of the English project, accompanied by an ever-increasing number of inspiring email messages, commenting on my tentative translations. These two projects now continued in tandem, the Swedish project finishing in December 2022 with the printing of *Petrus Artedi, Ichthyologia, det vill säga alla verk om fiskarna* (695 pages), published by the Academy with commentaries by Jakob Christensson (editor), Sven Kullander, and Clas-Ove Strandberg.

The English translation, in the meantime, had gained in scope and now comprised not only *Ichthyologia* but Artedi's three minor works: *Catalogus piscium maris Balthici*, *Manuscriptum ichthyologicum*, and *Trichozoologia*. The latter three works are published in the present volume with editions of the Latin texts, parallel translations, and commentaries. Owing to its size, *Ichthyologia* alone occupies Volume II.

Beyond my highly inspiring cooperation with Ted Pietsch, the work of translating has proved to be a loner's project, mostly conducted from home after my retirement from the chair of Latin. However, the Latin Seminar of Stockholm University, first headed by myself and, after my retirement, by Professor Maria Plaza, has on several occasions been presented with various aspects of the work. I am most grateful to the members of the Seminar for very valuable comments on the pages presented.

The authors finally wish to extend their thanks to the two anonymous reviewers who have offered invaluable comments on the manuscript. Our thanks are also due to the four Swedish foundations that generously contributed to covering the publishing costs, Helge Ax:son Johnsons Stiftelse, Magn. Bergvalls Stiftelse, Kungl. Patriotiska Sällskapet, and Sven och Dagmar Saléns Stiftelse.

# Peter Artedi's modern perspective<sup>1</sup>

By Theodore W. Pietsch

The name of Peter Artedi is familiar to most zoologists—particularly so to those engaged in the study of fishes. It is associated in their minds with the man who has come to be called the ‘Father of Ichthyology’. But beyond a brief outline of Artedi’s all too short life, which can be found in several of the recent histories of biology, there is little information that is readily accessible to those who are interested in knowing more. Nor should ichthyologists alone be thus interested, for although Artedi’s greatest fame now lies in his work on fishes, he deserves even more credit for his system of classification which applies not only to fishes but to all animals.

— Daniel Merriman (1938, 33)

## Introduction

The Swedish naturalist Peter Artedi (1705–1735) has been recognized as the father or founder of the modern science of ichthyology (e.g., Schneider 1789; Günther 1880; Lönnberg 1905; Merriman 1938; Pietsch and Aili 2014) but his only published work, *Ichthyologia sive opera omnia piscibus* (1738), has not received the attention that it deserves. This is partially because the book is rare and written in Latin, a language that few are now able to read, but apparently more so because many modern taxonomists and systematists consider a work published nearly three centuries ago to have little bearing on their studies (Wheeler 1961). However, far from simply a noteworthy curiosity in

---

<sup>1</sup> Based on an earlier publication that appeared in *Zootaxa*, volume 5169, issue 6, pp. 589–598 (2022): T. W. Pietsch and H. Aili, ‘Swedish naturalist Peter Artedi (1705–1735) and his place in the history of biosystematics as exemplified by his *Ichthyologia sive opera omnia piscibus* of 1738’; used with permission.

---

### How to cite this book chapter:

Aili, H. and Pietsch, T. W. 2024. *Peter Artedi: Reformer of 18th Century Zoology Volume I. Peter Artedi's Life and Works*, pp. 1–12. Stockholm: Stockholm University Press. DOI: <https://doi.org/10.16993/bcm.a>. License: CC BY-NC 4.0

the history of science, Artedi's *Ichthyologia* is of immense significance to ichthyology and perhaps of even greater import to the history of the development of biosystematics in general (Lönnberg 1905). It introduced for the first time a precise terminology, dividing fishes into orders, orders into genera, and genera into species; used uninominal generic names throughout; and, having provided full and pertinent diagnoses of all known taxa, it developed standard methods for making counts and measurements of anatomical features (Gill 1872; Jordan 1902; Wheeler 1961, 1987; Broberg 1987; Romero 2012; Aili and Pietsch 2020).

An increased understanding of the importance of Artedi's work has been made possible by the forthcoming English translation of *Ichthyologia*, admirably prepared by Hans Aili. The opportunity to study *Ichthyologia* in English for the first time emphasizes like never before Artedi's thoroughly modern approach.

## Ichthyologia

*Ichthyologia sive opera omnia de piscibus* (1738) is a book of about 500 pages, divided into five parts: Part I, *Bibliotheca ichthyologica seu Historia literaria ichthyologiæ* ('Ichthyological library or literary history of ichthyology'); Part II, *Philosophia ichthyologica* ('Philosophy of ichthyology'); Part III, *Genera piscium, in quibus systema totum ichthyologiæ proponitur* ('The genera of fishes, in which the entire ichthyological system is proposed'); Part IV, *Synonymia nominum piscium* ('Synonyms of fish names'); and Part V, *Descriptiones specierum piscium* ('Descriptions of fish species'). These five parts are arranged in such a fashion that they could be bound as separate volumes, although they are nearly always bound into one, but with a pagination individual to each part. Part I is preceded by the main title page (Figure 1), Linnaeus's 'Vita Petri Artedi' ('Life of Peter Artedi', dated Leiden, 10 March 1738), and Artedi's own 'Præfatio authoris' ('Author's preface', dated London, 1735). Each main part contains a short preface by Linnaeus.

Examining Artedi's book in greater detail, it is useful to analyze his 'Præfatio authoris' in which he summarized his primary objectives—achieved to a great extent in the five parts of his book that follow. This started off with a statement of the problem at hand:

I have been from my earliest youth a lover of Zoology, and primarily a lover of Fishes, but when I began, even eight years ago and more, to describe

PETRI ARTEDI  
 SVECI, MEDICI  
 ICHTHYOLOGIA  
 SIVE  
 OPERA OMNIA  
*de*  
 PISCIBUS  
 SCILICET:  
 BIBLIOTHECA ICHTHYOLOGICA.  
 PHILOSOPHIA ICHTHYOLOGICA.  
 GENERA PISCIIUM.  
 SYNONYMIA SPECIERUM.  
 DESCRIPTIONES SPECIERUM.  
 OMNIA IN HOC GENERE PERFECTIORA;  
 QUAM ANTEA ULLA.  
 POSTHUMA  
*Vindicavit, Recognovit, Coaptavit & Edidit*  
 CAROLUS LINNÆUS,  
*Med. Doct. & Ac. Imper. N. C.*

---

LUGDUNI BATAVORUM,  
 Apud CONRADUM WISHOFF, 1738,

**Figure 1.** The title page of Peter Artedi's *Ichthyologia sive opera omnia de piscibus*, published by Conrad Wishoff, Leiden, in 1738. License: Public Domain.

indigenous fishes and then to compare my observations with those of the Authorities, it was from the outset very difficult for me to make my fishes conform with the species as described by the Authorities.

Artedi then declared that ‘no one among the Ichthyologists had as yet defined the separate genera and their characters and species’. He therefore set out ‘with great effort to examine all the body parts of the fishes in order to see which parts agreed most in number, shape, and position, and which were most in disagreement, primarily among fishes that agreed in outer shape’. Every systematist of today will recognize this approach as a mainstay of modern taxonomy, that is, a precise definition or ‘diagnosis’, which is a required element in the description of any taxon.

Having provided a thoroughly modern definition of what he meant by the term genus—‘a certain likeness between certain species, which agrees in shape, location, number or proportion of parts in such a manner that they differ from all species of the other genera in one minimal part’—Artedi next observed that most generic names in the zoological lexicon of the day were not derived from Latin, or properly Latinized, but instead ‘Barbaric’, so he ‘cleansed Ichthyology of precisely these exotic designations’, prophesying the present-day, universally established rule set forth by the International Commission on Zoological Nomenclature (ICZN 1999) that mandates that all taxonomic names be based on Latin or Latinization of Greek words (although, admittedly, recent changes to the code allow taxonomic names to also be based on words of non-classical origin; ICZN 2012). For new genera, or for genera not yet possessed of any suitable name, Artedi advised that any newly proposed name should be ‘so general that it would, in some respect, fit all the Species of one single Genus’. Moreover, he eliminated any generic fish names that were found elsewhere, that is, among ‘Hairy Quadrupeds, Amphibians, Birds, Insects, and other things, on account of the confusion they might cause’—again foretelling another universally established rule, mandated by the ICZN, that requires that generic names in zoology be unique.

Artedi then acknowledged the existence of morphological variation within species and emphasized the need to distinguish species from varieties by selecting those body parts that reveal ‘the True Differences between the Species’, thus defining the diagnostic or key characters that we strive to identify today and which serve as the initial means of identifying a taxon. In *Philosophia ichthyologica*, the second of the five

parts of *Ichthyologia*, he urged that ‘the Classes, or more correctly the Orders, of the Fishes [...] ought to be Natural’. By ‘natural’, in contrast to ‘artificial’, Artedi was referring to taxa that are strictly defined by the ‘number, shape, position, and proportion of body parts’, independent of extrinsic features such as habitat, diet, and climate. This is, of course, in sharp contrast to what we now consider ‘natural’, that is, features that are the result of natural selection, but we cannot expect Artedi, writing in the early 18th century, to have had any notion of organic evolution.

Artedi furthermore emphasized the need to ‘treat all the body parts of fishes, external as well as internal, and this according to their differences in number, shape, site, and proportions et cetera’. In so doing, he provided an explanation of technical terms often employed in ichthyology—expressions and their definitions that are largely in use today. In addition to anatomical names and methods for making counts and taking measurements, he gave, for the first time, precise definitions of the general terms that identify his chosen branch of study: ‘The Science that deals with fishes is called Ichthyology; but before we can give a definition of Ichthyology itself, it is, on the very threshold, necessary that we indicate, what a Fish is.’ He thus began with a short, three-part phrase: ‘A Fish is an apod, an animal without feet, always furnished with fins.’ Considering, however, that this might not be enough to satisfy the more critical of his readers, he elaborated:

A Fish is an apod, always furnished with fins; breathing either by means of gills or lungs; often living in the water and there swimming, either by means of its fins only or, simultaneously, with a forceful bending of its body, sometimes however by its own initiative departing onto dry land and at times flying in the air above the water by means of its pectoral fins.

Although he did not realize at the time that a few fishes are devoid of fins and others are air-breathers or employ cutaneous respiration rather than gills, and excluding the mention of ‘lungs’ that was necessary to accommodate marine mammals, Artedi’s definition coincides rather precisely with that found in modern-day ichthyology textbooks.

Having provided the elements that characterize a fish, Artedi proceeded to define ichthyology, ‘the science of Fishes’, as ‘that which, first of all, points out and names all their parts, then provides their true generic and specific names, and finally indicates some proprieties worthy of observation’. Great emphasis is given to the necessity of



knowing and naming all the parts of fishes, internal as well as external, to enable the accurate placing of ‘all the Fishes encountered into their natural Families, Genera, and Species, along with a report of their Synonyms according to the Authorities’. An incredibly detailed catalogue of the anatomical parts of fishes follows, each structure named and given a precise definition, its number, shape, and position described, with examples of variation and the nature and extent of occurrence among various species. In so doing, and leaving nothing out, no matter how small, Artedi eclipsed the efforts of all the naturalists who came before him, whether in ichthyology or any other branch of natural history.

Turning now to *Synonymia nominum piscium*, Part IV of *Ichthyologia*, Artedi presented ‘the Synonymous Names of the Species from nearly all the Authorities’ and added them to his new specific names:

[T]his has caused me a great labour, beyond the other parts of this Work; very much time and an untiring mind is required in order to give reports of so many authorities on almost every single Species, particularly as so very few Synonyms had hitherto been collected, and those not being cited from their proper locations.

Once again, Artedi’s approach was unique for his time, setting precedent for the future—detailed annotated synonymies are now an essential part of every modern revisionary taxonomic work.

In *Bibliotheca ichthyologica*, the first of the five parts of his book, Artedi provided a ‘Literary History of Ichthyology [...] in order that the principal fortunes of Ichthyology, and its progress, should be visible at a glance, so to speak, and this cost me no small amount of time, namely in the complete perusal of so many Authorities’. Again, Artedi was well ahead of his time—until then no one had put together such a thorough and well-documented bibliography of any branch of zoology. Citing some 71 authors (77 names of authorities are listed in the index to *Ichthyologia*), from the ancients of the ‘*post diluvium*’ (those who came after the Great Flood to the birth of Christ) to François Valentijn (1666–1727), Artedi provided titles and surprisingly detailed descriptions of the contents of each of the more important works. In addition to an annotated chronological arrangement, he provided a summary listing of authors and their country of origin, grouped by century.

Finally, returning to the ‘Præfatio’, Artedi ends his introduction with a thoroughly modern view, rarely, if ever, stated so emphatically by an 18th-century naturalist:

My observations [...] and the descriptions belonging to them have been drawn forth from Nature's very own images, the consequence being that I have written nothing but what Nature's image has supplied, and thus I am only acting as Nature's interpreter; because of this I hope that nobody will justly taunt me with that vulgar saying: 'nothing is said here that has not been said before.' In this work I have not described any Fish except those that I have myself observed.

## Artedi's description of the European perch

To exemplify the extent to which Artedi applied his methodology to a specific taxon, attention is drawn here to his description of the European perch, *Perca fluviatilis* Linnaeus, 1758. Although Artedi recognized this species with a lengthy polynomial, *Perca lineis utrinque sex transversis nigris, pinnis ventralibus rubris* ('Perch with six black transverse lines on each side, ventral fins red'), the identity of the European perch—a species common in the lakes and streams of Sweden where Artedi grew up—is obvious.

Like the other accounts in *Descriptiones specierum piscium*, Artedi's description of the European perch is extremely detailed and entirely unique for his time. His Latin morphology and syntax are perfectly correct and his literary style straightforward. His vocabulary was strongly influenced by his medical studies: all those anatomical features that fishes share with humans are given the same names, *oculus* for 'eye', *nares* for 'nostril', *ovarium* for 'ovary', *hepar* for 'liver', and so on. Organs shared by fishes with birds or quadrupeds are handled in the same manner: *pinna* for 'fin', *rostrum* for 'snout', *cauda* for 'tail', etc. Only those organs that are unique to fishes required a new vocabulary, either taken from earlier authorities or invented by Artedi himself, who very strictly followed the principle that all newly coined terms should be taken from ancient Greek, albeit in a Latinized form. For example, he is almost certainly responsible for *membrana branchiostega* ('branchiostegal membrane') and *linea lateralis* ('lateral line'). Two of his innovations that describe aspects of the external morphology of a fish have been retained as English neologisms: *plagioplateus* ('depressed') and *catheplateus* ('compressed'). A good example of Artedi's striving for an exact terminology is his use of the term *ossiculum*, 'small bone', to signify the rays of the fins, although the usual term at the time was *radius*. Later, during his early student days at Uppsala University, when describing fishes in northern Swedish waters, he mainly used *radius*

(‘a staff’ or ‘rod’: its use in anatomy is a metaphor) but he showed an intermittent but increasing preference for *ossiculum*. His description of *Perca fluviatilis* (below) is clearly an early one, as it offers five instances of *radius* denoting fin rays. In his later descriptions, including all those that appear in two surviving Artedi manuscripts, *Catalogus piscium Maris Balthici* (autumn of 1734; see Aili and Pietsch 2020) and *Manuscriptum ichthyologicum* (summer of 1735; Pietsch and Aili 2023a), he used *ossiculum* exclusively.

Here follows Artedi’s description of the European perch, *Perca fluviatilis* Linnaeus, 1758 (Figure 2), one of 71 similarly described species recognized by him in *Descriptiones specierum piscium* (*Ichthyologia*, Part V, pp. 74–76; note that a line, as used below, is a historic unit of length used in France and elsewhere prior to the adoption of the metric system in the late 18th century; one line is approximately equal to 2.25 mm or 1/12 of an inch):



**Figure 2.** The European perch, *Perca fluviatilis*, syntypes A. BNMH 1853.11.12.2, right half-skin, 107 mm standard length; B. BNMH 1853.11.12.3, left half-skin, 130 mm standard length (courtesy of James Maclaine, Lucie Goodayle, © Natural History Museum, London; used with permission).

*PERCA*, 30th Genus of Fishes

1. *PERCA* with six transverse lines, black, on each side, ventral fins red. [Called] Abbor in Sweden.

Full length	inches 7	lines 5
Length to the middle of the eye		7
to the pectoral fins	1	9
to the ventral fins	2	2
to the end of same	2	5
to the first dorsal fin	1	9
to the end of same	3	9
to the second dorsal fin	4	1
to the anal fin	4	4
to the end of same	5	
to the end of second dorsal fin	5	2
to the beginning of finned tail	6	2
Width at the middle of the eye		9½
at the first dorsal and ventral fins	1	8
at the ventral fins	1	9
at the second dorsal fin and anus	1	4½
at the anal fin	1	9½
at the end of second dorsal fin		7
at the beginning of tail		6
the smallest, in front of tail		5

1. *Back* rising from the head and somewhat pointed. Belly is in its entirety, from head to anus, wide and flat.
2. *Head* cathetoplateous. Jaws of about identical length, except that the upper jaw, when mouth is closed, appears as little more drawn out; but this is not of importance.
3. Open mouth very wide.
4. Small teeth, very numerous, innate on the maxillary bones of each jaw.
5. On the palate, three areolae of teeth, sharp and small, the middle of which is smallest and triangular, but the lateral ones, oblong.
6. Small bones, four, sharp with little teeth, in the gullet; of these the two upper ones are larger, those below, of equal number, are smaller and grown together into one, so to speak.

7. *Tongue*, smooth and not very loose at the back.
8. *Nostrils* large, open, closer to the eyes than to the snout, having on each side one double opening with a large distance in between. The anterior hole covered by a small double valve.
9. *Ducts*, four small ones, on each side of the head, between the eyes and the snout, perhaps secreting slime.
10. *Iris* saturated yellow, that is, mixed from yellow, dark, and blackish. Pupil oval and greenish.
11. *Branchial covers* composed of two or four osseous laminae and seven rather wide and curved spines (of which the upper one is largest), on each side joined by a membrane; of these, the upper lamina is serrated in all its circumference, the lower ends in a prickly apophysis.

Note: very small scales borne on these laminae (11).

12. The *clavicles* [pectoral radials] consist of four bones on each side, joined to the body above the Pectoral Fins; the first and third of these bones is somewhat serrated in its circumference.
13. *Gills*, four on each side; all of these are gifted with a double row of tubercles which are about equal in size in the three lower gills on each side, or else the outer ones are a bit larger; but in the upper, that is the largest gill, there are sharp and bony knots, three or four times larger than the inner ones, pointed and bony, extended upwards. The inmost knots are barely visible in the smallest gill.
14. The *chest* is covered by very small scales, but not naked, as most Ichthyologists would have it.
15. The *lateral line* is curved, close to the back and curving towards it, placed far above the interstices of the muscles.
16. The *interstitial line* between the muscles is straight, midway between the back and the belly.
17. Lines, that is, transverse and blackish zones, six in number, on the flanks; the smallest of these is nearest the tail.
18. The *scales* are of medium size, adhering very tightly, and extremely hard, on the belly often white, on the flanks yellowish, grey-whiteish etc. In their anterior part, which is hidden under the skin, they are straight, that is, they have one straight side, and are distinguished by notches which are, however, smooth; in their posterior part and on the flanks they describe a kind of semicircle, armed along their outer edges by small and sharp hooks, backwards-leaning, by which the scales feel sharp to anyone who slides his hand forwards.

19. *Dorsal fins*, two; the first with fourteen, rarely fifteen rays, all prickly; the last one is smallest. Note: a large, black spot is visible at the rear end of the membrane of this fin (19); elsewhere, the membrane is grey-greenish or dark.
20. The posterior *dorsal fin* with sixteen rays of which the first is small and prickly, the others longer and very little branching at the tip.
21. The *pectoral fins* are not sited on the lowest part of the belly but on the flanks, *greyish*, of fourteen rays the first of which, that is, the two upper ones and the three last ones are small and undivided; the others, that is the middle ones, are longer than those at the ends and are branching at the tip, joined by a very weak membrane.
22. The *ventral fins* are of very red color, of six rays of which the first is prickly and simple the others much branching at the tip, that is divided into 6 and 8 small forks, all however robust at the beginning. They cannot be raised vertically, but the last small bone [fin ray] is joined with the belly membrane.
23. The *anal fin* is saturated red, with twelve, sometimes 11 rays, the two first of which are prickly, the others branching at the tip; the outer ones are very small, the 3rd and 4th longest.
24. The *tail* is a bit forked, reddish at the extreme ends, with 17 long rays of which one on each side is undivided at the tip, the middle ones much branching at the tip.
25. The *ovary* of the females is long, cylindrical and simple, filling almost the whole abdominal cavity. The seminal bladder of the males, however, is double, that is consists of two parts, joined at the bottom.
26. The *liver* is pale red, divided into two lobes of which the one on the left is larger. The gall bladder is located downwards in the middle.
27. The *peritoneum* of silvery color.
28. The *ventricle* very large, well separated from the intestine, having three Appendices similar to earthworms, below the pylorus.
29. The *intestine* is bent back once and embedded in fat; the oblong and red spleen is close to it.
30. The *air bladder* is large and simple, attached to the back along the entire length of the abdomen.
31. The *ribs* are nineteen on each side; they detach themselves of their own volition from the vertebrae. The vertebrae generally forty-one.

## Summary

Artedi's work, summarized in his 'Praefatio' and detailed in the parts of *Ichthyologia* that follow, provides a concise treatise on how the beginner should start out in ichthyology, or, for that matter, how any taxonomist should proceed, providing information not unlike what all major professors of biosystematics pass on to their students. Much of it seems rather elementary to us today, but, realizing that no one had put these ideas to paper before, it becomes highly significant that Artedi was the first to set precedents toward a modern systematic perspective.

## **Peter Artedi's life and works**





# 1. Preamble: chronology of Peter Artedi's life

By Hans Aili

## Documented dates and events

Peter Artedi, born Petrus<sup>2</sup> Arctaedius, met with an early and untimely death, and the list of chronological facts concerning his life<sup>3</sup> is comparatively short, offering scant information on his childhood, his school days at Härnösand, his ten years at Uppsala University, his time in England, and his life and work in Holland. The purpose of this chronology is to present information in tabular form to facilitate the more detailed information and discussion offered in Part III. Its sources are Carl Linnaeus's *Vita Petri Artedi* (entered in front of Part I of Artedi's *Ichthyologia* 1738), Lönnberg (1905), and Nybelin (1954–1955, 1966). Valuable information is also offered by Wheeler (1961) and Fries (1985), and much inspiration by Pietsch (2010, 2023). Notices from July 1735 are taken from Linnaeus's *Almanach* 1735 (Uggla 1935). Some dates relating to Artedi's visit in England can be found in *Genera piscium*. Only a few days before his death, Artedi wrote a letter to his mother in Sweden, which offers a few independent pieces of information (Walde 1951).

Dates up to the summer of 1735 are according to the Julian calendar (the Old Style), then still observed in Sweden; later dates according to the Gregorian calendar (New Style), already in force in Holland and always 11 days later than the Old Style, are, when certain, given in *italics*.

---

<sup>2</sup> The spelling of personal names of the 18th century (and earlier) are notoriously unstable. *Petrus* is the most correct form, in use during Artedi's lifetime, while *Peter* appears to be the accepted name form for Artedi in English literature; his sister called him *Petter*, which was probably more familiar.

<sup>3</sup> I am much indebted to the chronology published by Pietsch (2010, pp. 187ff; 2023, pp. 225ff.) but hope that I have managed to add to it in some respects, while discarding any information relating to the life of Carl Linnaeus that has no bearing upon Artedi's life.

---

### How to cite this book chapter:

Aili, H. and Pietsch, T. W. 2024. *Peter Artedi: Reformer of 18th Century Zoology Volume I. Peter Artedi's Life and Works*, pp. 15–19. Stockholm: Stockholm University Press. DOI: <https://doi.org/10.16993/bcm.b>. License: CC BY-NC 4.0

## Childhood

1705, 27 February: Petrus Arctaedius born in the residence of Olaus Arctaedius, curate, parish of Anundsjö, Ångermanland, Sweden.

1716, 26 September: Olaus Arctaedius ordained as vicar, parish of Nordmaling, Ångermanland, Sweden.

## Education

1710 to 1716: Petrus Arctaedius educated at home by his father.

1716, autumn term: admitted to Trivial School of the Cathedral School of Härnösand.<sup>4</sup>

1716 to 1717: Class 2: *Alphabetica*, Upper.

1717 to 1718: Class 3: *Etymologica*, Lower.

1718 to 1719: Class 4: *Etymologica*, Upper.

1719 to 1720: Class 5: *Syntactica*, Lower. Ranked *Primus* of his class. Skipped one year.

1720 to 1721: Class 7: *Conrectoris*.

1721 to 1722: Class 8: *Rectoris*.

1722 to 1723: *Gymnasium*, Class I.

1723 to 1724: *Gymnasium*, Class II. Left the *Gymnasium* during summer holidays.

## Student years

1724, 30 October: matriculated as Petrus Arctaedius at Uppsala University.

1724, 10 December: matriculated at Ångermanland Nation.

1724, 10 December: absolved from menial duties of attendance at the nation, normally laid upon new students (*recentiores*).

1726, 13 December: appointed *Stipendiatus regius* at Faculty of Medicine.

1727, 8 July: opponent on dissertation *De piscibus* (by Lars Roberg, *praeses*).

1728, August: returned home to care for his ailing father.

---

<sup>4</sup> School education offered at Härnösand took 12 years in all: eight years of trivial school with classes *Alphabetica*, *Etymologica*, *Syntactica*—each with Lower and Upper year—and *Conrectoris* and *Rectoris* of one year each, while the *Gymnasium* contained four classes of one year each. Source: Nybelin (1954–1955, 89).

- 1729, 24 February: *Nordmalings Flora*, ms. finished and dated by Petrus Arctaeus.
- 1729, March: back at Uppsala.
- 1729, March: first meeting of Petrus Arctaeus and Carl Linnaeus.
- 1729, 2 April: appointed opponent on dissertation held at Ångermanland Nation.
- 1730, September: resident tutor to two sons of Magnus Mentzer, estate of Brunnby outside Uppsala.
- 1731, autumn term: appointed *Stipendiatus*, second class.
- 1731, 4 December: appointed senior at Ångermanland Nation.
- 1732, spring term: instructed Carl Linnaeus on practical matters for travelling in Lapland.
- 1732, spring term: appointed *Stipendiatus*, third class.
- 1732, 15 November: Professor Lars Roberg led a disputation on *Theses chemicae*. Censured by Faculty of Theology. Artedi probably very active at this occasion.
- 1732, autumn, probably end of term: *Stipendium* exhausted.
- 1732, December: appointed *praeses* of coming disputation, *respondens* Georgius Wallin.<sup>5</sup>
- 1733, 25 January: appointed *curator* of Ångermanland Nation (probably salaried position).
- 1733, 24 March: signed document as Petrus Artedi (first mention of his new name form).
- 1734, 13 April: oration by Artedi at Ångermanland Nation: *De serie philosophorum a condito mundo*.
- 1734, 27 May: resigned from office of *curator*.
- 1734, June: friends' parting: Carl Linnaeus left Falun on 3 July to travel in Dalarna.
- 1734, Midsummer: Artedi left Uppsala for Stockholm.
- 1734, 17 July: as *medicinae studiosus peregrinaturus*, underwent formal examination in theology, for *testimonium academicum*, compulsory for students intending to travel abroad.
- 1734, 31 July: *testimonium academicum* awarded to Petrus Artedi, *med. stud.*

---

<sup>5</sup> Dissertations within the nations are not accessible in the online version of Lidén's Catalogue.

## In England and Holland

- 1734, July–August: in Stockholm, Artedi met brothers-in-law Pehr Bjur and Jonas Ljungberg, who agreed to finance his voyage to England.
- 1734, July–August: Artedi in Stockholm; met Jacob Serenius, vicar of the Swedish congregation in London, currently visiting Sweden.
- 1734, August: Carl Linnaeus returned to Falun and, later, Uppsala. No mention of meeting.
- 1734, early September: Artedi in Stockholm; embarked ship with destination London.
- 1734, 26 October: letter of recommendation (in English), by Jacob Serenius, from Stockholm.
- 1734, November: Artedi viewed specimen of whale in London (*Ichthyologia, Genera*, p. 77).
- 1734, November, through 1735, June: Artedi observed exotic animals (a panther from Buenos Aires, a leopard, two tigers, and a hyena) at ‘Moorefield’, London (*Trichozoologia*, pp. 48–49; Pietsch and Aili 2023c).
- 1735, 15 May: Artedi visited Hans Sloane’s museum (*Ichthyologia, Genera*, pp. 56–60).
- 1735, 26 May: Artedi visited Stratford.
- 1735, end of June: Artedi left England (source: letter to mother, from September).
- 1735, 27 June (8 July): Artedi arrived Leiden, visited Boerhaave’s *Arboretum*, met Linnaeus (source: Linnaeus’s *Almanach*, ed. Uggla).
- 1735, end of June: Artedi and Linnaeus meet in Leiden.
- 1735, 30 June (11 July): Linnaeus sent *Systema naturae* to printers.
- 1735, 6 July (17 July): Linnaeus went to Amsterdam.
- 1735, 12 July (23 July): Linnaeus dated *Systema naturae*, praising Artedi’s *Ichthyologia* (source: *Systema naturae*, 1735, p. 11).
- 1735, 15 July (26 July): Linnaeus ‘absolved’ *Systema naturale* (sic! Source: Linnaeus’s *Almanach*).
- 1735, early September: Artedi wrote (in Swedish) home to his family. No mention of Linnaeus.
- 1735, late September: Linnaeus demonstrated his *Fundamenta botanica* to Artedi and was persuaded by him to read *Ichthyologia*.
- 1735, evening of 27 September: Artedi dined at Seba’s house.
- 1735, 28 September, about 1 o’clock am: Artedi drowned in a canal in Amsterdam.

## Peter Artedi, deceased

- 1735, 28 September, morning: Artedi's body discovered, removed to an Amsterdam hospital.
- 1735, 29 September: Claes Sohlberg informed Linnaeus of Artedi's demise. Took responsibility for the funeral. Linnaeus received financial support from Seba: 50 florins for funeral expenses.
- 1735, 30 September: Linnaeus viewed Artedi's dead body.
- 1735, 30 September: notary public of Amsterdam made inventory of Artedi's possessions.
- Artedi's works in manuscript: Surviving: *Ichthyologia*, *Manuscriptum ichthyologicum*, *Trichozoologia*. Mentioned in inventory but lost: *Manuscriptum thunense*, *Manuscriptum mineraloense*,<sup>6</sup> *Manuscriptum de amphibiis*, Letter to family. Kept elsewhere: *Catalogus* (with Sloane).
- 1735, 2 October: Peter Artedi laid to rest in a pauper's grave<sup>7</sup> at the cemetery of Sint Antoniuskerk, Amsterdam.
- 1735, autumn: Linnaeus received funds from George Clifford and the Arctadius family for recovering Artedi's manuscript, Seba having refused his help. *Ichthyologia* copied for Clifford, who returned original to Linnaeus.
- 1735 to spring 1737: Linnaeus inspected and edited *Ichthyologia*, his assistants, among them Tiburtius Kiellman (b. 1718), making a clean copy for printing.
- 1737, autumn, to March 1738: *Ichthyologia* printed part by part in reverse order: Part V *Descriptiones*; Part IV *Synonymia*; Part III *Genera*; Parts II and I *Philosophia* and *Bibliotheca*.
- 1738, 10 March: Linnaeus concluded and dated *Vita Petri Artedi*.

<sup>6</sup> Cf. OED s.v. *mineral*, n., †1. Alchemy. 'According to certain writers: that variety of the philosopher's stone which was responsible for the purification of metals, esp. in orebodies [...] This variety of the philosopher's stone was called more fully *lapis mineralis*, the others being *lapis animalis* and *lapis vegetabilis*.'

<sup>7</sup> The 50 guilders Seba had provided were apparently insufficient even for a pauper's grave.



## 2. Introduction

By Hans Aili

This monograph on the life and works of Peter Artedi, enhanced by editions of his three minor Latin works with English translation, is primarily to add some details to what is already known, thanks to a number of eminent scholars, about the life of Peter Artedi, and secondarily to formulate a new perspective on the usefulness in practice of his method of examining fishes and *Trichozoa* or ‘hairy animals’, which was his collective noun for mammals.

Peter Artedi composed his zoological treatises in Latin, which was the regular language for everyday communication among 18th-century scientists, while Greek, the language of Aristotle, was Artedi’s richest source of words suitable for creating new names.<sup>8</sup> Artedi’s fame rests on his major work, *Ichthyologia sive opera omnia de piscibus* (Leiden, 1738, 500 pages), after his premature demise published by Carl Linnaeus, his friend during some five years of studies at Uppsala University. Very few modern scientists, however, have a first-hand understanding of this work, Latin being no longer a current language of science. When Artedi died by drowning in Amsterdam, his store of unpublished manuscripts also comprised a ‘Catalogue of the Fishes of the Baltic Sea’ (*Catalogus piscium maris Balthici*)<sup>9</sup> and a pilot study entitled *Idea institutionum*

---

<sup>8</sup> Artedi’s innovations in this respect form a major subject of discussion in Part III, below.

<sup>9</sup> Latin edition by [J. M. Hulth and] Orvar Nybelin: 1934, pp. 35–90: *Catalogus* on pp. 78–90. English translation and commentary in: Hans Aili and Theodore W. Pietsch, ‘Peter Artedi’s Catalogue of the Fishes of the Baltic Sea: An English translation with an introduction and commentary’, *Zoological Journal of the Linnean Society* 189 (3), July 2020, 975–97 (reprinted here in part with kind permission of Oxford University Press).

---

### How to cite this book chapter:

Aili, H. and Pietsch, T. W. 2024. *Peter Artedi: Reformer of 18th Century Zoology Volume I. Peter Artedi’s Life and Works*, pp. 21–24. Stockholm: Stockholm University Press. DOI: <https://doi.org/10.16993/bcm.c>. License: CC BY-NC 4.0



*Trichozoologiae*,<sup>10</sup> that is, ‘An Outline of the Principles of the Science of Hairy Animals’.<sup>11</sup> *Catalogus*, which is retained in a 32-page manuscript<sup>12</sup> in Artedi’s own handwriting, was probably finished before his voyage to England in the autumn of 1734; it is today part of the Sloane manuscript collection at the British Library, and it is possible that Artedi, who lacked an English mentor, let it serve as a kind of introduction to prove to Sir Hans Sloane that he was a worthy visitor.<sup>13</sup> It also offers evidence important for our understanding of the development of his views on ichthyology, as mirrored by changes in his terminology. *Trichozoologia* only survives as a handwritten copy<sup>14</sup> of 50 pages (some blank), dated 1746, of his original manuscript and contains two pages of notes written while in England. Finally, at the time of his demise, Peter Artedi was also working on a contribution to volume 3 of the Dutch apothecary Albertus Seba’s famous *Locupletissimus rerum naturalium Thesaurus*. Artedi had been contracted in July 1735 to describe Seba’s collection of tropical fishes, stemming chiefly from Ambon and Suriname; he died just when his work was making good progress towards completion. Artedi’s work survives both as an integrated and stylistically polished part of Seba’s *Thesaurus* and as a manuscript copy,<sup>15</sup> made by Seba’s son-in-law Roeland Willem van Homrigh (1711–1801) in the year 1773 (see Pietsch and Aili 2023a).

These four works in Latin<sup>16</sup> existed as manuscripts in the summer of 1735 but none of them was published during Artedi’s lifetime, and they have never been translated in their entirety into any modern

<sup>10</sup> Latin edition by Orvar Nybelin: 1934, pp. 58–77; see Theodore W. Pietsch and Hans Aili, ‘Peter Artedi’s “Idea institutionum Trichozoologiae” and the classification of mammals’, *Journal of Natural History* 57 (17–20), 2023b, 1066–79 (reprinted here in part with kind permission of Taylor & Francis, Inc.).

<sup>11</sup> *Trichozoa* was the name Artedi chose for the animals Linnaeus first called *Quadrupeds*, later *Mammals*.

<sup>12</sup> British Library, Sloane Ms. 3870.

<sup>13</sup> This theory was put forward by Nybelin (1934, 44).

<sup>14</sup> Stockholm University Library, Bergianska samlingen. H. VII: 8.I.n.4.

<sup>15</sup> Washington DC, Library of Congress (Philipps MS 8328), call number QL618.15.A78 1735 available at <https://loc.gov/resource/rbcoo01.2019gen56155> (accessed 8 August 2019).

<sup>16</sup> Artedi’s first essay on natural history was a botanical work written in Swedish in 1729: *Kårt förteckning på de träen buskar åg örter, somm wäxa sponté wid Nordmalings prästebord äller i närmaste byar där ämmkring äfter dänn alldrasimplaste åg Klaraste Methoden i ärdning satte*, commonly known as *Nordmalings Flora*, edited by Margit Wennstedt, in: Fries (1985).

vernacular.<sup>17</sup> The third decade of the 21st century will mark a complete reversal of this situation. A translation of *Ichthyologia* into Swedish has been published by the Royal Academy of Forestry and Agriculture, Stockholm;<sup>18</sup> a complete English translation by Hans Aili is under way; an English translation of *Catalogus* was published in December 2019 by the *Zoological Journal of the Linnean Society*,<sup>19</sup> London, in digital format, a printed version appearing in July 2020; and new Latin editions of *Manuscriptum ichthyologicum* and *Trichozooologia* with English translations form Parts 5 and 6 of the present work.

From these four translations modern ichthyologists will find an opportunity, at long last, to reach an appraisal of Artedi's impact on ichthyology and zoology, hitherto only indirectly transmitted through the works of Carl Linnaeus. Inevitably, the work of translating them has also offered the translator an opportunity to make some observations on Artedi's language and scientific method. The present work is thus a by-product of the labour of translation and was originally written to clarify some perspectives, in the belief that they were already common knowledge among professional ichthyologists and zoologists.<sup>20</sup> It turned out, however, that new knowledge emerged, not only on Artedi's person but also on his work, offering encouragement to completing a full series of translations and analyses.

The Latin editions follow traditional editorial practice in classical and medieval scholarship; this is explained in the introductions to the editions. The principles followed in the translations require some explanation, as modern ichthyologists are bound to find the vocabulary rather unprofessional and hardly *lege artis*.

---

<sup>17</sup> A manuscript containing a contemporary critique of *Ichthyologia* was published in 2014: Theodore W. Pietsch and Hans Aili, 'Jacob Theodor Klein's critique of Peter Artedi's *Ichthyologia* (1738)', *Svenska Linnésällskapets Årsskrift* 2014, 39–84.

<sup>18</sup> Petrus Artedi, *Ichthyologia*, 2022. Swedish translation by Hans Aili; editor: Jakob Christensson; ichthyological expertise: Sven O. Kullander; bibliographical research: Clas-Ove Strandberg.

<sup>19</sup> Hans Aili and Theodore W. Pietsch, 'Peter Artedi's Catalogue of the Fishes of the Baltic Sea: An English translation with an Introduction and Commentary', *Zoological Journal of the Linnean Society* 189 (3), 2019, <https://doi.org/10.1093/zoolinnean/zlz162>.

<sup>20</sup> The assurance I received from Professor Theodore W. Pietsch, to the effect that my observations opened up a largely unknown field, provided me with the motivation to expand my personal observations into a more comprehensive, but still succinct, study. The full discussion on Artedi's real contribution to the sciences of fishes and hairy animals will be left to modern zoologists.

In translating Artedi's texts from Latin into English I disobey one of the fundamental rules of translation, which is that you only translate from a foreign language into your own mother tongue. As I am a Swedish speaker by birth and upbringing, and an English speaker only by education and professional training, my English vocabulary relies heavily on a major dictionary, C. T. Lewis and Ch. Short, *A Latin Dictionary*, which first appeared in 1879 and is always my main authority on the meaning of Latin words. I have also made extensive use of the *Oxford English Dictionary* in its latest online edition in order to ensure that, when hesitating between many English synonyms, I will select one that was in use among scientists in England during the 17th and 18th centuries, as it has been my constant ambition to give my translation the air of being contemporary with Artedi himself. Three technical terms, apparently of Artedi's construction, are retained in an anglicised form: *cathetoplateous* ('compressed'), *plagioplateous* ('depressed'), and *branchiostegal* ('pertaining to the membrane which protects the gill chamber').<sup>21</sup>

Peter Artedi was a competent Latinist who wrote brisk, grammatically correct statements on his practical observations and theories, his prose style using few verbs but many genitives and ablatives; his sentence structure may appear to favour long periods, but a closer inspection shows they often consist of a string of main clauses, often with one subordinate relative clause, each of which serves the grammatical function of an attribute of many words. The word order is highly regular, with the sentence subject leading the clause and the predicate finishing it; failed concords between a noun and its attribute or predicate more often appear as misprints rather than failures of Artedi's; his Latin vocabulary is that of the ancient Roman authors, much conditioned by his medical training, with a large sprinkling of Latinised Greek words, many of his own construction. This is not literary Latin, which put a premium on the variety of constructions and words; instead, there is generally only one word for each anatomical part of fishes and the sentence structure is somewhat monotonous. All these features are faithfully, and with few exceptions, represented in my translation. A fuller discussion on Artedi's language is given below.

---

<sup>21</sup> *Oxford English Dictionary*, online ed., s.v.

### 3. Peter Artedi's life and surviving works

By Hans Aili

#### Peter Artedi's life

##### Family

Petrus Arctædius, who was eventually to change his name to Peter Artedi, was born on 27 February<sup>22</sup> 1705, into a family then living in the hamlet of Anundsjö, province of Ångermanland, Sweden. Petrus Martini, his paternal grandfather, was the son of a farmer residing in the parish of Hiske, nowadays part of the city of Umeå, since 1637 capital of the northern province of Västerbotten on the shore of the Gulf of Bothnia. 'Martini' here is not a proper family name but a Latin patronymic: 'Martin's son'. Petrus Martinsson did not stay true to his origins. Like many other Swedish young men of the peasant estate he found a successful way to better himself socially: he managed to enrol at the recently founded Royal Academy of Åbo/Turku,<sup>23</sup> on the east, that is, Finnish coast of the Gulf of Bothnia, and win the academic degree necessary for taking cloth as a minister of the Church of Sweden. According to the fashion of his time he marked his rise on the social scale by adopting a Latinised surname, spelled Archtædius, and crowned his career by being appointed vicar of the parish of Nordmaling in the province of Ångermanland.

---

<sup>22</sup> Julian calendar, which is 11 days behind the Gregorian.

<sup>23</sup> During its century as a great power (1611–1721), Sweden had five universities: Uppsala (founded 1477), Dorpat (1632, now Tartu), Åbo (1640, now Turku), Greifswald (1456, Swedish since 1648), and Lund (1666); after 1815, only Uppsala and Lund remained within the national borders. The Academia Aboensis enjoyed six or more decades of flowering, until the Russian incursions during the Great Nordic War (1700–1721) compelled a temporary relocation of its activities to Stockholm. After the peace of Nystad in 1721, the Academy saw a new period of flowering; Finland became a grand duchy within the Russian empire and the Academy was removed to Helsingfors/Helsinki to become the University of Helsingfors. See Lindroth 1975, *Stormaktstiden*, pp. 15ff.

---

#### How to cite this book chapter:

Aili, H. and Pietsch, T. W. 2024. *Peter Artedi: Reformer of 18th Century Zoology Volume I. Peter Artedi's Life and Works*, pp. 25–115. Stockholm: Stockholm University Press. DOI: <https://doi.org/10.16993/bcm.d>. License: CC BY-NC 4.0

Petrus Martini's son, Olaus Petri, followed in his father's footsteps by studying at Academia Aboensis but modified the spelling of his surname as Arctædius; he was also ordained as a minister and eventually succeeded his father as vicar of Nordmaling. His wife was Helena Sidenia; the couple had five children but only three survived into maturity: Anna Maria (b. 1703), Petrus (b. 1705), and Elisabeth (b. 1710). Olaus was then curate at the inland parish of Anundsjö, province of Ångermanland. The church is situated on River Moälven between two sizeable, longish lakes: Gensjösjön and Anundsjön. Moälven runs through the coastal city of Örnsköldsvik before reaching the Gulf of Bothnia. During the first 11 years of his life, Petrus Olavi, the grandchild of Petrus Martini, lived in a region that was then, as now, rich in lakes and running waters,<sup>24</sup> and enjoyed plenty of opportunities to begin his life-long interest in fishes. After the move to Nordmaling, lying on the Gulf of Bothnia, Petrus Arctædius could move on to study the fishes of its briny, or at least brackish waters.

### Childhood and education

Petrus Arctædius's childhood and early youth were spent in the shadow of the Great Nordic War, which had started in 1700 when a coalition of three kingdoms, Denmark, Saxony, and Russia, jointly attacked Sweden, with its young King Charles XII. A few years of brilliant Swedish victories followed, whereby Denmark was immediately forced out of the war, the Russian investment of the border fortress of Narva was turned into a major defeat, and the Saxon invasion of Riga was turned back and the Saxons repeatedly defeated on Polish territory during a campaign that lasted nearly seven years. During the king's campaign in Poland, however, the Russians under Czar Peter invaded the easternmost Swedish territories of Livland, Carelia, and Finland. Finland suffered grievously in this conflict, as the Finnish troops, held to be the crack units of the Swedish army, were busy far away, fighting with the king but leaving their own country and the other Baltic provinces weakly defended—Czar Peter actually started building St Petersburg, his future capital, on recently captured Swedish territory on the River Nyen (Ru. Neva) as early as 1703. During the years 1719

<sup>24</sup> Owing to the steady rising of the land since the melting of the inland ice, effective in most of the Scandinavian Peninsula, the contours of its coastline have changed considerably. Along the coast of Västerbotten, close to Artedi's childhood home, the rise is about 7 millimetres yearly. Many of the present-day lakes were then bays of the Gulf of Bothnia (Source: Sw. Wikipedia: Landhöjning).

to 1721, two Russian fleets—the High Sea Fleet of some 30 ships of the line based at Reval and the Galley Fleet of about 140 galleys based at Åbo/Turku (both nominally Swedish towns)—repeatedly attacked and plundered towns, villages, and farms along the Swedish coastline; the coasts of Västerbotten and Ångermanland were particularly invested during the summer of 1720 and 1721, when the towns of Söderhamn, Hudiksvall, Sundsvall, Härnösand, Piteå, and Umeå were ravaged. In June 1721 the vicarage of Nordmaling was burned by the Russians and the Arctaedius family was made homeless. Peace did not come until the Treaty of Nystad was signed on 30 August 1721.

During these troubled times, Petrus received his first schooling from his father, but in 1721, at the age of six, he started his formal school education by enrolling at the Cathedral School of Härnösand, then the northernmost seat of learning in the Swedish realm, offering the full course of studies comprising eight years of Trivial School and four years of *Gymnasium*.<sup>25</sup> Petrus was clearly a very gifted scholar: at the age of 11, he was admitted directly into the second grade of the Trivial School, *Alphabetica* Upper, later also skipping *Syntactica* Upper and finishing with the two one-year classes of *Conrectoris* and *Rectoris*. He then took the two first years of *Gymnasium* studies before being demitted with *summa cum laude* and admitted, at the age of 19, to Uppsala University.

Petrus Arctaedius did not follow his grandfather and father by enrolling at Academia Aboensis. Instead, he found his way to Uppsala, where he enrolled for the autumn term of 1724. He was to stay there for nearly ten years.

### A decade at Uppsala University

The Swedish universities of Artedi's time held tenaciously to the medieval course of studies. The Faculty of Philosophy provided the basic curriculum that all students had to follow for six years of attending lectures, giving orations in Latin, composing Latin poetry on significant

---

<sup>25</sup> 'Trivial' refers to the medieval school system, where the lower school, *Trivium*, taught grammar, rhetoric, and dialectic. In Sweden, after the Reformation at the middle of the 16th century, the entire school system came under the Crown, although the medieval organisation was preserved and trivial schools remained part of the cathedral schools in the old diocesan towns, Härnösand being the northernmost of them. The Trivial School of Härnösand was founded in 1640, the *Gymnasium* in 1648. Source: Sw. Wikipedia: Härnösands gymnasium.

events,<sup>26</sup> and at disputations defending and opposing academic theses, the final one being named *disputatio pro exercitio*. As *candidatus philosophiae*, the graduate student could then continue at one of the three higher faculties: theology, medicine, and law, finishing his three years of study there by defending a *disputatio pro gradu*, the text of which could be written by himself or (very often) by his professor. The grade awarded after these nine years was *magister philosophiae*. At Uppsala University this onerous programme seems not to have been adhered to very strictly in practice;<sup>27</sup> instead, students usually aimed directly for the degree of *magister*, which was also the highest degree that could be taken at a Swedish university. For the doctor's degree, ambitious graduates had to go abroad, mostly to Germany and Holland.

Petrus Arctaedius studied at Uppsala University for nearly ten years, from 30 October 1724 to the end of July 1734. His activities during these ten years are mostly documented by records made at Ångermanland Nation,<sup>28</sup> founded in 1646. The records have very little to say about Artedi's formal activities, which appear, indeed, to have been somewhat informal. Instead of spending six years at the Faculty of Philosophy, after only two years he advanced to the Faculty of Medicine, receiving a *stipendium regium* there in December 1726. We may assume, although no records exist to attest it, that he attended the lectures given by the two professors responsible for the teaching of science, Olof Rudbeck the younger (1660–1740) and Lars Roberg (1664–1742). Both, however, were ageing and failed to uphold the academic standards expected by Artedi. Rudbeck's series of lectures on ornithology, attended by both Artedi and Linnaeus, appears as a shining exception. The compulsory academic exercises, the writing of occasional poetry, holding orations, and defending theses, all of which Artedi must have performed, have left no documentary evidence in the university archives or library: only the records of the nation offer the information that Artedi was appointed opponent on Professor Lars Roberg's dissertation *De piscibus*, and also appointed *opponens* and *praeses* of dissertations at the nation, where he also, for 15 months, held the position of *curator*. The only formal examination recorded was for the *testimonium academicum*, a theological examination compulsory for all students and graduates planning to go abroad.

<sup>26</sup> For the various kinds of occasional poetry written by undergraduates of Uppsala University, cf. Ström 1994.

<sup>27</sup> Lindroth 1975, vol 2, *Frihetstiden*, p. 33.

<sup>28</sup> Amalgamated in 1827 with other nations of the northern provinces into Norrlands Nation, its present-day successor.

## A tale of friendship and competition

Peter Artedi and Carl Linnaeus met each other for the first time, on Linnaeus's initiative, very soon after Artedi's return from Nordmaling after his father's death, that is, in late March 1729. Linnaeus furnished us with the only known description of Artedi's physiognomy and personality, so, even if the following passage was written in 1738 and only from memory, this is all we have. Linnaeus had moved from Lund University to Uppsala in 1727, intending to study medicine and natural history. When asking which student's scientific bent was superior to the others', he invariably received the answer: Peter Artedi's.

I entered Uppsala from the Gothic Academy of Lund planning to work in Medicine, and when I asked who, among the students, excelled above the others, Petrus Artedi by general consent came as an answer to my questioning, famous among all thanks to the glory of his learning and desire of knowledge. I therefore burned with a great desire to enter into a friendship with this young man of such a fertile intellect. My friend had, however, just before my arrival, received the sad news of his Father's fatal illness, and therefore crossed the Baltic Sea in greatest haste in order to seek his parental *Lares* and satisfy his dying father's final wishes. Having fulfilled these duties to his father to the best of his ability, he returned to Uppsala; barely had the news of his return reached me, before, on the following day, I visited him. I found him to be of a very noble stature, a lean body, long black hair, in his looks quite like John Ray (according to a portrait), very humble of soul, but furnished with a sense of judgement, not precipitate but nonetheless quick, at the same time firm and mature, of an old-fashioned virtue and trustworthiness. I was pleased by our conversation, which immediately turned to Stones, Plants, and Animals. I was captivated by his many careful observations which he, even at our first meeting, did not hesitate to share with me. I desired his friendship, and he did not reject me but promised mutual services and also performed them. We cultivated this sacred friendship during seven full years at Uppsala, always in the same faith, nay, with a fervour that grew day by day; he was the most intimate friend I had, and I was the same to him.<sup>29</sup>

<sup>29</sup> Linnaeus, *Vita Petri Artedi* p.3. Summo itaque flagrabam desiderio ineundi cum juvene felicis adeo ingenii amicitiam. At vero Hic Meus brevi ante accessum meum, accepto tristi nuntio de lethali Parentis sui morbo, patrios lares trajecto mari Bothnico petierat, ut qua posset alacritate ultimis moribundi patris satisfaceret desideriiis. Hisce, quæ patri præstare poterat, officiis peractis redit Upsaliam. Vix vero de Ejus adventu ad me perveniebat nuntium, quin statim die sequenti ad eum adirem; quem videbam statura proceriori, corpore macilento, crinibus longis nigris, facie Joanni Rajo sat (ex pictura) simili, animo subjectissimo, at judicio licet non præcipiti, prompto tamen, firmo simul et maturo.; antiqua virtute et fide.



It is difficult to form a mental picture of Peter Artedi's appearance by reading Linnaeus's description. Portraits of John Ray appear to focus on his arching eyebrows, his very long and somewhat hooked nose, and his blue eyes, and we might suppose that Artedi's face shared those characteristics. Artedi was also of slender build, possibly slightly taller than Linnaeus himself. He was fast-thinking and observant, yet always methodical and steady and faithful in his friendship. Linnaeus confessed to a very different character, and it is tempting here to find indications of the differences that would eventually grate on their friendship:

How often did we, with equal joy in our hearts, admire how the first gems of our friendship poured forth, how often did we rejoice at the joining of our minds! Nay, even the diversity of inclination that existed between us excited the propensity of our minds towards our chosen specialities. He was of a much humbler mind, more severe and attentive, slower in observation and everything else, but more accurate. It quite often happened that I was too quick to praise a decision to perform some tasks, and it quite often happened that he laughed at his friend who in his eagerness had been carried away in some direction, because his earlier duties had slipped from his attention, but then returned to them. Unavoidably therefore, our envy brought forth a certain noble child, a companion to our competition.<sup>30</sup>

Linnaeus's style is highly rhetoric, with a very complicated sentence structure, giving the reader the impression that Linnaeus was struggling through a thicket of conflicting feelings; his deliberate use of the imperfect tense to describe actions, and of the perfect tense to carry on the narrative, difficult to render in translation, is also suggestive of some feeling on Linnaeus's part, one that was permanently smouldering in the background; so is the use of the words *invidia* and *aemulatio*, which

---

Colloquia nostra illico directa ad Lapides, Plantas et Animalia lætabar; ego captus tot Ejus observatis curiosis, quæ vel prima vice mecum communicare non dubitabat. Ejus amicitiam desiderabam, quam nec recusavit sed mutua officia promisit, præstitit. Colimus hanc sancitam amicitiam per septem integros Upsaliæ annos, eadem semper fide sed fervore in dies semper aucto; fuit ille mihi intimus, quem habui, fui et ego ipsi.

NB: All translations from the Latin are my own.

<sup>30</sup> Linnaeus, *Vita Petri Artedi* p. 4: Quanta sæpius mutuaque animi oblectatione primas nostræ amicitiaë propullantes gemmas admirabamur! Quam gratam animorum nostrorum lætabamur conjunctionem! Immo et ea, quæ inter nos intercedebat inclinationis diversitas, excitabat conceptam animo ad res nostras propensionem. Ille animo magis demisso, magis severo et attentiori, ad observationes et omnia lentior sed accuratior erat. Me laudare promptius in rebus peragendis consilium, illum impetu ad quævis delatum, sed ad pristinas iterum curas redeuntem, quod mente exciderant, amicum ridere dum sæpius contigit. Non poterat non oriri inde nobilis quædam invidiaë soboles æmulationis nostræ comes.

do not always carry a positive connotation. These passages, of course, offer us no information on Artedi's own feelings towards Linnaeus.

### A scandal caused by alchemy

In the beginning of the autumn term of 1732, a scandal broke out at the Faculty of Medicine, caused by the publication and presentation by Lars Roberg on 15 November of one of a series of theses, printed at Uppsala and innocently entitled *Theses miscellanæ disceptatæ coram alumniis regiis, magnatum aliorumque civium* ('Miscellaneous Theses Discussed in the Presence of the Royal Alumni, Sons of Magnates and Other Citizens').<sup>31</sup> The thesis in question, *CLIII Aphorismi chemici, ad quos quidquid est scientiæ chemicæ commode referri potest*, is in reality a Latin translation, originally by one Eremita Suburbanus, of Christopher Packe's *One Hundred and Fifty Three Chymical Aphorisms*. The Faculty of Theology, realising that the thesis dealt with alchemy, strongly disapproved of it and roundly, albeit in a friendly fashion, gave Professor Roberg a formal *censura* for his attempt to suborn and disturb the academic youth. The faculty requested that the archbishop of the Church of Sweden, resident at Uppsala, and the *procancellarius* of the Academy should prevail upon the *rector magnificus* of the university to prohibit the printing of this work, or at least limit its accessibility. The *censura* emphasised that King Charles XII, on 2 November 1717, had proscribed all writings on alchemy. The faculty not only quoted the Protestant authority Philip Melancthon (*Est sophistica quædam impostura*: 'It is a kind of sophistic deceit') but also Petrarca (*Mentiendi et fallendi ars*: 'The art of lying and deceiving'), among a number of authorities who had condemned the study of alchemy.

Artedi's burning interest and considerable competence in alchemy are many times attested by Linnaeus in his *Vita Petri Artedi*, when expounding on their fierce competition: *Hinc, cum in alchemicis me tantam, ad quam ille jam pervenerat, cognitionem consecuturum desperabam, totus ab ea destiti* ('Hence, when I despaired of reaching knowledge in alchemy as wide as that he had already gained, I entirely gave up this subject').

<sup>31</sup> Uppsala University Library, cf. Lidén, 1788, p. 394: In Octavo. 2. *Theses chemicæ disceptatæ coram alumniis regiis, magnatum aliorumque civium* Anno 1732, die 15 Novembris. Upsaliæ. 2d: *CLIII Aphorismi chemici ad quos quidquid est scientiæ commode referri potest: concinnati Opera et Studio Eremitæ Suburbani, juxta exemplar Amstelædami apud Janssonio-Wæsborgios, anno MDCLXXXVIII impressum, Upsaliæ denuo editi 1733*. This appears to be a reprint, with *Censura* added on pages 19 to 20, of Roberg's copies.

The Faculty of Theology did not mention Artedi by name, but we may assume that this scandal was in some measure a consequence of his great interest in the subject. The publication of the thesis may well have taken place on his initiative and accepted by Roberg out of respect for his ambitions. The theologian censure coincides in time with Artedi's losing his financing through the *Stipendium regium*; he was, however, appointed *curator* of Ångermanland Nation in December 1732 and held that title for 18 months, leaving it at the end the spring term of 1734. The *curatela* was, and is, the highest office in a Swedish university nation. During his two final years at the university, Artedi appears to have been more closely tied to his nation than to the university.

### Leaving Uppsala University

Artedi left the university for good in the summer of 1734 after nearly ten years of study, without having taken any documented academic degree at all. The records of the Faculty of Theology for 17 July 1734 say: 'Dn. Petrus Arctedi Med. stud. peregrinaturus examinerad' ('Mr. Petrus Arctedi, Medical student intending to go abroad, examined'), and two weeks later, on 31 July, the records of the *Consistorium Academicum* note in paragraph 6: *Resolverades at studiosus medicinae Petrus Artedi Angermannus får testimonium academicum, ärnandes han sig utomlands, sedan han blifwit efter förordningen in Theologia examinerad* ('Resolution taken that *studiosus medicinae* Petrus Artedi shall receive *testimonium academicum*, as he intends to go abroad after having been examined in theology according to statutes').<sup>32</sup> We note that he was still called *dominus*, not *magister*, and *studiosus medicinae* is not an academic degree but only an indication of his area of studies. No information is offered on the level he had reached in his progress towards a formal recognition as a medical practitioner.<sup>33</sup>

Artedi's sentiments after spending ten years at Uppsala University, and eventually finding all financial sources exhausted, are succinctly but indirectly described by Linnaeus:<sup>34</sup>

<sup>32</sup> Both quotes taken from Lönnberg (1905, 15).

<sup>33</sup> As Lindroth points out, Sweden was still, during the first half of the 18th century, an undeveloped country when it came to medical practice and hospital care: a major part of medical practice still remained in the hands of barber-surgeons lacking formal medical training (*Frihetstiden*, pp. 414–15).

<sup>34</sup> *Vita Petri Artedi*, p. 6: Doluit hic meus se integros decem annos in eadem Academia consumsisse, studio qui erat addictus, cujus objecta per totum orbem essent dispersa doluit sibi vix amplius sufficientes superesse pecunias, quibus exteras adire posset Academias.

My dear friend grieved that he had spent ten solid years at one and the same Academy, in the studies to which he was devoted, although its objects were dispersed all over the world; he grieved that he had now barely enough money to enable him to go away to approach foreign Academies.

Linnaeus paints a somewhat dramatic picture. As we have seen, the extant records show Artedi's real situation: from 13 December 1726 to the end of December 1732 he enjoyed the benefits of a *stipendiatus regius*; from December 1732 to 27 May 1734 he held the (probably salaried) position of *curator* of Ångermanland Nation. After these seven years, his hopes of a remunerative position at Uppsala University were dashed, and he consequently made up his mind to go abroad, supported by money from his two brothers-in-law. This is not the picture of an academic suffering the hardships of absolute poverty but rather that of a situation well known by many Swedish graduates: sooner or later, the time comes for the student to find a salaried position outside the academy. In his desire to continue his formal studies abroad and taking the degree of *doctor medicinae* at a Dutch university, Artedi appears to be a fairly normal Swedish medical student of his time, albeit lacking a formal degree and secure financial resources.<sup>35</sup>

After receiving his *testimonium academicum*, the document that made him a legitimate citizen of the academic world, on 31 July, Artedi made ready to proceed abroad, supported by financial aid from his two brothers-in-law. He also met Jacob Serenius, vicar of the congregation of the Swedish Church in London, then on home leave. This benevolent clergyman wrote a letter, dated 26 October 1734, to Sir Hans Sloane, at the end of which Serenius provided a recommendation of Petrus Artedi.<sup>36</sup> Nybelin comments (1966, 16) that the wording of the letter makes it clear that it was committed to Artedi's care, to be handed over personally to Sloane.

In *Vita Artedi* Linnaeus states that Artedi *ascendit itaque sub initio Septembris navem, discedit Holmiae Londinium Anglorum* ('at the beginning of September boarded a ship, departed from Stockholm to London, England').<sup>37</sup> The discrepancy between this date for the start of

<sup>35</sup> Lindroth, 1975, *Frihetstiden*, devotes some eighty pages to the history of medical studies and practice in Sweden during the 18th century; pages 437 to 442 describe the peregrinations of Swedish medical practitioners.

<sup>36</sup> This letter was found by Orvar Nybelin, in April 1959, in the Sloane collection of letters in the British Museum; it is written in English and was published by Nybelin (1966, 23ff.)

<sup>37</sup> It was common practice among scholars from Lund University, Linnaeus among them, to make it clear that London, England, was indeed *Londinium Anglorum*,

Artedi's voyage and that of Serenius's letter is very difficult to resolve, unless it can be seen as a slip of memory on Linnaeus's part: after all, he wrote his *Vita Artedi* in 1738, more than three years after the event.

### England: a successful visit

We do not have any details of Artedi's voyage down the Baltic and across the North Sea but, whatever ports Artedi's ship called along its way, Artedi's own note makes it clear that he reached London in November, where he examined a Greenland whale, as he stated in *Ichthyologia*, Part III *Genera piscium: Ex observatione propria, Londini 1734, in Novembri* ('From my own observation in London, November 1734'). In Part V *Descriptiones*, pp. 106ff., he offered a detailed description of the same whale, in 12 numbered paragraphs.

Nybelin (1966, 106ff.) diligently sought out the places, taverns, and people Artedi mentioned in *Genera piscium* and *Descriptiones*, and his account of this exploration offers tantalising glimpses into Artedi's movements and social life during his eight months in London. Artedi named two Englishmen he met: Sir Hans Sloane and James Salter, owner of Don Saltero's Coffee House in Chelsea. This was famous for its great collection of natural curiosities exhibited on its walls—Salter eventually published a catalogue of his collection.<sup>38</sup> Artedi also mentioned a compatriot: one, Mr Lillja, whom Nybelin identified as Lars Lilja (d. 1744), member of the Swedish congregation in London, landlord of the King of Sweden tavern in Fox Lane, and resident at Joseph's Lane and Pelican Stairs, Shadwell. Nybelin suggested that Artedi, too, was a resident of Shadwell, close to the fishermen's landing places.

Artedi also mentioned other places, in those days mere villages outside London city: besides Chelsea and Shadwell, he found specimens of fishes in Stepney and Stratford. He found them not just in fish markets and in fishing boats but also in taverns. He named (with various spellings) the Nag's Head Tavern, the White Bear, the Green Dragon in Stepney, and the Spring Gardens (a public resort demolished in 1828). Nybelin also noted that Artedi, in *Idea institutionum trichozologiæ*, added descriptions of four species of mammals he had observed in London: a panther, a leopard, two tigers, and a hyena (see Pietsch and

---

'London of the Englishmen'. Cf. Helander, 2004, p. 259. The myth seems to be that King Cnut the Great, from 1018 King of Denmark, England, and Norway, had exalted the town of Lund (founded 990) in *Scania*, the then Danish province of Skåne, to be one of his two capital cities: *Londinium Anglorum* and *Londinium Scanorum*.

<sup>38</sup> Salter, c.1750.

Aili 2023b, 2023c). The latter two species he had seen at 'Morefield' (now Moorfields), a popular park situated just north of the City of London.

Two observations Artedi made in *Genera piscium* (pp. 56 and 60), finally, give us two different dates and places: *Vidi in museo Hans Sloane die 15 Maii 1735* ('I saw this in Hans Sloane's Museum on the 15th day of May 1735') and *Vidi in oppido Stratford Angliæ die 2 Pentecostes, 1735* ('I saw this in the town of Stratford, England, the second day of Pentecost,<sup>39</sup> 1735'). Whether the former date indicates Artedi's first visit to Sloane's Museum or just puts a date on a find of his during one of his habitual visits is unclear.

Even though the evidence concerning Artedi's stay in England is limited, it appears that his manuscript on the fishes of the Baltic Sea was favourably received by Sloane and retained in his library, that he did enjoy Sloane's hospitality, and probably that of other members of the Royal Society, and that his work on *Ichthyologia* and *Trichozoologia* was much furthered by the observations he made during his stay.<sup>40</sup> The fictitious episode recounted by John Hill, in his novel of 1751, *The Adventures of Mr. George Edwards, a Creole*, and the admiring comments offered Artedi by Patrick Browne in Chapter 2 of *The Civil and Natural History of Jamaica* of 1757 (see Pietsch and Aili 2023d) are proof that Artedi's name and achievement were not quickly forgotten in England—this will be further discussed below.

### Holland: the end of the road

Petrus Artedi left England in June 1735, probably cherishing fond memories of his fruitful stay. He arrived in Leiden at the end of June, visiting Boerhaave's Arboretum and renewing his friendship with Linnaeus. Artedi afforded us a rare insight into his feelings and conditions at this time through a letter<sup>41</sup> he wrote to his mother and sister. Along with the manuscript of *Catalogus*, it offers us an opportunity to study his handwriting. Here he mentioned his quick passage from England to Holland, some problems with cashing a promissory note from his Swedish relatives,

<sup>39</sup> According to Cappelli (1983, 74), Easter in 1735 was on 10 April and Pentecost on 29 May. If Artedi followed the ancient Roman inclusive reckoning, the second day of Pentecost would be 30 May; if not, 31 May.

<sup>40</sup> The investigation on the impression he made on the English scientists should be continued by archival studies in England of material not yet digitised, such as the Proceedings of the Royal Society for the year 1735, and collections of private letters by members of the Royal Society (and their spouses).

<sup>41</sup> Stockholm, Royal Library, ms. X 1002.

his travels in Holland, mentioning Rotterdam, Delft, Leiden (although there is no mention of meeting Linnaeus), Harlem, and Amsterdam. He then stated that, immediately upon arriving in Amsterdam, he heard a lot of talk about an apothecary (that is, Albertus Seba) occupied with the publishing of a large work on natural history. This learned man interviewed Artedi, discovered his ichthyological expertise, and persuaded him to remain in Amsterdam in order to provide descriptions on Seba's collection of East Asian and American fishes (a subject Seba knew nothing about, as Artedi notes).<sup>42</sup> Artedi accepted the task on the condition that he should be named *auctor*. At the time of writing his letter, Artedi had prepared accounts of more than a hundred fishes and reckoned that he had about 50 more to go. By performing this work, he said, he had gained more knowledge about the rare and curious fishes of Ambon, the East Indies, Suriname, and America than anyone who had travelled all through Europe. He estimated the time before completion at some three weeks. After describing the two tomes of *Thesaurus* that were already printed and noting that the Queen of Sweden had already purchased them for her library at Drottningholm Palace, he went on to mention that he did not yet know what remuneration he could expect for his work. He did not think it politically wise to negotiate his financial reward with a man so renowned and fortunate until he had fully demonstrated his own capacities. In Holland he had not found anyone whom he could call his master, and he trusted that Seba would prove himself generous. Until that time, he had to endure in penury. Artedi once more expressed his gratitude for the promissory note received but admitted that most of the money had been spent on the voyage from England and the cost of living in Holland. He could not now afford to improve himself even by buying new clothes. He commented sadly on the evil conditions that a man had to suffer, if without a standing in the world. He assured his family that he did not beg them for a new promissory note but mentioned a certain Brenbom,<sup>43</sup> a compatriot whom he had failed to locate in Amsterdam. The cost of lodgings was lower in Holland than in England but food and drink more expensive, and the Dutch were not as nice, on a personal level, as the English. He asked his family to write to him in Leiden, where he had a friend<sup>44</sup> who could receive their letters in his absence. Artedi

---

<sup>42</sup> Artedi's description of the beginnings of this acquaintance agrees, on the whole, with that given in *Hamburgische Berichte* 1736 reported from Amsterdam on 4 May (see below, section *Post mortem*).

<sup>43</sup> The identity of this person has not been established.

<sup>44</sup> Possibly Claes Sohlberg, who was in Leiden at that time.

offered no information as to the identity of that 'friend' in Leiden, itself a rather curious reticence, as his family would have found it difficult to address their letters.

Linnaeus recorded one meeting with Artedi late in September and hinted at a previous one on 23 July (new style). These were the two occasions when Linnaeus expressly gained acquaintance with the work Artedi had done since their separation in the summer of 1734. The first meeting gave Linnaeus reason to praise Artedi's work, but the final meeting seems to have been a source of irritation no less than of information.<sup>45</sup>

As soon as my *Fundamenta Botanica* were published, I went to Amsterdam, and shared this work with Artedi.<sup>46</sup> He then insisted on showing me his *Philosophia ichthyologiae*, and in my presence tried to read through all of it, written to its end in its final version, and he would not let me go, although I was then much occupied with other affairs, before I had examined all his works on ichthyology. This he did in order to hear in which respects I would disagree with him on his systematic laws, and then he would defend his opinions energetically against my few objections. He said he intended to publish his works before he sought his fatherland, and he would do this as soon as his work for Seba, God willing, was finished, in order then to be able finally to order, describe, and polish everything. I bade my friend farewell: he then tried to show me all his observations, all his manuscripts that I had never, until that time, seen, despite being his closest friend. But then he had detained me much too long and much beyond my patience, quite against the method we usually observed. But if I had known that this was to be our very last conversation, I should have desired a far longer one.

---

<sup>45</sup> Linnaeus, *Vita Artedi*, p. 8: Quam primum Fundamenta mea Botanica edita erant, Amstelædamum peto, eaque cum Amico communico. Ostendebat mihi tum suam Philosophiam Ichthyologiæ, quam coram me perlegebat totam, ultima manu descriptam, nec dimittebat me, aliis negotiis tum maxime distractum, antequam omnia ejus opera Ichthyologica examinavissem, ut audiret, in quibus ab eo dissentirem circa leges systematicas, ubi contra paucas meas objectiones sua strenue defendebat; dixit se prius sua editurum antequam Patriam peteret, idque quamprimum volente Deo opus Sebæ esset absolutum, ut omnia posset ultimo digerere, describere, polire; Valedico Amico, qui tum ostendebat mihi omnes suas observationes, omnia manuscripta, quæ antea licet Amicissimus vidi numquam; qui tum me nimis diu detinuerat, et ultra patientiam, contra solitam inter nos methodum. Hos autem, si ultimos scivissem sermones, longe ampliores desiderassem.

<sup>46</sup> The numerous references to *Fundamenta botanica* that Linnaeus added to various definitions and canons in Part II *Philosophia* indicate that the two friends, during their years in Uppsala, had formulated such definitions and principles together but dressed them in individual linguistic garbs when translating them into Latin. See *Philosophia*, paragraphs 190, 193, 195, 196, 198, 200, 202, 204, 218, 223, and 231, with footnotes.



Linnaeus's use of the tenses in this passage is remarkable: again, he did not describe Artedi's actions in the perfect tense, the normal one for a plain narrative, but constantly in the imperfect tense (*ostendebat, perlegebat, dimittebat, defendebat, ostendebat*), which is normally more descriptive than recounting and is often best rendered by 'would', 'tried to', or even 'insisted on'. He thus created the impression that Artedi was pathetically eager to gain Linnaeus's approval (not adverse criticism) and, possibly, his assistance. Linnaeus portrayed himself as cool and unwilling to be bothered. This cannot be seen as a description of a friendly meeting. The final sentence forms a conditional clause in the pluperfect subjunctive (*scivissem, desiderassem*), a construction that conveys the notion of impossibility and expresses a vain regret for something irretrievably lost. Inevitably, the sentence smacks of hypocrisy on Linnaeus's part.

This passage appears, indeed, to be Linnaeus's version of the story of a friendship that had cooled. It has a counterpart in Artedi's letter to his family in which he did not mention Linnaeus at all. Considering their great friendship with its daily manifestations, as portrayed by Linnaeus in the *Vita Petri Artedi*, it is difficult to understand why Artedi failed to mention that he had met his dear friend from Uppsala, unless, of course, they had just realised that they were no longer friends but competitors, one successful in his Dutch connexions, the other still striving to find his place in that community.

On the evening of 27 September 1735, Artedi was invited to a convivial session at Seba's house and took his departure only late at night. Our only source to what happened at this dinner party and its fatal sequel is Linnaeus's report in his *Vita Petri Artedi*. It is written in a highly rhetorical style, more like a that of funeral oration than the account by an eyewitness appearing in a court of law. Linnaeus probably strove to achieve the latter impression. As he admitted that he himself was then at Hartekamp, we are tempted to believe that he reported the words of his young assistant, Claes Sohlberg, whose presence at the dinner is never clearly stated but discreetly suggested by Linnaeus.<sup>47</sup>

<sup>47</sup> Linnaeus, *Vita Petri Artedi*, pp. 8–9: Paucis ab hinc diebus, die vigesima septima Septembris 1735, vocatur ex hospitio suo, ut cum Seba coenam sumeret; confabulantur amici plures in seram noctem, tandem lætus et contentus valedicit, domum tendens per tenebricosas minusque ipsi cognitatas plateas Amstelædamenses, dum infelici passu fossam intrat, decedit, clamat, frustra opem petit, submergitur, perit. Sic occidit, corpore adhuc sano in florentissima ætate, nationis suæ decus et ornamentum! Defloruit sic præcoci fato ingenium hoc seculare! Sic in aquis destruitur Ichthyologorum longe Princeps, in aquis, qui suas per vitam quæsierat delicias! Invident sic orbi erudito Ichthyologorum quem a condito orbe videre mortales summum fata adversa! Altero

A few days later, on the twenty-seventh day of September, Artedi was called from his lodgings in order to partake dinner with Seba; many friends confabulated there into late at night, but eventually he bid adieu, merry and satisfied, directing his way towards home along shadowy Amsterdam streets, not very well known to him. Then with an unfortunate step he goes into the canal, falls down, cries out, shouts in vain for help, sinks, dies. So did he die, his body still healthy, in his most flowering youth, his nation's honour and ornament! So did he wither through a premature fate, he, the genius of his generation! So did the greatest Prince of Ichthyologists perish in the waters: in the waters, from which, all through his life, he had sought his pleasure! So did an adverse fortune grudge the learned world the greatest ichthyologist mortal men had seen since the world's creation!

On the following day<sup>48</sup> he was found dead; he was carried to a hospital in Amsterdam; and the day after that I received from my compatriot, Claes Sohlberg, the very sad news of my friend's unexpected death, and I hurried from the garden of Hartekamp to Amsterdam.

It is difficult to render faithfully the full rhetorical colouring of Linnaeus's description of Artedi's demise, with the exception of his use of the historical present tense for the narrative (often used to bring the reader closer to the action), and a stylistically advanced double tricolon: 'he walks into the canal, falls down, cries out, shouts in vain for help, sinks, dies'. We note that the first limb of the first tricolon (in Latin) is longest, with ten syllables, while the two following fade ominously, containing only three and two, respectively; in the second tricolon the first limb is again longest, with six syllables, while the two following fade away with four and two respectively. In the second tricolon, composed of *sic—sic—sic* ('so', 'so', 'so'), each limb offers a longish following passage. The dramatic repetition of *in aquis* ('in the waters') emphasises the tragedy. This will give an idea of Linnaeus's flowery prose. The whole story was, of course, pure fabrication. Linnaeus by his own admission was at Hartekamp at that time. A suggestive hint is given in his diary for 27/28 September: *hora I noctis drunknade Artedius uti Amsterdam* ('at 1 o'clock at night Artedi drowned in Amsterdam').<sup>49</sup> One may wonder

---

abhinc die reperitur demortuus, in nosocomium Amstelædamense portatur et ego tertio die per Conterraneum meum Cl. Sohlberg de Amici inopinata morte tristissimum accipiens nuntium ab horto Hartecampensi Amstelædamum peto.

<sup>48</sup> Literally 'On the second day thereafter'. Linnaeus makes use of the ancient Roman inclusive reckoning, which takes account of both the day an event occurred and the following day; hence, the second day is actually the day after the event.

<sup>49</sup> Uggla (1935, 148).

at this precise statement. Nobody, except an eyewitness or an assassin, could have known the exact time of Artedi's death. And, if this person was only an innocent eyewitness, why did he not try to save Artedi?

Two phrases in Linnaeus's account contrive to suggest that Artedi's death was accidental: *infelici passu* ('unfortunate step') and *per tenebricosas minusque ipsi cognitatas plateas Amstelaedamenses* ('along shadowy Amsterdam streets, not very well known to him'). The unfortunate step is a conjecture by Linnaeus and not an unlikely one. Against his contention that Artedi was unfamiliar with Amsterdam's topography can be argued that he had walked from his home to Seba's place and back many times, but we may adduce an argument to the contrary: Artedi had, until only lately, walked back and forth during the summer;<sup>50</sup> now, the autumnal equinox had passed, it was late at night, and the streets were unlit by any lantern, and Linnaeus did not mention Artedi carrying one. A completely new situation if, in fact, the situation was aggravated by intoxication. The moon, at this moment of time, was less than full,<sup>51</sup> but its light may have cast shadows; if the sky was overcast, the darkness would have been compact. In either case, it would have been very easy for an unsteady walker to take a false step into a dark spot hiding an emptiness. The case for accident appears very strong and with no contrary evidence, excepting Sohlberg's sinister lurking in the background, it remains quite credible.

Two other hypotheses have been advanced. Pietsch (2010, 143; 2023, 177) very elegantly suggests that it was not a false step but a powerful kick that sent Artedi tumbling into the water. The identity of his assailant and his motive are not easy to pin down. Linnaeus does not mention any other participant in Seba's party by name but his account of Artedi's death gives the impression of coming from an eyewitness (if it does not merely represent a conventional picture of how an accidental drowning ought to happen). Linnaeus does mention Claes Sohlberg as the bearer of the sad news and leaves us with a vague impression that he witnessed the accident itself. The case for murder is quite strong in itself, but without material evidence and the name of a possible perpetrator it can only be put forward as a hypothesis.

Recently, a strongly formulated suicide hypothesis has been advanced by Jakob Christensson, editor of the Swedish translation of

<sup>50</sup> We have no evidence that he had walked home late at night before this time.

<sup>51</sup> The moon phase for 28 September 1735, was in waxing gibbous phase. This is the phase in which the moon is more than 50% illuminated but has not yet reached 100% illumination. Source: <https://predicalendar.com/moon/phases/1735>. I am indebted to Professor Pietsch for this comment.

*Ichthyologia*, but it is based on an unpublished work and some theorising on Artedi's state of mind, and is therefore not susceptible to critique in detail. The main argument is that Artedi was depressed and despaired of ever gaining academic recognition or financial security. This is probably quite likely, but whether Artedi's feeling of despair was strong enough to drive him to drowning himself is impossible to ascertain. As Linnaeus recounts, Artedi left Seba's party 'merry and satisfied', an expression that cannot but hint at something that happened at Seba's dinner party, but Linnaeus, not being an eyewitness, offers no explanation of Artedi's good mood. Artedi's surviving works, particularly his preface to *Ichthyologia*, offer the picture of a man made of sterner stuff, hardly one to succumb to self-pity. After all these years of unremitting work, why give up when he was so close to finishing his contribution to Seba's *Thesaurus* and receiving the monetary reward he clearly expected? That would be the financial support he required while perfecting the manuscript of *Ichthyologia*. In my opinion, Artedi's letter home is a demonstration of resignation, not despair.

### *Post mortem*

The 50 fishes that remained for Artedi to describe when he wrote the letter to his family had at the time of his death been reduced to ten, as attested by the obituary on Seba published in the *Hamburgische Berichte* of 1736. Its anonymous author spent only a few words on Seba but the major part of the two-page obituary on Artedi. It was published as a report dated Amsterdam, 4 May 1736, and covers two full pages of the *Berichte*:

Um die Mitte des verwichenen Sommers, fand sich Hr. Petrus Artedi, aus Engelland hieselbst ein, nachdem er von dem Präside der londonschen Societät, Hrn. Sloane, und den sämtlichen Mitgliedern deselben mit den grösten Lobsprüchen weggelassen und beehret worden war. Er was aus Angermannia, in Schweden, gebürtig, und wiewol er das 32ste Jahr<sup>52</sup> kaum errichtet hatte, so war er dennoch in *ichthyologicis* oder in der Kentnis der Fische so vortreflich geübt, daß er seines gleichen darin noch nicht gehabt hat, und schwerlich haben wird. Weil er ganzer zehn Jahre nichts anders getahn hatte, und daß er diesen Teil der Naturlehre untersuchte. Sobald Herr Seba mit diesem Man in Bekantschaft geriet, traf er mit ihm einen Vergleich, daß er ihm seine *collectanea* von den Fischen, die er nach ihren *Synonymis* und Benennungen ordentlich beschrieben, und in gewisse *genera* und *species* eingeteilet hatte, zum besagten dritten *tomo* seines *thesauri* überlassen mögte. Hr. Artedi hatte

<sup>52</sup> Artedi was 30 years and seven months when he died.

also fast das ganze Werk, nemlich bis auf 10 Fische, zuende gebracht, wie ein unvermutlicher Unglücksfal seine Unternehmung unterbrach. Denn wie er den 28. Sept. nach eingenommener Abendmalzeit, des Abends spät, von Hrn. Seba zu Hause gehen wolte, fiel er unversehens in einen der Canäle, und muste elendig sein Leben enden. Da er ein weit längeres verdiente hatte. Nunmehr sind die nachgelassene Handschriften des Hrn. Artedi, dem sich noch hieselbst aufhaltenden berühmten Hrn. D. Linnaeo zur Herausgabe und völligen Ausarbeitung übergeben worden: welcher dieses Werk aber bereits so vollkommen findet, daß er darüber erstaunet, und gegen verschiedene unser Gelehrten versichert hat, daß dergleichen niemals zum Vorschein getreten sey. Der Hr. Seba hatte die von dem Hrn. Artedi gemachte Ordnung verschiedentlich geändert, welches ihn (wie er sichs denn gar kurz vor seinem Ende gegen einem seiner Freunde sehr deutlich hat merken lassen), sehr heftig sol verdrossen haben.

This extract tells us, probably mostly correctly, that Artedi had earned great respect and praise from Sloane and all the members of the Royal Society; that he came from Ångermanland in Sweden; that he had studied fishes for more than ten years; that Seba, as soon as he had made Artedi's acquaintance, arranged with him that he should assume responsibility for the third part of Seba's *Thesaurus*; that he had nearly finished this task, only ten fishes remaining to be described, when he attended a dinner at Seba's house and returned home late at night but accidentally fell in a canal; that the works in manuscript that Artedi left behind had been given to the 'famous Herr Doktor Linnaeus, still residing here' for complete elaboration and publication; that Linnaeus had assured many listeners that nothing like this had ever been brought to daylight; and, finally, that Seba had made great changes to the order Artedi had set up, a thing that (as Artedi had made abundantly clear to one of his friends, shortly before his demise) had greatly irritated Artedi. As will be clear from my edition of *Manuscriptum ichthyologicum*, in which Artedi's text can be compared with the corresponding text of *Thesaurus*, the editorial changes mainly affect Artedi's syntax and style, while the descriptions themselves are, on the whole, retained. Artedi's complaints, as described above, therefore appear somewhat out of proportion.

The article was published anonymously, but Linnaeus, a frequent contributor to the *Hamburgische Berichte*, was not averse to a little bit of self-praise, so the piece was probably by his hand; it is remarkable, however, that Linnaeus mistook Artedi's age (which he gets right in his *Vita Petri Artedi*, which he wrote from memory) and that the story of how Artedi met Seba is more in accord with Artedi's own version, as presented in his letter, than with that offered by Linnaeus in the *Vita Artedi*:

Albertus Seba, a rich old man and apothecary in Amsterdam, famous through his *Thesaurus rerum naturalium*, and renowned thanks to his enormous collection and Museum of Natural History that has no equal, had used a very rich dowry to finish and publish his two first Parts, on Quadrupeds and Serpents; for the finishing of the third Part, on Fishes, he had a short time before requested my services, as he himself was burdened by his old age, in order that I should give my assistance to the work that his devoted readers awaited. I was, however, locked up by other affairs, and was disposed now to hand over to my Friend the Spartan task I had myself abandoned; I persuaded him to come with me to Amsterdam in order to advance Seba's work, from which (as I promised him) he could expect remuneration worthy of his labour.<sup>53</sup>

We shall never know whether Seba would have honoured his promise of a generous remuneration. He did, however, contribute 50 guilders towards the cost of Artedi's funeral, a sum that failed to give Artedi anything better than a pauper's grave, but refused to help Linnaeus release Artedi's manuscripts from the landlord's possession. In this case he adduced the reason that the manuscripts would undoubtedly come up for public auction, when they could be purchased at a much lower cost than that demanded by the landlord.

The publication of *Ichthyologia* did not go unremarked by the world of learning: Jacob Theodor Klein in the very year of its printing devoted some manuscript pages to a *Brevis recensio* of *Ichthyologia*, which he sent to Sir Hans Sloane.<sup>54</sup> Two anonymous short notices appeared in *Hamburgische Berichte*, the first (1736) on Artedi's death, the second (1738) on the publication of *Ichthyologia*, which was also given short mentions in *Neue Zeitungen von Gelehrten Sachen* and *Nova Acta Eruditorum*.

In 1751, John Hill, an English botanist, journalist, author, and satirist, with the Royal Society (in which he had failed to be elected member) as his chief object of ridicule, published a satirical novel,

<sup>53</sup> Linnaeus, *Vita Artedi*, p. 7. Divus Senex Albertus Seba, Pharmacopæus Amstelædamensis, clarus ex Thesauro rerum Naturalium, Celebris ob collectionem summam et museum in Historia Animalium, cui par non exstitit, largioris fortunæ dotibus usus absolverat et ediderat duo priora volumina de quadrupedibus et serpentibus. In tertio, de piscibus tomo perficiendo operam meam paulo ante postulaverat, ut premente senectute ipsi auxilia præstarem circa exspectatum a Curiosis opus. Sed aliis tum adfixus negotiis, Spartam a me relictam jam conferre cogitabam Amico, ipsi persuadens, ut Amstelædamum mecum adiret ad Sebæ opus promovendum, unde digna labore præmia exspectanda ipsi essent.

<sup>54</sup> Theodore W. Pietsch and Hans Aili, 'Jacob Theodor Klein's critique of Peter Artedi's *Ichthyologia* (1738)', *SLÅ* 2014, 39ff.

titled *The Adventures of Mr George Edwards, a Creole*. On pages 180 and following,<sup>55</sup> its protagonist, an ambitious youth, demonstrated his ichthyological prowess to an admiring audience by examining a fish by quoting, both verbatim and in translation, passages from Artedi's *Philosophia* and *Descriptiones*, in the latter case the description of *Gadus dorso tripterygio, ore imberbi, corpore albo, maxilla superiore longiore* ('*Gadus* with three-finned back, mouth without barbels, body white, upper jaw longer'), that is, the whiting. He never mentioned Artedi's name. His audience immediately proposed the protagonist for a member of their learned society, 'and their utter Unacquaintance with the Authors who treat on these Subjects, gave them no Idea that one Petrus Artedus had talked much to the same purpose'. This brilliant piece of satire with its off-hand reference to Artedi suggests that its author held the opinion that an intimate knowledge not only of the name of *Ichthyologia* but also of its exact wording was a prerequisite for a true man of science even in the middle of the 19th century. It is, however, very strange to find that the same author, only one year later, used Artedi's *Ichthyologia* by presenting as his own work an English translation that follows Artedi almost word by word but does not name him as the author at all (Pietsch and Aili 2023d).<sup>56</sup>

## The works of Peter Artedi

### Surviving works

Peter Artedi's scientific production in Latin, extant in manuscript form, comprised at his death quite a large number of works, most of which were kept in his lodgings. The works that were found in his rooms, listed by Amsterdam's notary public and still extant, are *Ichthyologia* and *Trichozoologia*. *Manuscriptum ichthyologicum* had been composed for volume 3 of Albertus Seba's *Thesaurus*, and the resulting unfinished manuscript was in Seba's possession; the surviving manuscript is a copy made by Seba's son-in-law, Roeland Willem van Homrigh (1711–1801). *Catalogus piscium maris Balthici* is an autograph preserved by Sloane and held by the British Library.<sup>57</sup> The inventory made by the notary also enumerates *Manuscriptum thunense*, *Manuscriptum mineraloense*, and *Manuscriptum de amphibiiis*, all of which have been lost, and Artedi's surviving letter to his family (appended to a small manuscript containing excerpts from other authors).

<sup>55</sup> See Appendix II for a transcription of this passage.

<sup>56</sup> Hill 1752, Part III, *Fishes*, pp. 201–317.

<sup>57</sup> English translation with commentary by Hans Aili and Theodore W. Pietsch, 2020.

The contents of two of the minor works that still exist are now available to the modern world through the Latin editions and English translations offered in the present volume; as the contents of the largest work, *Ichthyologia*, is not yet available to an international readership, although it was recently made available in Swedish<sup>58</sup> and its English translation will be published as Volume II of this work, a section devoted here to a succinct description of its way to the printers and its eventual contents will not be out of place.

Almost directly after Artedi's death and funeral, Linnaeus assumed responsibility for the manuscripts Artedi had left behind, basing this decision on a promise that the two friends had given each other before leaving Uppsala. He immediately discovered that there would be no easy access to the literary remains in Artedi's lodgings, 16 Warmoesstraat in the dock area of Amsterdam's waterfront (Pietsch 2010, 2023). Hendrick Jüttinck, the landlord, insisted on keeping everything for himself with a mind to selling it to cover the outstanding rent for Artedi's lodgings, now several months overdue. After obtaining permission from Artedi's Swedish relatives to assume full legal control over Artedi's literary possessions, Linnaeus approached Jüttinck, who presented a considerable bill to be paid before he would hand over the manuscripts. Linnaeus found himself unable to cover more than half of this cost, and turned to Albertus Seba, who had already contributed 50 guilders towards the funeral expenses; Seba, however, procrastinated, arguing that the manuscripts were bound to come up for public auction, whereby he expected that they could be bought for a song. The final help came from George Clifford:<sup>59</sup> 'W]ith tranquil aspect he counted out the money, paid up, received the manuscripts, had them copied for his own use, and generously returned them to me after copying.'

The style of Linnaeus's narrative at this point has given rise to a fatal error in translation: both Lönnberg (1905, 21) and Odelstierna (1966) took the word *transcripta* to be a neutral noun in the accusative plural, and reported that Clifford kept the original for himself and merely handed over a copy of the manuscript to Linnaeus. This interpretation does not take into account Linnaeus's stylistic ambitions, as *manuscripta* is the direct object of three verbs in the historical present tense: *accipit* 'received', *transcribi curat* 'had them copied', and *transcripta reddit* 'returned them after copying'; hence *transcripta* is here a predicative

<sup>58</sup> Petrus Artedi (2022).

<sup>59</sup> Linnaeus, *Vita Petri Artedi*, p. 11: [...] qui serena fronte pecunias numerat, solvit; manuscripta accipit, in proprium usum transcribi curat, mihi transcripta generose reddit.



perfect participle, not a noun. Lars Roberg, however, was not fooled by this advanced construction:<sup>60</sup> *Georg Clifford löste dem, latt copiera dem, gaf Linnæus originalen* ('George Clifford redeemed them, had them copied, gave Linnaeus the originals'). Unless Roberg had had this information personally from Linnaeus, he merely understood Linnaeus's words in *Vita Petri Artedi* in the same way as I did independently much later. For some short period of time, therefore, *Ichthyologia* existed in three manuscripts: the original, containing all of Artedi's marginal and interlineal changes and corrections, Clifford's copy of this original, and the fair copy Linnaeus had made for the printing. All three manuscripts are today lost or missing.

Upon receiving the manuscripts containing *Ichthyologia*, Linnaeus eagerly inspected them, with the following result:<sup>61</sup>

Among them I found that only the Philosophy was absolved; the Science of Synonyms, a work of immense labour, was very perfect but remarkably compressed; the Descriptions were well done; the Library still remained unfinished; the System, however, was sufficiently elaborated by its author, who had never thought he was doomed to abandon his work in this way.

### Contents of *Ichthyologia*

*Ichthyologia* is Artedi's own collective title of a work in five major parts that Linnaeus here described by their contents instead of reporting with their proper names. The name Artedi gave to the entire work was undoubtedly *Ichthyologia*, but the names he intended for the five component parts are less easy to ascertain. On the fourth and fifth pages of his *Praefatio Authoris*, Artedi described the five different parts with the following names and gives them the following order: *Historia literaria Ichthyologiae*, *Philosophia*, *Ipsum opus*,<sup>62</sup> *Synonyma Specierum*, and *Specierum descriptiones*.

### Linnaeus's contribution as editor

When Linnaeus, in the final months of 1737 and the first months of 1738, prepared *Ichthyologia* for the press, he retained its collective title

<sup>60</sup> Roberg, *Anteckningar* p. 4.

<sup>61</sup> Linnaeus, *Vita Petri Artedi*, p. 9: Inveni inter hæc *Philosophiam* solam absolutam, *Synonymiologiam*, immensi laboris opus, completissimam sed mire congestam, *Descriptiones* bonas, *Bibliothecam* adhuc imperfectam, *Systema* vero sat elaboratum ab authore, qui nec sic dimissurum sese sua crediderat.

<sup>62</sup> That is, 'The Work Itself'—a fair indication of the importance he attributed to this part of his work.

but made important changes to Artedi's own titles of the five parts, possibly as a reaction to the terseness of Artedi's style. Linnaeus apparently felt the need to clarify some of Artedi's titles but he was not entirely successful. The most obvious change is that he made sure that the word 'fish', in the form of the Greek loanword *ἰχθύς* (*ichthys*) or *Piscis*, would be found in each title, an aspect that Artedi apparently did not bother with. Part I received the full title *Bibliotheca ichthyologica seu Historia Literaria ichthyologiae* ('Ichthyological library, that is, the literary history of ichthyology'), Artedi's original title being thus subordinated to Linnaeus's new principle; Part II kept its original name although it was expanded into *Philosophia ichthyologica*; Part III, *Ipsum opus*, underwent a radical change to become *Genera piscium, in quibus Systema totum Ichthyologicae proponitur* ('The genera of fishes, in which the entire ichthyological system is proposed'). Part IV, *Synonyma Specierum* ('The synonyms of the species'), a precise description of its contents, became *Synonymia nominum piscium* ('Synonyms of the fish names'). Part V, *Specierum descriptiones* ('Descriptions of the species'), became *Descriptiones specierum piscium*. Artedi's word order here, probably deliberately, emphasises that the species form the constant subject matter, whereas Linnaeus chose to give emphasis to the fact that the part contains descriptions of fishes.

Linnaeus arranged these five parts in such a fashion that they could be bound as separate parts, containing some 500 pages but with a pagination individual for each part and preceded by the main title page, Linnaeus's *Vita Petri Artedi* on 111 pages, dated Leiden, 10 March 1738, and Artedi's own *Praefatio Authoris* on seven pages, dated London, 1735 ('*Scripti Londini 1735*'). A small separate section containing dedications written by Linnaeus to Artedi's two brothers-in-law and to George Clifford is usually to be found as the first pages of *Genera* but is in some existing copies inserted instead into Part I. Every part contains a short preface by Linnaeus.

A major question is whether Linnaeus took the opportunity to make significant changes to the text of *Ichthyologia*. This question will take up an important part of the following descriptions of the separate parts, the main purpose of which is to offer an idea of their general contents.

### Part I. *Bibliotheca ichthyologica seu Historia Literaria ichthyologiae*

This part contains 66 numbered pages, followed by an alphabetical index. This part promises to offer the names of all authors on ichthyology, presented in chronological order; many articles also offer Artedi's

criticism of the author's productions. Artedi's list contains a large number of authors who had written about fishes or, in many instances, merely mentioned the word 'fish' in Greek or Latin. Artedi offered a programmatic introductory statement.<sup>63</sup>

1. Ichthyology, insofar as it is held to be a science in its own right, without consideration of other disciplines, should be treated analytically, following the series of centuries. 2. This we shall now try to perform, to the degree, that is, that the monuments of the ancients have been left to us. 3. Nobody is unaware that today no monuments or genuine written works remain from our Antediluvian Fathers, neither in the other sciences, nor — to an even less extent — in Natural History and Ichthyology.

Artedi then proceeded to enumerate his authorities, century after century after the Flood, which he seems to have placed in the year 4004 of the 24th century BC. It is, however, only in the 11th century after the Flood, or about 1300 BC, that a proper name appears: Linus of Thebes, mythical son of Apollo, said to have described the origins of animals and fruits. Artedi's chronology was based on the Bible and appears closely to agree with that of Archbishop James Ussher, who published his *Annales veteris testamenti* in 1650. Although Artedi never mentioned God by any name and thereby differed radically from Linnaeus, who very often did so, he did not hesitate to make use of the biblical chronology all through *Bibliotheca*.

The list of names of each century grows: in the 19th and 20th centuries after the Flood (5th to 4th centuries BC), the great Greek natural scientists appear:<sup>64</sup> Epicharmus, Plato, and Aristotle. The latter merits more than two pages of listing of works, and also a brief comment: *Stylus sententiosus est sed multa habet ad Zoologiam proprie non pertinentia* ('His style is pithy but it holds much that does not properly belong to Zoology').

Artedi listed a total of 71 authorities, nearly always with bibliographical references, sometimes with critical notes. Only one major

<sup>63</sup> *Bibliotheca*, p. 1. 1. Ichthyologia, quatenus ut scientia per se spectatur, nullo scilicet habito respectu ad alias disciplinas, analytice, secundum seriem seculorum tractari debet. 2. Quod jam præstare conabimur, quantum monumenta, scilicet antiquorum relicta nobis, id permittunt. 3. Neminem latet nulla Patrum Antediluvianorum monumenta vel scripta genuina hodie extare, cum neque in reliquis scientiis, tum multo minus in Historia naturali et Ichthyologia.

<sup>64</sup> Artedi expressly omitted Anaxagoras, Archelaus, Democritus and Hippocrates because, as he states, they did not write anything *ex arte* on natural history.

authority received a different treatment: *Petrus Bellonius floruit 1551 & 1553* ('Pierre Belon flowered in 1551 and 1553')—Artedi named no works and offered no criticism. Considering that Belon's name recurs time and time again in this part of *Ichthyologia*, mostly in notes concerning other authorities as well as in Artedi's final short list, this silence is remarkable, and we can only assume that Artedi had not yet, at the time of his demise, formulated his article on Belon, and that Linnaeus either failed to observe the lack or neglected to fill the lacuna. The line that contains Belon's name is immediately followed by the article on Guillaume Rondelet, which takes up five full pages. The last authority named is Père Jean-Baptiste Labat (1663–1738), whose *Voyages aux isles de L'Amérique* is referred to descriptively as *Itinerarium insularum Gallicarum ad Americam* ('Travels to the French islands in America'), a work published in 1722.

The list of authorities ends on page 59 and is followed by a list of the names of the principal ichthyologists, grouped by centuries, which is in its turn followed by a list stating their attributes: systematic ichthyologists; authors who described fishes of one particular locale; authors who wrote in verse or in prose; authors who only copied earlier authorities; authors without method; authors who described fishes in alphabetical order; and authors who found their method in the locale or followed Aristotle in dividing fishes into *Cetacei*, *Cartilaginei*, and *Spinosi*. Finally, Artedi offered a short list:

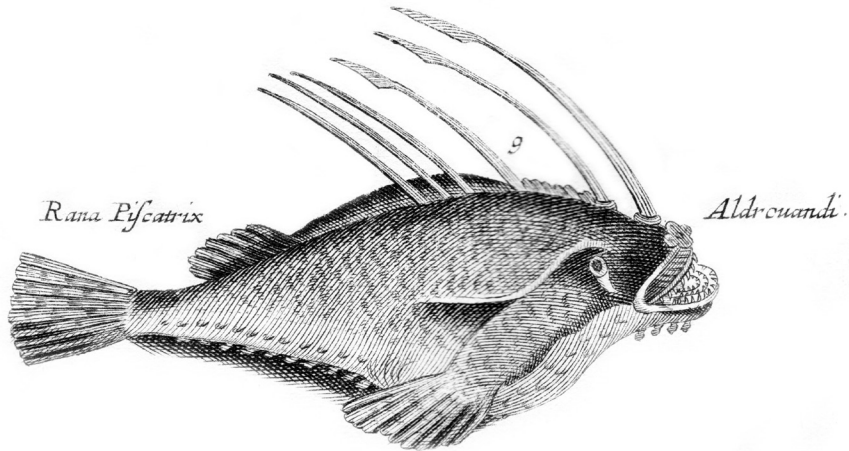
The foremost authorities of all within Ichthyology, and, so to speak, its reformers are: Aristotle, Pierre Belon, Guillaume Rondelet, Hippolyte Salviano, Conrad Gesner, Francis Willughby, and John Ray.<sup>65</sup>

Artedi's final verdict on the quality of his predecessors was: 'All having now being named (from 1 to 8), until this very day, the palm has been won by Sir Francis Willughby of England.'<sup>66</sup>

Thus ends Artedi's *Bibliotheca*, but Linnaeus did add one quarter of a page containing the names of three eminent, recent ichthyologists who had appeared too late to be listed by Artedi.

<sup>65</sup> Page 65. Auctores ichthyologici, omnium præcipui et reformatores quasi sunt: Aristoteles, Petrus Bellonius, Guilelmus Rondeletius, Hippolytus Salvianus, Conradus Gesnerus, Franciscus Willoughby et Johannes Rayus.

<sup>66</sup> Page 65. Omnibus vero jam nominatis (a 1 ad 8) in hunc usque diem palmam præripit Franciscus Willoughby, Armiger, Anglus.



**Figure 3.** ‘*Rana piscatrix*’, now known as the European angler, *Lophius piscatorius*, after Hendrik Ruysch (1663–1727), *Theatrum universale omnium animalium piscium, avium, quadrupedum, exanguium, aquaticorum, insectorum, et angium*, 1718 (vol. 1, pl. 11, fig. 9). License: Public Domain.

## Part II. *Philosophia ichthyologica*

This part presents Artedi’s fundamental principles of the science of ichthyology. Its 91 pages are devoted to definitions of the subject itself, ichthyology. Artedi starts *in medias res*:<sup>67</sup>

1. The Science that deals with fishes is called Ichthyology; but before we can give a definition of Ichthyology itself, it is, on the very threshold, necessary that we indicate, what a Fish is.

<sup>67</sup> Artedi, *Philosophia* pp. 1–2: 1. Scientia, quæ de Piscibus agit, appellatur Ichthyologia; sed antequam ipsius Ichthyologiæ definitio dari possit, in ipso statim limine necesse est, ut primum indicemus, quid Piscis sit. Definitio. 2. *Piscis est animal Apodum, Pinnis semper præditum. Scholion.* 3. Justo brevior quidem hæc definitio (2) est, sed quamdiu nullum aliud animal aquaticum et simul apodum monstrari possit, quod Pinnis veris in aqua natet, tamdiu pro vera æstimari debet: unde male a quibusdam Animalia aquatica pedata, et apoda Pinnis carentia, ut Angues et Insecta, in numerum Piscium recipiuntur. Verum ut distinctius percipiatur, quibus Piscis a reliquis animalibus aquaticis differat, sequens definitio substitui potest: *Piscis est Animal apodum, Pinnis semper præditum; vel branchiis, vel Pulmonibus respirans; plerumque in aqua habitans, ibique vel solis Pinnis, vel flexuoso corporis impulsu simul natans, interdum vero in terram sponte egrediens, et quandoque in aëre supra aquam ope pinnarum Pectoralium volans; quod tamen ultimum de paucis quibusdam speciebus intelligendum est.*

*Definition:*

2. *A fish is an apod, an animal without feet, always furnished with fins.*

*Scholion.*<sup>68</sup>

3. This definition (2) is shorter than is just, but so long as no other animal, living in water and at the same time being an apod, can be shown to swim in water by means of real fins, it should, for equally long a time, be held to be true; hence it is an error of some people to accept among the Fishes, water-living animals with feet, and apods lacking fins, such as snakes and insects. But in order that it may more clearly appear in what manner Fishes differ from other water-living animals, the following definition may be introduced instead:

*A fish is an apod, an animal without feet, always furnished with fins, breathing either through gills or lungs; often living in water and there swimming, either by means of its fins only or, simultaneously, by a forceful bending of its body, sometimes however on its own initiative departing onto dry land and at times flying in the air above the water by means of its pectoral fins. The last point, however, must be understood only to concern some few species.*

This definition is based exclusively on the external features and habits of fishes; therefore, it logically fails to exclude the whales and dolphins from the class of fishes, a problem that Artedi did not formally deal with, although he consistently noted that all cetaceans differed from the other fishes by coupling like the quadrupeds and, like them, bearing living offspring, facts that many of his predecessors had already noticed and confronted in various ways.

John Bernström (1903–1989), a Swedish linguist and polyhistor, particularly of zoology, who wrote a learned bestiary for the Nordic Dictionary of Cultural History,<sup>69</sup> noted in his article on the whales (Sw. 'Valar') that it was well known, not only since classical antiquity<sup>70</sup> but also among the common people and learned men of the Middle

<sup>68</sup> Artedi in his *scholia* commented on his statements, for example by pointing out deficiencies of a definition and following this by formulating his own definition.

<sup>69</sup> Ingvar Andersson and John Granlund, eds., 1956–1978, *Kulturhistoriskt lexikon för nordisk medeltid*. Malmö, Oslo, Copenhagen, s.v. *Valar*, p. 439.

<sup>70</sup> Referring to Aristotle, *Historia animalium* 1.5 and 6.12, and Pliny, *Naturalis historia* 9.6–9.7.

Ages, that whales were not similar to fishes, as they breathe through lungs and nurse their young.

Despite this common knowledge, ichthyologists of the 16th and 17th centuries did not budge but resolutely held on to a more traditional view. Ippolito Salviani only touched briefly on the difference between the *cete* and fishes by quoting Pliny on Aristotle (my translation):<sup>71</sup>

Pliny transcribed this from Aristotle thus: ‘And although other fishes lay eggs, only the cartilaginous genus, like those called *Cete*, gives birth to an animal, except those that we call *Rana*.’

Edward Wotton, Salviani’s English contemporary, handled the same problem in the following manner (my translation):<sup>72</sup>

Among the aquatic animals, the cetacean genus has a certain peculiar nature, as also the dolphin, balaena, and whatever others among them have a fistula: because they take the sea in the manner of fishes, also lack feet and take their food in the water, but breathe air like terrestrials, with the consequence that in some fashion they are terrestrial and also aquatic.

Sir Francis Willughby, three decades later, started his *Historia piscium* with a definition of *piscis* (my translation), noting the problem but still counting the cetaceans among the fishes:<sup>73</sup>

<sup>71</sup> Ippolito Salviani, *Aquatilium animalium historiae liber primus*. Roma 1554 fol. 131r: Quod sic ex eo transcripsit Plinius, ‘Et cum cæteri pisces ova pariant, cartilagineum genus solum, ut ea quæ cete appellant, animal parit; excepta, quam Ranam vocant.’

<sup>72</sup> Edward Wotton, *De differentiis animalium libri X*. Paris 1552 ch. 193, fol. 171r: Inter aquatilia peculiaris quædam natura cetaceo generi est, ut delphino, balenæ et quæcumque alia ex iis fistulam habent. Cum et mare accipiant quenadmodum pisces, pedibusque careant, et cibum in humore capiant, aërem vero spirant ut terrestria, ut quodammodo terrestria sint et aquatilia.

<sup>73</sup> Francis Willughby, *De historia piscium*, London 1686, p. 1: Non sum nescius *Piscis* nomen a nonnullis quam latissime extendi ad *Aquatilia* omnia significanda tam sanguinea, quam exanguia majora, quæ *Aristoteles* in tria genera dividit, nimirum *μαλάκια*, seu *mollia*, *μαλακόστρακα* seu *crustacea*, et *ὄστρακόδεσμα* seu *testacea*. Quin et vulgus nostrum hæc omnia pro piscibus habet. Verum nos in hoc opere restrictiore acceptione voce *piscis* utemur, pro iis tantum aquatilibus, quæ et sanguinea sunt, et pinnis natant, et pedibus carent, et in aquis perpetuo degunt, ibidemque pariunt, nec unquam sponte in siccum exeunt, aut extra aquas diu vivere possunt. Quod ad *cetaceum* genus seu *belluas marinas* dictas attinet, quamvis pulmonibus respirent, & quadrupedum more coeant, & vivos foetus pariant, partiumque omnium internarum structura & constitutione cum Quadrupedibus viviparis conveniant; quia tamen figura corporis externa pisces omnino referunt, cute glabra et depili a Quadrupedibus viviparis differunt, pedibus insuper carent, a quibus præcipue Animalium disctintio peti solet, pinnis denique natant, nec in siccum exeunt, eas pro

I am well aware that the word *Fish* by many persons is very widely extended to signify all *Aquatilia*, whether they should be sanguineous or larger exsanguine ones: they are those which *Aristoteles* divided into three genera, namely μαλάκια, that is the *soft ones*, μαλακόστρακα, that is soft-shelled or *crustaceans*, and ὄστρακόδερμα, that is shell-skinned or *testaceans*. Indeed, our common people also hold all these to be fishes. We, however, shall in this work use the word *fish* in a more restricted meaning and only for those aquatiles which are both sanguineous and swim with fins, and lack feet, and always live in the waters, and give spawn there, nor ever depart on their own accord onto dry land, or are able to live long outside the waters.

As for the *Cetacean genus*, that is those called 'Beasts of the Sea' [*Belua marina*]: although they breathe with lungs, and couple like quadrupeds, and give birth to live offspring, and agree with viviparous Quadrupeds in the structure and build of their all internal parts, as they are on the whole, in their outer aspect, similar with fishes, differ from Quadrupeds by their smooth and hairless skin; as they also lack feet, from which qualities the difference between Animals is habitually taken, and, finally, swim by means of fins and do not depart onto dry land, we consider that they should be held to be fishes.

Amphibians that are viviparous and hairy should more correctly, by my judgement, be referred to the viviparous Quadrupeds; but the oviparous (understand the sanguineous), that is the smooth ones, the scaly ones, the crustaceans, go to the oviparous Quadrupeds, that is the genus of Serpents.

A Fish, thus, by our definition is an aquatile Animal, lacking feet, covered either by scales or naked skin, swimming by fins, living always in the waters, nor ever of its own accord leaving it onto dry land.

John Ray presented the problem and his personal solution in the following way (my translation):<sup>74</sup>

---

piscibus habendas putamus. Animalia amphibia vivipara & pilosa, rectius me iudice ad Quadrupeda vivipara referuntur: ovipara autem [sanguinea intellige] seu glabra, seu squamosa, crustaceave, ad Quadrupeda ovipara seu Serpentinum genus. Est ergo, nobis definientibus, Piscis *Animal aquatile, pedibus carens, vel squammis vel cute nuda contactum, pinnis natans, in aquis perpetuo degens, nec sponte unquam in siccum exiens.*

<sup>74</sup> John Ray, *Synopsis methodica avium et piscium*. London 1713, p. 3f: Piscis nomen a nostratum etiam eruditorum vulgo latissime extenditur ad *Exanguia* aquatica *Crustacea*, *Testacea* & *Mollia* complectenda. A nonnullis e contra non solum *Exanguia* aquatica, sed & *Cetaceum* genus seu *Belluæ* marinæ ab hujus nominis communione excluduntur; nec alia Animalia pisces dicenda contendunt, quam quæ branchiis respirant, & unicum tantum in corpore ventriculum habent. Cum his & nos plane sentimus, Piscis scilicet nomen, si proprie & Philosophice loqui velim-



The word ‘Fish’ is by the majority of my countrymen, even the educated, widely extended to cover aquatic *Exsanguines*, *Crustaceans*, *Testaceans*, and *Soft* creatures. Many people, on the other hand, exclude not only the aquatic *Exsanguines* but also the *Cetacean* race, that is, the marine *Belluae*, from sharing this name; and these people contend that no other Animals should be called ‘fishes’ but those that breathe by means of gills and have only one ventricle in their hearts.

We plainly agree with them, namely in holding that the name ‘Fish’, if we wish to talk properly and philosophically, should be restricted to these creatures only. For since the means of separating Animals should be taken from their most essential marks, that is those parts and principal actions that are both common to all species under the single genera under discussion, and proper to them alone, we shall not find marks of the kind through which the Fishes called ‘Cetacei’ will agree with other fishes. For, excepting the locality in which they live, the outer shape of their bodies, their hairless skin and their forwards movement, that is their swimming, they have almost nothing in common with Fishes, but agree in other respects with viviparous Quadrupeds.

But in order that we shall not appear to disagree too much from received thinking and eagerly follow paradoxical opinions, we shall create nothing new but, for the time being, consider Animals of this kind to be Fishes, and define ‘Fish’ in general as *an aquatic Animal, sanguineous, lacking feet, swimming by means of fins, covered either by scales or skin, naked and hairless, living forever in the waters and never of its own accord leaving it for dry land.*

Bernström<sup>75</sup> found the explanation to this enigmatic refusal of the authorities to state clearly that the cetacei were not fishes, in the Bible, particularly Matthew 12:40, Christ’s parable of Jonah in the belly of the *cetus*. In the Greek New Testament, this parable runs:

---

us, ad hæc sola restringendum. Nam cum Animalium distinctio a notis maxime essentialibus, seu partibus & actionibus præcipuis, quæ et omnibus speciebus sub singulis generibus contentis communes sunt, & et solis propriæ, peti debeat, non inveniuntur hujusmodi notæ in quibus *Pisces Cetacei* dicti cum reliquis conveniant; nam præter locum in quo degunt, figuram corporis externam, cutem depilem, & motum progressivum seu natatum, nihil fere cum *Piscibus* commune habent, sed in reliquis cum *Quadrupedibus viviparis* conveniunt. Verum ne a recepta sententia nimis abhorre, & et opiniones paradoxas sectari videamur, nihil innovabimus, sed hujusmodi Animalia impræsentiarum pro *Piscibus* habebimus, *Piscemque* in genere definiemus, *Animal aquatile sanguineum, pedibus carens, pinnis natans, vel squamis, vel cute nuda glabra & depili contactum, in aquis perpetuo degens, nec unquam sponte in sicco exiens.*

<sup>75</sup> 1956–1978, 439.

ὡσπερ γὰρ ἦν Ἰωνᾶς ἐν τῇ κοιλίᾳ τοῦ κήτους τρεῖς ἡμέρας καὶ τρεῖς νύκτας, οὕτως ἔσται ὁ υἱὸς τοῦ ἀνθρώπου ἐν τῇ καρδίᾳ τῆς γῆς τρεῖς ἡμέρας καὶ τρεῖς νύκτας.

The key word here is the neutral noun κῆτος, gen. κήτου, nom. pl. κήτη ‘sea monster, big fish’, which was borrowed twice into Latin, both as a transcription of a noun in the singular, *cetus*, *ceti*, m, and in its plural form, *cete*, n, both referring rather widely to any large monster of the sea but particularly to large fishes.

*Versio vulgata*<sup>76</sup> borrowed the Greek word *cetus*, -i (my emphasis):

Sicut enim fuit Ionas in ventre ceti tribus diebus et tribus noctibus, sic erit Filius hominis in corde terrae tribus diebus et tribus noctibus.

Although *cetus* refers to any large fish or monster of the sea, the earliest Bible translators chose to take it to refer to the whale. Thus, we find this translation in the Wessex Gospels of c.1175 (‘swa ionas wæs on þas hwæles innoðe’), and John Wycliffe’s Bible of 1382 (‘as Jonas was in the wombe of a **whal**’).<sup>77</sup> Martin Luther’s German translation of the New Testament, completed in 1522, was probably very influential, as it was the first to use as its exemplar Erasmus of Rotterdam’s edition of the Greek New Testament rather than *Versio Vulgata* (my emphasis):<sup>78</sup>

Denn gleych wie Jonas war drey tag vnnd drey nacht yn des walfisschis bauch, Also wirt des menschen son drey tag vnnd drey nacht seyn mitten ynn der erden.

Gustav Vasa’s Swedish Bible of 1526, translated by Laurentius Andreae and Olaus Petri, relied heavily on Luther’s text:

Ty såsom Jonas war j tree daghar och j tree nätter j hwalwiskens bwk, så skal menniskinnes Son wara j tree daghar och j tree nätter j jordenne.

So did early modern English translations, as the Douay-Rheims Bible of 1582:

For as Jonas was in the **whale**’s belly three days and three nights: so shall the Son of man be in the heart of the earth three days and three nights.

And in the King James Bible of 1611:

<sup>76</sup> A. Colunga and L. Turrado, eds. 1977. *Biblia sacra iuxta Vulgatam Clementinam*. Madrid.

<sup>77</sup> Source: textusreceptusbibles.com, accessed 2 December 2022.

<sup>78</sup> English Wikipedia: Bible translations into German, accessed 4 November 2022.

For as Jonas was three days and three nights in the **whale's** belly; so shall the Son of man be three days and three nights in the heart of the earth.

All these early modern translators agree on the identity of the marine monster: it was a whale, and in Germany and Sweden even a 'whale-fish'.<sup>79</sup> As Christ himself was the author of this parable and the identification, it would have taken a very staunch-minded zoologist to criticise it openly.<sup>80</sup>

When formulating his definition of 'fish', Artedi took over some of the criteria formulated by his forebears, but added one of his own, viz. that which recorded the mode of locomotion, while he ignored the question of blood and the inability to live long out of water. He was clearly conscious of the problem caused by the inclusion of the *cetacei* among the fishes, but did not discuss this problem openly; instead, he created a whole new order of *Plagiuri*, that is, fishes with horizontal tails. He continued by defining the object of ichthyology as that class<sup>81</sup> of animals that are called fishes, and defined the nature of all the body parts of fishes (fins, gill, et cetera); the criteria that might be applied when dividing fishes into different orders; of the natural genera of fishes and their characters; the correct principles to be followed when naming the genera (and of the false principles that must be avoided); the origins of the generic names; of the species of each genus; the true specific varieties; and

<sup>79</sup> Bernström, loc. cit. emphasized this point but erroneously assumed that *cetus* could only be translated as 'whale'.

<sup>80</sup> Willughby (1686, 47) commented, however, that Rondelet had opened up another possibility: *Quamobrem opinatur idem* [Rondelet], *nec sane præter rationem, Lamiam fuisse, in quam ingressus est Jonas propheta, [...] quod S. Scripturæ nullo modo repugnat*. ['For this reason he opines, and clearly not without reason, that it was a *Lamia* into which the prophet Jonah entered, something which does not in any way militate against the Sacred Scripture']. Later in the same work, he goes further (p. 48). *Lamiam fuisse non cetacei generis piscem qui Jonam prophetam voraverit verisimillimum puto, 1. Quoniam cetaceis angustior est gula quam ut integrum hominem deglutire possint. [...] 2. Quoniam in mari Mediterraneo, in quod projectus fuit Jonas cete rarius inveniuntur, si pro bellui illis marinis viviparis maximis vox accipiatur. 3. Quoniam Piscem illum in cuius os Hercules insiliisse, & et in cuius ventriculo tridui spatio hæsisse veteres fabulantur, Canem carchariam fuisse narrant*. ['I think it most probable that it was a *Lamia*, not a fish of the cetacean genus, that devoured the prophet Jonah, 1. because the throat of the cetacei is so narrow that it does not permit them to swallow a whole man. [...] 2. Because the *cete* are only rarely found in the Mediterranean Sea, if this word may be accepted for these, the largest vivaprous monsters of the sea. 3. Because the Fish that the Ancients talk about, into the mouth of which Hercules jumped and in the belly of which he was stuck for three days, was, as they say, a *Canis carcharias*.'

<sup>81</sup> This use of class (Lat. *classis*) came late to Artedi, as, even in his short summary of the contents of his projected *Ichthyologia*, offered at the end of *Catalogus piscium maris Balthici*, he used *classis* as a synonym of *ordo*.

the correct principles to be followed when naming the species (and the false principles that must be avoided), offering eventually, on pages 88 and following, a list of the genuine characters of the species. Many definitions are formulae, followed by a *scholion* offering a closely reasoned explanation. In order to give an example of the precision employed in the wording of the definitions, we give here § 11, which defines the tail:<sup>82</sup>

*The tail in particular varies much according to its number, site, and shape, for*

*α.* according to its *number* there is; 1° none, as in one single species of *Serpens marinus* and *Acus lumbriciformis*, 2° in all others there is one, only. *β.* According to its site, vertical and horizontal, it also varies, for it is: 1° sited vertically, as in nearly all fishes, 2° sited horizontally, that is, in a body set in its natural position, as in *Delphinus* with *Phocaena* and *Orca*, *Balaena*, *Manatus Indorum*, and all of *Cete*. *γ.* According to its *shape*, it is: 1° *round* at the tip, as in *Cottus*, 2° *even* at the tip, and so its entire tail is a square or a parallelogram as in some of the *Salmo*, *Tinca* etc., 3° *pointed* at the tip, as in *Conger* and *Anguilla*, *Petromyzon* etc., 4° a little excavated at the tip, so to speak, with a *circle segment*, as in some species of *Salmo*, *Carassius* of Gesner etc., 5° *two-pronged* like an open pair of scissors as in most of the *Cyprinus*, *Clupea*, *Coregonus*, *Esox*, *Perca* etc., 6° *sickle-shaped* like the waxing moon as in *Scomber*, that is, *Thynnus*, *Amia*, *Xiphias* etc.

By this method Artedi defined the external body parts of fishes: fins, tail, head, mouth, snout, teeth, jaws, lips, eyes, pupils, eyelids, neck, back, flanks, chest and belly, anus, penis, vulva, tips of the fins, scales, lateral lines, slime, barbels, ears, openings of the gills, sharp thorns, and tubercles; the interior parts defined are: tongue, gills, heart, diaphragm, gullet, ventricle, intestine, liver, gall bladder, spleen, pancreas, ovaries, roe, seminal vesicles, testicles, prostate, uterus, air bladder, pneumatic duct, kidneys, urinal vessel, peritoneum, bones (of the head, chest,

<sup>82</sup> 11. Cauda vero specialiter secundum numerum, situm et figuram multum variat, nam *α.* secundum numerum 1° nulla adest, ut in unica Serpentis Marini et Acus Lumbriciformis specie. 2° In reliquis omnibus unica est. *β.* Secundum situm perpendiculi et horizontis differt quoque, nam 1° situm perpendicularem obtinet, ut in omnibus fere piscibus. 2° Horizonti parallela est, in corpore scilicet naturali situ locato, ut in Delphino cum Phocæna et Orca, Balænis, Manati Indorum et omnibus Cetis. *γ.* Secundum figuram, 1° in extremo rotunda est, ut in Cotto. 2° In extremo æqualis est et sic tota cauda quadrata vel parallelogramma est, ut in Salmonibus quibusdam, Tinca etc. 3° In extremo cuspidata, ut in Congro et Anguilla, Petromyzo etc. 4° Segmento quasi circuli parum in extremo excavata, ut in quibusdam speciebus Salmonis, Carassio Gesneri etc. 5° Bifurca forficis diductæ instar, ut in Cyprinis plurimis, Clupeis, Coregonis, Esocibus, Percis etc. 6° Falcata in modum crescentis lunæ, ut in Scombris seu Thynnus, Amiis, Xiphia etc. [To save space, the extracts from Artedi are not formatted typographically as in exemplar.]

belly, vertebrae, ribs; bones of the muscles; bones of the fin rays), brain, medulla spinalis, and muscles. He determinedly refused to digress outside his proper subject, a principle he formulated in *Philosophia*:<sup>83</sup>

§ 113 The description of the arteries, veins, lymphatic vessels, and nerves of fishes does not properly belong to Ichthyology, that is, the natural history of fishes, but to Comparative Anatomy, and should therefore justly be left to those who call themselves Anatomists, particularly as the object of our method is not to play at being an Anatomist.

Finally, in this part of the text (§§ 114–15), Artedi defined the mode of swimming of fishes and their use of the air bladder and the fins.

It would seem reasonable to assume that Artedi based his definitions and the principles contained in this part of *Ichthyologia* on his own experiments and observations and as a result of his having tried out his principles in practice, but there are inconsistencies in vocabulary<sup>84</sup> that rather suggest that he wrote it in parallel with the other parts, and, owing to his premature death, failed to edit into a finished shape.

Linnaeus stated that this part alone was ‘absolved’, by which he probably wished to imply that it should be read as Artedi’s work entirely and completely finished at the time of his death. This, however, is very far from the truth. There is a large number of indications that Linnaeus entered his own ideas into this very text. The most obvious ones are the frequent references to Linnaeus himself, as, for instance, on page 33, in which the *scholion* that comments on the eggs of fishes is finished by *Haec D. Linnaeus* (‘Mr. Linnaeus wrote this’). The natural question—‘What portion of the text does *haec* (“this”) refer to?’—is not answered, but remarks of this kind—and they are quite frequent—indicate that Linnaeus read the text very carefully, constantly referring to his own *Systema naturae*.

Other evidence points to Artedi’s trying out concepts before applying them in practice, as in § 136:<sup>85</sup>

<sup>83</sup> 113. Descriptio Arteriarum, Venarum, Vasorum Lymphaticorum et Nervorum in Piscibus, non proprie ad Ichthyologiam seu Historiam Piscium naturalem, sed ad Anatomiam Comparatam pertinet, unde illis merito relinquenda est, qui se Anatomicos profitentur, praesertim quum instituti nostri ratio non est Anatomicum agere.

<sup>84</sup> On page 46 he used *classis*, *familia*, and *ordo* interchangeably, although in practice he only used *ordo*. On page 47 he talked of *Quadrupedes* (four-footed animals) and even *Tetrapodologia* (§ 133), although he must already have settled for the name *Trichozoon* in his pilot study on the science of the ‘hairy animals’, written in parallel with his ichthyological works.

<sup>85</sup> § 136 Tales ordines seu Familiae naturales in Ichthyologia numero quinque vel sex circiter constitui debent, quoniam, uti dictum est, Genera Piscium Naturalia prius

Such orders, that is natural Families, ought in Ichthyology be established in a number of about *five or six*, since, as mentioned, the Natural Genera of Fishes should first be collected into certain, so to speak, Maniples, from which then the Natural Orders will arise by their own accord.

This can only be construed as evidence that Artedi had not yet given the final touch to his three-tiered hierarchy of *ordo*, *genus*, and *species* but was still labouring with different names that do not agree with those he eventually settled on: in the passage quoted, *classis*<sup>86</sup> and *familia naturalis* equal *ordo*, the highest tier; *genus naturale* appears to equal *species*, the lowest tier; *manipulus* equals *genus*, the middle tier. He did use *classis*, eventually, but only to distinguish between, say, fishes and hairy animals, which form two separate classes.

In practice, Artedi organised fishes into five orders, not six, and used the word *manipulus* only twice: here and in § 130. It is therefore quite possible that paragraphs such as these two do not represent early stages in Artedi's thinking at all, but were additions by Linnaeus. In § 189 Linnaeus offered proof positive that he did add considerably to Artedi's text, this time in order to reform the generic names:<sup>87</sup>

In this part Mr. Linnaeus acted on his own, as he recently posited this very fundament in Botany; it applies in the greatest part to Ichthyology, a few things changed, excepted, or added.

Artedi defined the three distinctive characters needed to separate species belonging to one single genus:<sup>88</sup>

§ 184 All these marks (182: 1°, 2°, 3°, 4°, 5°, 6°) are not to be found in all fishes belonging to one and the same genus, but more in one genus, less in another. However, the three first, namely 1°, the outer aspect, 2°, the same number of small bones in the branchiostegal membrane, and 3°,

---

in certos quasi Manipulos conquærenda sunt, ex quibus postea Ordines Naturales sponte exsurgunt.

<sup>86</sup> *Classis* is used in the heading to §§ 124 to 136: *Divisio piscium in classes vel potius familias seu ordines* ('Division of fishes into Classes or rather Families, that is Orders'). This agrees with his use of *classis* in *Catalogus piscium maris Balthici*.

<sup>87</sup> § 189 In hac parte egit solus D. Linnæus, dum in Botanicis fundamentum hocce nuper posuit, quod idem in Ichthyologicis maxima ex parte obtinet, mutatis, exceptis, vel additis paucis.

<sup>88</sup> § 184 Hæ tamen Notæ omnes (183. 1, 2, 3, 4, 5, 6) non reperiuntur in omnibus Piscibus ad unum idemque genus pertinentibus, sed in uno genere magis, in alio minus. Tres autem primæ scilicet 1° *Facies externa*, 2° *Idem numerus Ossiculorum in membrana branchiostega* & 3° *Idem situs Pinnaarum* necessario adesse debent & fere semper adsunt.

the same location of the fins, must necessarily be present, and they are nearly always present.

The order given does not correspond to Artedi's practice, which gave precedence to the number of small bones in the branchiostegal membrane. He conceded that other signs may also be taken into account, as the number of fins, location of the teeth, and shape of the scales, as well as other external and internal parts, also contributing their significance, but the three numbered ones form the central core in Artedi's system for recognising one particular genus.

The fundamental problem, that of identifying the different genera, is stated in § 124:<sup>89</sup>

Not only in Ichthyology, but also in the rest of Natural History, some genera of animals agree very much among themselves, and again, others differ very much among themselves.

This statement is supported by examples culled from various parts of nature, the argument finishing with a demonstration from the world of fishes:<sup>90</sup>

§ 125 The genus of *Cyprinus* and that of *Clupea* agree in most respects, the genus of *Clupea* and that of *Balaena* differ in almost all respects.

Artedi's conclusion as to the principle, if not the terminology:<sup>91</sup>

§ 127 These classes (126), that is, these most general divisions are, in each part of Natural history, either Artificial, that is, Hypothetical, or natural, that is, true.

In this passage Artedi used *classis* for the overarching category of fishes, quadrupeds, etc. The distinction between the artificial and the natural is a recurring theme when Artedi proceeded to castigate erroneous nomenclature: this involves analogy, by which the name of a terrestrial creature is used metaphorically for a fish, like *Lupus* ('wolf'), even with the attribute *marinus*, for two-word compositions are also faulty, as *Lucio-perca*. All names without a Graeco-Roman origin, like

<sup>89</sup> § 124 Non tantum in Ichthyologia, sed etiam in reliqua Historia naturali, quædam Animalium Genera inter se multum conveniunt et rursus alia plurimum inter se discrepant.

<sup>90</sup> § 125 Genus Cyprini et Clupeæ in plurimis conveniunt, Genus Clupeæ autem et Balænae in omnibus propemodum differunt.

<sup>91</sup> § 127 Classes (126) seu divisiones illæ generalissimæ, in singula Historiæ Naturalis parte, sunt vel Artificiales seu Hypotheticæ, vel naturales seu veræ.

*Macarellus*, from the German *Makarel*, are rejected as false. Artedi also castigated diminutives, as *Anguilla* from *Anguis* ('snake'). Latin neologisms, not attested by ancient authorities, were 'barbarous', but Greek neologisms were acceptable, as the ancient Greeks accepted novel formations much more willingly than the Romans.

Artedi ended this section with a long list of 37 acceptable generic names (§ 208). Not only is this number smaller than the number of genera (52) actually listed with their descriptions in *Genera piscium*; the list also comprises names that do not appear there: *Amia*, *Anthias*, *Elops*, *Mullus*, *Pristis*, *Salpa*, *Scarus*, *Thynnus*, *Torpedo*, *Tursio*, and *Uranoscopus*. In the section immediately following (pp. 81–84), Artedi offered a long list of genera followed by his own etymologies of these generic names, but also explained three generic names that he did not employ in *Genera piscium*, the work that offers the synthesis of his system. These latter names are: *Atherina*, *Liparis*, and *Lepturus*. *Liparis* also features in the first list but the two others do not. With the exception of *Lepturus*, all these names feature in Part IV, *Synonymia nominum piscium*, as traditional names awarded by the ancient or more recent authorities, albeit not adopted by Artedi. Their presence in *Philosophia* was probably influenced by their being named in *Synonymia*. It is therefore quite likely that Artedi would have removed them in a final revision of *Philosophia*. Concerning *Lepturus* we may note that Artedi explained it as a composition of two Greek words, λεπτός and οὐρά, meaning 'Thin-tail'. As the word cannot be found in classical Greek, it was probably of Artedi's own making and intended for use on a suitable subject: an intention never fulfilled.

The dissimilarities here noted must be regarded as the inevitable result of Artedi's untimely demise, which left the final editing to Linnaeus and his assistants.

From paragraphs 209 to 210, Artedi moved on to the criteria for defining species. The definition runs:<sup>92</sup>

209. Species in Ichthyologia is the name of every Fish that differs from the other fishes of its own genus by one particular external part: depending on lack or excess, number, proportion, form, and a constantly differing colouring.

<sup>92</sup> § 209. Species in Ichthyologia appellatur unusquisque Piscis, qui a reliquis sui generis speciebus in Parte quadam externa, secundum defectum vel excessum, numerum, Proportionem, Figuram et colorem constantem variantem, diversus est. 210. *Non tamen singulae hae differentiae specificae in omnibus speciebus seu piscibus adsunt, sed in aliis pauciores, in aliis plures, in quibusdam etiam singulae reperiuntur.*



210. All these individual specific differences are not present in all species, that is, fishes, but are less frequent in some, more frequent in others, and are even found alone in some species.

Artedi subjected both sets of definitions, that is, the criteria required for identifying the genera and those required for identifying the species, to a penetrating discussion of the problems they created, rejecting a large number of criteria—usually by way of relevant examples—before arriving at a satisfactory rule.

### Part III. *Genera piscium*

*Ipsum opus* ('The work itself') appears to be Artedi's preferred title<sup>93</sup> for the part of the work that Linnaeus, in his brief description of the contents of *Ichthyologia*, reported as the 'System' and, on the title page of Part III of *Ichthyologia*, titled *Genera piscium*. It is given an exact description by Artedi, in his preface to *Ichthyologia*:<sup>94</sup>

In the Work Itself I first established some natural Orders of fishes, as far as this could be done; after that I collected the Genera, separated each in its Order, with their Characters—genuine, as I hope; then I distinguished the individual Species of each and every Genus by new differences, that is, Specific Names; the laborious building of these names was not so simple as some might think at first glance.<sup>95</sup>

As stated on the title page of this part, it comprises five orders, 52 genera and 241<sup>96</sup> numbered species. There is also an appendix naming six species for which Artedi probably had not found the proper place at the time of his death. The orders and genera, and the number of species within the latter are:

<sup>93</sup> Cf. his identical usage in *Catalogus piscium maris Balthici*.

<sup>94</sup> In ipso opere primum *Ordines* aliquot *Piscium*, quantum fieri potuit, *Naturales* constitui; deinde *Genera* in singulo ordine distincta cum suis *Characteribus*, ut spero genuinis, collocavi; tum *Species* singulorum *Generum* distinctas novis differentiis seu *Nominibus Specificis* insignivi, quorum constructio et elaboratio non adeo facilis fuit, ut quibusdam primo intuitu videri posset.

<sup>95</sup> This description is a revised version of that which he offered in *Catalogus*: 'In the Work itself (which is not yet completed in all parts due to lack of necessary observations) I first, as far as I could, separated Fishes into their natural Orders, Sections, and Genera, then carefully enumerated the distinct Species of each and every Genus (those that I had been permitted to view) with their new Specific Names.' Here, Artedi still laboured with *sectio* as the first subdivision of *ordo* (a use he would successfully employ in *Trichozoologia*).

<sup>96</sup> Not 242, as stated on the title page.

ORDO	GENUS	SPECIES
I. MALACOPTERYGII	I. <i>Syngnathus</i>	4 species
	II. <i>Cobitis</i>	3 species
	III. <i>Cyprinus</i>	19 species
	IV. <i>Clupea</i>	4 species
	V. <i>Argentina</i>	1 species
	VI. <i>Exocoetus</i>	2 species
	VII. <i>Coregonus</i>	4 species
	VIII. <i>Osmerus</i>	2 species
	IX. <i>Salmo</i>	10 species
	X. <i>Esox</i>	3 species
	XI. <i>Echeneis</i>	1 species
	XII. <i>Coryphaena</i>	3 species
	XIII. <i>Ammodytes</i>	1 species
	XIV. <i>Pleuronectes</i>	10 species
	XV. <i>Stromateus</i>	1 species
	XVI. <i>Gadus</i>	11 species
	XVII. <i>Anarhichas</i>	1 species
	XVIII. <i>Muraena</i>	6 species
	XIX. <i>Ophidion</i>	2 species
	XX. <i>Anableps</i>	1 species
	XXI. <i>Gymnotus</i>	1 species
Sum		90 species
II. ACANTHOPTERYGII	XXII. <i>Blennius</i>	5 species
	XXIII. <i>Gobius</i>	3 species
	XXIV. <i>Xiphias</i>	1 species
	XXV. <i>Scomber</i>	5 species
	XXVI. <i>Mugil</i>	1 species
	XXVII. <i>Labrus</i>	9 species
	XXVIII. <i>Sparus</i>	15 species
	XXIX. <i>Sciaena</i>	2 species
	XXX. <i>Perca</i>	7 species
	XXXI. <i>Trachinus</i>	2 species
	XXXII. <i>Trigla</i>	10 species
	XXXIII. <i>Scorpaena</i>	2 species

(Continued)

ORDO	GENUS	SPECIES
	XXXIV. <i>Cottus</i>	5 species
	XXXV. <i>Zeus</i>	3 species
	XXXVI. <i>Chaetodon</i>	4 species
	XXXVII. <i>Gasterosteus</i>	3 species
Sum		77 species
III. BRANCHIOSTEGI	XXXVIII. <i>Balistes</i>	6 species
	XXXIX. <i>Ostracion</i>	22 species
	XL. <i>Cyclopterus</i>	1 species
	XLI. <i>Lophius</i>	1 species
Sum		30 species
IV. CHONDROPTERYGII	XLII. <i>Petromyzon</i>	3 species
	XLIII. <i>Acipenser</i>	2 species
	XLIV. <i>Squalus</i>	14 species
	XLV. <i>Raja</i>	11 species
Sum		30 species
V. PLAGIURI	XLVI. <i>Physeter</i>	2 species
	XLVII. <i>Delphinus</i>	3 species
	XLVIII. <i>Balaena</i>	4 species
	XLIX. <i>Monodon</i>	1 species
	L. <i>Catodon</i>	2 species
	LI. <i>Trichechus</i>	1 species
	LII. <i>Siren</i>	1 species
Sum		14 species
APPENDIX	Genus not assigned	1. <i>Taenia altera dicta</i> 2. <i>Silurus</i> † <i>Clarias Nilotica</i> 3. <i>Taenia Authorum</i> 4. <i>Mustela</i> † <i>Mustela vivipara</i> 5. <i>Phycis</i> 6. <i>Sphyraena</i>

The 52 genera named in this list represent the names that Artedi found acceptable for the classification of fishes. The six numbered species in the appendix have names not mentioned in *Philosophia* but they do occur in *Synonymia*; *Clarias*, marked with a dagger, is not mentioned anywhere else.

The five orders have Graeco-Latin names made up by Artedi himself, while most of the generic names bear names inherited from classical antiquity. Artedi's nomenclature and its purpose will be described in detail below.

There can be no doubt that, in Artedi's view, *Ipsum opus* is indeed 'the Work Itself'. The name Linnaeus gave to it as Part III, *Genera piscium*, does not convey the same impression of its true importance.

In many copies of *Ichthyologia* this part starts off with two dedications, to George Clifford and to Jonas Ljungberg and Petrus Bjur, Artedi's two brothers-in-law; in other bindings these dedications are found at the beginning of the whole book. It is possible that Linnaeus, in recognition of the part's importance within Artedi's system, entered his own two dedications here. The dedication to Clifford is dated 20 March 1738.

Linnaeus also included a greeting to the reader:<sup>97</sup>

In the preceding, our Author offered the Theory of the art, but in this part he offers the entire PRAXIS, a brilliant abridgement of his great work.

This praise, though apparently glowing, nonetheless fails to do justice to *Ipsum opus*. This failure also shines through in the *Clavis ordinum* ('Key to the Orders'), printed on page 6, which does offer the reader a shortcut to the understanding of the characteristic traits of the five orders, but only to the 31 genera of *Malacopterygii* and *Acanthopterygii*, as it stops short at that point, leaving the three remaining orders and all their genera and species hanging undefined.

The true importance of *Ipsum opus* only appears after a closer perusal of Artedi's diagnostic method, which will be analysed in the section below entitled 'Peter Artedi: innovator of examination'. The fishes collected in *Genera* are first organised into the five orders, each of which contains its appropriate number of genera, and each genus contains its own number of species; they are thus arranged in a hierarchical system of three tiers. Linnaeus's statement on the condition of the *System*, that

---

<sup>97</sup> *Genera*, p. 5: In præcedentibus Theoriam artis dedit Author, in hac vero parte integram PRAXIN, maximi operis insigne compendium.

is, *Ipsum opus*, as he found it after Artedi's death, was *Systema vero sat elaboratum ab authore* ('The System, however, was sufficiently elaborated by its author').

This is not, unfortunately, an entirely correct description of the actual situation. Some important pieces of information are missing, and Linnaeus's (or his assistants') failure to supply them is remarkable. Artedi's method of identifying the genera was based, wherever applicable, on the number of small bones in the membrane of the gill cover, in Artedi's own vocabulary *membrana branchiostega*, here translated as 'branchiostegal membrane'. This crucial information, however, is conspicuously lacking for seven genera in Orders I and II, and for one genus in Order III, and its absence marked by the editor with three or four dots, as in Genus I. *Syngnathus*: '*Membrana Branchiostega ....*'. The same is true in seven more genera: II. *Cobitis*, V. *Argentina*, XV. *Stromateus*, and XIX. *Ophidion* among the *Malacopterygii*; XXVIII. *Sparus*, XXIX. *Sciaena*, XXXI. *Trachinus*, and XXXII. *Trigla* among the *Acanthopterygii*. In the *Branchiostegi* these small bones were found and enumerated in genus XL. *Cyclopterus*, but they are lacking in three others, viz. genus XXXVIII. *Balistes*, XXXIX. *Ostracion*, and XLI. *Lophius*, where Artedi remarked: *Membrana Branchiostega nulla* ('Branchiostegal membrane, none'); numbers of other small bones are always given. Furthermore, in the four genera of the *Chondropterygii* and the six genera of the *Plagiuri* the number of small bones in the gill membranes seems not to be applicable, as the species are here organised into ten genera by other, carefully formulated, common characters. The fundamental importance of the correct numbering of these small bones is best illustrated by the generic character Artedi gave to Genus XX, *Anableps*, which contains one single species that Artedi found in Seba's collections. Artedi characterised this genus with two criteria: *Membrana branchiostega ossiculis sex. Pinna dorsi unica, exigua, in extremo dorsi* ('Branchiostegal membrane with six small bones. Dorsal fin, one, small, at extreme end of the back'). The number of small bones is here crucial to the characterisation of the genus, and no additional features are offered in the description of its single species. Rather surprisingly, Artedi made no mention of the curious double eyes that this fish enjoys.

The system of diagnostic naming of both genera and species that Artedi employed in *Genera*, *Synonymia*, and *Descriptiones* was his own invention, but it is only fully employed in these three parts of *Ichthyologia*. We have already noted that Artedi spent most of *Philosophia* in building this nomenclature and only employed it fully

at the end, as a conclusion of his discussion. He appears to have been fully aware of its novelty and the patient reasoning required to make it generally accepted, for, in *Catalogus piscium maris Balthici*, a work surviving in an autograph manuscript and probably conceived as a means to gain entrance to Sir Hans Sloane and his collections,<sup>98</sup> he used a much more traditional method for most of the fishes, listing the well-known genera under their conventional names, followed by species as named by previous authorities, without offering any novel characteristics at all. A note at the end of the list of species of genus *Cyprinus* offers a relevant comment:<sup>99</sup>

The names I gave to those species of the aforementioned *Cyprini* that had not been described by the famous Willoughby I chiefly took from the number of rays, that is small bones, in the anal fin, as other external parts of those fishes that belong to the same genus agree very much in numbers, shapes, and proportions.

In other words: Artedi here only applied his own method to those fishes that had no traditional names. His slightly apologetic note suggests that, when composing *Catalogus*, his purpose was to demonstrate to Hans Sloane his capacity for organising existing information in a traditional manner, but that he introduced his own method of counting small bones, whenever the traditional knowledge showed a lacuna. In brief, a mixture of the conventional and the revolutionary. This is also apparent in Artedi's deft way of replacing the conventional *radius* ('ray') with his own preference, *ossiculum* ('small bone'), the difference here being that *radius* is a metaphor, while *ossiculum* is an exact description.

In *Manuscriptum ichthyologicum* the number of small bones (i.e. branchiostegal rays) in the gill covers is not used at all as a criterion, for it is nowhere mentioned in the surviving manuscript. Genus XX. *Anableps*, which Artedi had found in Seba's collections, is defined by the two criteria mentioned above. *Anableps* contains one single species, also called *Anableps*, for which Artedi, in Part III. *Genera*, offered the following note: *Novus piscis quem in Sebae thesauro descripsi* ('A new fish that I described in Seba's *Thesaurus*'). The description of *Anableps*

<sup>98</sup> This was proposed by Nybelin (1934, 44).

<sup>99</sup> Artedi, *Catalogus piscium maris Balthici*: Nomina Specifica Cyprinorum præcedentium à Nobil. Willoughbejo non descriptorum, e Numero Radiorum seu Ossiculorum in Pinna Ani imprimis sumsi, quum aliæ partes externæ horum piscium ad unum idemque Genus pertinentium, in Numero, Figura et Proportione multum conveniant.

does not, however, feature in the surviving *Manuscriptum ichthyologicum* itself, and we only find it in *Thesaurus*,<sup>100</sup> albeit with a completely different diagnostic name:

Num. 7. *Anableps with four longitudinal lines on each side, a tubular outgrowth at the anal fin.* [...] There is no one, among more recent as well as among old Ichthyologists, who has made any mention of this fish before Artedi did. He, however, as soon as he had caught sight of it in Seba's museum and examined it, placed it among the *Malacopterygii* in his *Ichthyologia*, and constituted a particular genus for the same fish and gave it an appropriate name fetched from the location of its eyes, by which this fish separates itself from the rest.

We may well query by whom, and for what purpose, Artedi's original diagnostic name was so completely changed into one that still fails to note the remarkable eyes. As will be clear from a comparison between Artedi's original descriptions in *Manuscriptum ichthyologicum*, as presented in the second part of this work, and the corresponding texts published in *Thesaurus*, the editor did not materially change the basic information given by Artedi but only padded his language into a more rhetorical style. The full description of *Anableps*, which occupies some 20 lines following on the above passage, does not differ from this pattern—it even respects Artedi's preference for *ossiculum* instead of *radius* in the description of the rays in the animal's fins.

Besides the diagnostic names of the genera, *Genera piscium* lists the species under each genus and offers a diagnostic name that features two or three criteria. This information is followed by page references to Part IV *Synonymia* and—wherever relevant—to Part V *Descriptiones*. Older names given by the authorities, mainly Willughby and Ray, are given, and sometimes also a few more anatomical details.

The articles on genera that comprise a larger number of species are subdivided by intercalary headings printed in italics and creating, as it were, subgenera, for example genus *Cyprinus*, in which species 1 to 7, 8 to 17, and 18 to 19 are headed, respectively:<sup>101</sup>

<sup>100</sup> Seba, *Thesaurus*, p. 108a. Num 7.: *Anableps, lineis quatuor longitudinalibus ad utrumque latus; processu tubulato ad pinnam ani.* [...] Inter recentiores æque ac veteres Ichthyographos nemo est, ejus qui in scriptis suis ante Artedii mentionem fecerit. Hic autem, ut primum in museo Sebano conspexit, examinavitque, ad Malacopterygios in opere suo Ichthyologico retulit, ac singulare genus pro eodem constituit, nomenque pisci dedit pro more suo appropriatum, a singulari oculorum situ, quo piscis iste a ceteris sese distinguit, petitum.

<sup>101</sup> Maxillis ejusdem fere longitudinis vel superiore in quibusdam tantillum longiore; Maxilla superiore vel parum vel notabiliter longiore; Maxilla inferiore longiore.

With jaws of almost equal length or the upper one, in some species, a little longer.

With upper jaw either a little or noticeably longer.

With lower jaw longer.

These nameless subdivisions form groups that Artedi could have named *Manipuli*, but, as we have seen, when the word *manipulus* is mentioned in *Philosophia*, it serves as a synonym of *Genus*.

Artedi continued to add information to this part during the summer of 1735, when he was fully occupied with recording the fishes of Albertus Seba's collections. Whenever he found a fish he had not seen before, he managed to compose a diagnostic name for it, adding it to the text of *Genera*. This is evident from short notes at the end of the articles of some species of *Ostracion*, viz. 9. *Ostracion: Apud Dominum Sebam vidi* ('I saw this at Mr Seba's'); 13. *Ostracion: Vidi apud Sir Hans Sloane & in Chelsey apud Don Salteros, & in Springgarden & et apud D. Sebam Amstelodami* ('I saw this at Sir Hans Sloane's, and in Chelsey at Don Salteros, and in Springgarden and at Mr Seba's in Amsterdam'); 14. *Ostracion: Apud Dominum Sebam Amsterdami* ('At Mr Seba's in Amsterdam').<sup>102</sup> Finding 13. *Ostracion* at Seba's was a reunion of old friends, while 9. and 14. *Ostracion* were probably novelties to him. His references to Lister, Willughby, and Ray suggest that his short descriptions had already been written when he observed the actual specimens, but the diagnostic names are probably of his own making.

Some species appear to have come to his attention too late to be given a serial number: the information he had on these was entered into the text but marked by a dagger or a Greek letter; concerning most cases, he actually doubted whether he was really dealing with a new species or an example of one already known. Such is the case in, for instance, the addition entered after 6. *Gadus*:<sup>103</sup>

6a. GADUS, three-finned back, mouth with barbels, first small bone of ventral fins prolonged into a long thread. Artedi *Synonymia* 35. *Asellus luscus* Willughby App. 21, Ray p. 54 seems on the whole to belong to this species and is hardly different. Artedi.

<sup>102</sup> *Genera piscium*, pp. 58–59.

<sup>103</sup> 6a. GADUS dorso tripterygio, ore cirrato, ossiculo pinnarum ventralium primo in longam setam producto. Art. Syn. 35. *Asellus luscus*. Will. app. 22. Ray p. 54 ad hanc speciem omnino pertinere videtur & vix differt. Artedi.



The lack of consistency between the three parts of Artedi's *Ichthyologia* is often confusing. We encounter a problem when comparing two, precisely coeval, diagnostic names of the species called, in *Genera*, 9. *Ostracion triangulatus, tuberculis hexagonis radiatis, aculeis 2 in imo ventre* ('*Ostracion*, triangular, with hexagonal radiating tubercles, two prickles on lowest belly'). This is one of the five species Artedi also described in his *Manuscriptum ichthyologicum*, but there as 3. *Ostracion triangulatus figura, hexagonis parum tuberculosi et quasi radiatis, aculeis 2 in imo ventre. Art.* ('*Ostracion*, triangular in shape, with hexagons slightly furnished with tubercles and, so to speak, rayed; two prickles on lowest belly. Artedi'). The differences between these two descriptive names may be small but, considering that they were written in parallel and as a result of Artedi's labour for Seba, they are rather puzzling. Did Artedi write one of them from memory or did he change his mind when writing one without following up his impulse in the other?

#### Part IV. *Synonymia nominum piscium*

Artedi, by his own confession, had found this part a very exacting task:<sup>104</sup>

Again, I collected the Synonyms of the Species from almost all Authorities and added them under my new specific Names. This caused me a labour large beyond all other parts of this work; for it is necessary to have a vast amount of time and an untiring spirit for the narration of so many Authorities on almost each and every species, particularly since until now so very few Synonyms have been collected, and these, moreover, are not quoted in their proper places.

As already mentioned, Linnaeus commented: 'I found that the Science of Synonyms, a work of immense labour, was very perfect but remarkably compressed.'<sup>105</sup>

This part of *Ichthyologia* consists of three sections, in which the science of synonyms proper takes up 109 printed pages, the appendix

<sup>104</sup> Artedi, *Præfatio Authoris*, pp. 4–5: Porro Synonyma Specierum ex omnibus prope modum Auctoribus collegi et Nominibus specificis novis subjunxi, quod præ reliquis hujus operis partibus magnum negotium mihi facessit; plurimum enim temporis et animus indefessus in evolvendis tam multis Auctoribus circa singulas ferme species requiritur, præcipue quum adeo pauca Synonyma hucusque collecta sint, eaque suis locis non citata.

<sup>105</sup> Linnaeus, *Vita Artedi*, p. 11. Inveni [...] Synonymologiam, immensi laboris opus, completissimam sed mire congestam.

(containing articles on 12 species) covers pages 110 to 118, and the index of fish names in various languages covers 19 unpaginated pages.

The arrangement of the contents is basically the same as in *Genera*, with the hierarchy in three tiers: orders, genera, and species. The species form the true objects of study, for here Artedi gave the specific names, followed by a reference to the corresponding article in *Descriptiones* (if any), and then listed all the names used for each particular species, by any author<sup>106</sup> from Aristotle to his own time. This covers the names in Latin, followed by the vernacular names, mostly without the name of any author, that is, names used in Sweden, Denmark, Germany, Holland,<sup>107</sup> England, France, Italy, Spain, and miscellaneous countries.

The final index lists the Greek names. All items are furnished with a reference to the relevant page in *Synonymia* itself. Despite its humble placing at the very end of the part, this index is a work of crucial importance providing the student who knows a fish by one of its vernacular names but nothing else with a simple and practical entrance into Artedi's world of fishes. The vernacular name, if found in the indexes, will point the reader to the relevant page in *Synonymia*, thereby providing a specific name and, in many cases, a page reference to *Descriptiones*.

*Synonymia* covers the greatest number of species by far, while *Descriptiones* has the smallest number and *Genera* falls in between. This means that many species are only represented in *Synonymia*, in which Artedi offered a wealth of information on authors and vernacular names. In these cases, he also added his own diagnostic names (adding a modest 'Art.' to indicate his authorship), and sometimes even a fuller description, without bothering to insert them in *Genera*.

An incongruent article in *Synonymia* is found on 6. *Salmo*, a species that has no counterpart in *Genera* or *Descriptiones*. The information on this Alpine species, called *Salmarino* in Trento, was culled almost word by word from Ippolito Salviani's *Aquatilium animalium historiae*, (Rome, 1554–1558, p. 106). The article may be taken as a demonstration of Artedi's desire to present information on all the species found by

<sup>106</sup> Artedi's precision in referring to the correct pages of his authorities is truly amazing: I have personally checked all references to all authorities found in the library of the Royal Academy of Sciences, kept at Stockholm University Library, viz. Aldrovandi, Belon, Charleton, Gesner, Ray, Rondelet, Salviani, and Wotton, and found very few errors indeed.

<sup>107</sup> Like most Swedish authors of the 18th century, Artedi spoke of *Belgae*, meaning Holland.

himself or that came to his knowledge during his wide reading, even at the cost of appearing confused or disorganised.

The researcher's path returning from *Synonymia* to *Genera* will be more difficult, not least because *Synonymia* only contains page references to *Descriptiones*, but also owing to a major defect in the planning of *Genera*, *Synonymia*, and *Descriptiones*: the ordinal numbers of the separate species are not the same in all three parts. The gudgeon, for instance, a species of the genus *Cyprini*, is called in *Genera* 10. *Cyprinus quincuncialis maculosus, maxilla superiore longiore, cirris duabus ad os* ('C. five inches, spotted, with longer upper jaw, two strands of beard at the mouth') but is in *Synonymia* 20. *Cyprinus* and in *Descriptiones* 5. *Cyprinus*. To resolve this issue, I was compelled to draw up a comparative table based on the items in *Genera*, adding the information offered on the same species in *Synonymia* and *Descriptiones*. The resulting Excel file offers so much information, not only on these three parts but also on the corresponding species of *Catalogus* and *Manuscriptum*, that it requires a printout in the DIN A2 format to be legible.<sup>108</sup>

#### Part V. *Descriptiones specierum piscium*

This part of 112 printed pages was mentioned by Artedi himself as the final item of his labours; Linnaeus followed suit by making it the final part of *Ichthyologia*. At the same time, it is obvious that the work Artedi put into dissecting more than 70 different species and carefully recording their anatomical details laid the very foundation of his theoretical work. This did not end when Artedi left Sweden, but the difference between his earlier work and that of his last year, spent in England, can only be seen in small, seemingly unimportant details: for instance, the article on 4. *Cyprinus* (*Leuciscus Leuciscus* L., Sw. Stäm, En. common dace) in *Descriptiones* offers a thorough anatomical account in 16 paragraphs and a table of dimensions; the species has the same ordinal number in *Synonymia* but in *Genera* it is 13. *Cyprinus*. Artedi apparently did not know its English name. When numbering the fin rays, he called them *radius*. On the other hand, the article in *Descriptiones* on 5. *Cyprinus*<sup>109</sup> (*Gobio gobio* L., En. gudgeon) enjoys an article of 15 paragraphs but lacks a table of dimensions. For this species, Artedi offered the vernacular names in Danish, German, English, and French, but he

<sup>108</sup> A PDF copy of this file, always updated with the latest corrections, is at the time of printing available from my homepage: [www.hansaili.se](http://www.hansaili.se) under the heading *Artedi*.

<sup>109</sup> = *Genera*: 10. *Cyprinus*; *Synonymia*: 20. *Cyprinus*.

apparently did not know its Swedish name, Sandkrypare. The rays of the fins are here called *ossiculum* 'small bone'. This designation was the one he consistently used in most of the articles of *Ichthyologia*, and in all of articles of *Manuscriptum*. These two observations from two articles, otherwise very similar in language and organisation, convincingly demonstrate, first, that the gudgeon was a species Artedi had not encountered or dissected in Sweden but only during his stay in England, and, second, that *Descriptiones* remained a work in progress to the end of his life.

As an example of the quality of the rich information contained in *Genera*, *Synonymymia*, and *Descriptiones*, accounts of the common herring will be presented later in this work, in Latin and English, with the corresponding information offered by the works of Sir Francis Willughby, John Ray, and Linnaeus.

*Descriptiones* does not cover more than a portion of the fishes Artedi registered in *Genera* and *Synonymymia*. Of the ten species of *Salmo* recorded in *Genera*, Artedi only reported five in *Descriptiones*, while *Synonymymia* has all ten but not in the same numerical order, and also an additional two; of the five species described in *Descriptiones*, four are also represented—with various ordinal numbers—in *Genera* and *Synonymymia*, while the fifth, rather incongruously called 2. *Salmo minor vulgari similis* ('Salmon similar to Common Salmo', no. 1),<sup>110</sup> and reported in *Synonymymia* as 12. *Salmo* (with the same diagnostic name but no more information), in *Descriptiones* enjoys a full description of 14 paragraphs. The only vernacular name offered is Sw. 'Laxunge'. Since this description is part of the body text of *Descriptiones*, Artedi's failure to report it in *Genera* can only be regarded as a blatant oversight, however unlikely it may appear in this tightly woven set of three interconnected books.

In the five parts of *Ichthyologia* we find five distinct aspects of Artedi's scientific skill: in *Bibliotheca ichthyologica* he demonstrated his wide reading and critical judgement; in *Philosophia* he showed his intellectual capacity for formulating and testing definitions, rejecting traditional nomenclature and proposing a new and coherent system of nomenclature; in *Synonymymia* he showed his prowess in sorting information; *Descriptiones* demonstrates his keen powers of observation and careful description. The wealth of concentrated information offered in *Genera piscium* makes it the real focus or hub of *Ichthyologia*, a fact

---

<sup>110</sup> = *Synonymymia*: 12. *Salmo*.

that Artedi made clear by naming it *Ipsum opus*. His reading, observing, thinking, and organising here bear their true fruits in his system of precise diagnostic names that do not conflict or contradict each other.

### Evidence of a failed coordination

It is greatly to be regretted that Artedi lost his life at the precise moment when a final editorial effort on his part could have brought symmetry and order to his entire manuscript. Instead, his errors were left unobserved and uncorrected by an editor who would not, or could not, correct them. We are left with a work containing a considerable number of inconsistencies that often lead us to suspect that more than one hand was active, albeit in a less than successful manner, in the final editing.

One example of this failure can be found in Artedi's treatment of the genus *Cyprinus*, represented by 33 numbered species in *Synonymia*, which offers the largest number of specific names, many of which were culled from Artedi's reading of his authorities. *Genera* is alone in offering the precise generic characters of *Cyprinus* but reports only 19 of its species with their individual characters, adding references to *Synonymia* and *Descriptiones* plus one specific Latin name given by some previous authority, one vernacular name (most often in English or Swedish), and a few anatomical details. In *Descriptiones*, finally, we find very detailed dissection reports on 16 species of *Cyprinus*, but all are given with their Swedish names only. This apparent confusion is probably due to the progress of Artedi's work, in which the dissections he carried out in Sweden form the practical foundation of his work, while the fishes he examined and read about in England provided material for the formal analysis of the genera and the collection of names given to each species at different times and locations but offered no opportunity for a full dissection.

The enduring problem we encounter in these three parts, as noted above, is Artedi's failure to offer a consistent numbering of the species. The genera have the same names and numbers all through these parts, and the names of the species are, on the whole, consistent, but their ordinal numbers are not. This fault defeated Linnaeus and his assistants: there is no trace of an awareness on their part, no attempt to explain this to the reader. In my translation of *Ichthyologia* into English, Volume II of the present work, the articles on every single species in *Genera*, *Synonymia*, and *Descriptiones* contain notes offering the ordinal numbers of the species given in the other parts.

Another example of incongruity is found in *Philosophia*, paragraphs 214 and 215, in which Artedi, in a curiously personal style, confessed to

his failure to establish specific differences by the normal three characters alone. His problems arose in the genus *Salmo*.<sup>111</sup>

§ 214 At times, however, there are some distinct species of one single genus that are alike one another to such a degree that they do not seem to differ by any real mark; an example of this fact is offered us by the genus *Salmo* in which all the species are entirely alike, and only seem to differ in size, colour and other accidental qualities. [...] § 215. In order that we shall be confident, which species of one genus, being similar, are in reality different from one another, the vertebrae of the back should be counted (which is best done in fishes cooked). The number of these vertebrae is always the same in each single species, and, to the contrary, usually different in different species. Care, however, must be exercised, that no error in counting should be made, and therefore the entire dorsal spine, well separated from flesh and membranes, should be divided by knife, in a bowl or on a clean table, into its vertebrae, and these afterwards carefully counted, so that their true number should be known. Again and again I advise that, in order not to omit the outermost vertebra at each end, that is, the one closest to the tail and the cranium, and, also for the sake of making certain, we should count the vertebrae not only once, but a number of times.

In this charming and personal, although rather verbose, account, Artedi appears indirectly to relate his enjoyment of eating the objects of his research, but he probably spoke here of experiences he made in a period long past, even when he was a student at Uppsala. In another of his descriptions, namely his article on the herring, given in *Catalogus* (quoted below), he made a point of the importance of noting the number of vertebrae. It would appear, however, that he overcame this difficulty, for when he dealt with the troublesome species of *Salmo* in *Opus ipsum* (Part III *Genera*), *Synonymia*, and *Descriptiones*, the number of vertebrae did not serve any visible diagnostic purpose. In *Genera*, ten

<sup>111</sup> 214. Interdum vero dantur species aliquot distinctæ unius generis, quæ sibi adeo similes sunt, ut in nulla reali nota differre videantur, cujus rei exemplum nobis exhibet Genus Salmonis, in quo omnes species sibi simillimæ sunt, et magnitudine tantum, colore et aliis rebus accidentibus discrepare videntur. [...] 215. Ut autem certi erimus qua ratione Ejusmodi species Unius Generis sibus similes, vere a se invicem differunt, *Vertebræ Dorsi* numerari debent (quod optime in Piscibus coctis fit). Numerus enim harum vertebrarum semper in una eademque specie idem est, et contra diversis plerumque in diversis. Ast cavendum est, ne error aliquis in numerando committatur, proinde tota dorsi spina a carne et membranis bene separata, in patella vel mensa munda, cultello in suas vertebrae dividenda est, quæ postea bene numerantur, ut numerus illarum verus innotescat. Iterum tamen atque iterum moneo, ne vertebra utrinque ultima, seu caudæ et cranio proxima, in separatione omittatur, neque semel tantum, sed aliquoties certitudinis causa numerari debent.

species of *Salmo* are listed, four of which are also represented in the dissection reports of *Descriptiones*. In *Synonymia*, the number of species has risen to 12. *Descriptiones* contains five species of *Salmo*: in 1. *Salmo*, the number of vertebrae is given in § 29, which is the last one concerning this species; in 2. *Salmo* and 3. *Salmo*, information on the number of vertebrae is lacking; in 4. *Salmo* it appears as § 1; in 5. *Salmo*, it is again lacking. The same observation is valid for the short characteristics belonging to the species of *Salmo* that only appear in *Genera*: 2. *Salmo*, 4. *Salmo*, 6. *Salmo*, 7. *Salmo*, 9. *Salmo*, and 10. *Salmo*. All of them ignore the number of vertebrae. We may conclude, therefore, that when writing *Ichthyologia* Artedi had successfully mastered the problem of distinguishing the different species of *Salmo* without having to cook the fishes, dissect them, and laboriously count their vertebrae.

Part V *Descriptiones*, too, is not entirely devoid of contributions by Linnaeus. At the end of the article of the last species of *Cyprinus* described, 16. *Cyprinus*, we see indications of his hand in action:

I consider that *Cyprinus minimus*, which was discovered in Lapland at the Church of Lycksele by our Friend, the famous Linnaeus, during his travels in Lapland, is the same as our fish. Our highly praised Authority gave an even better description in his *Iter Dalecarlicum*, among the *zoologica* he noted on the first day; in this, his most carefully executed account, the fish was often found in the very smallest of streams in all of Dalarna.<sup>112</sup>

The last species of *Salmo* accounted for in *Descriptiones*, 5. *Salmo*, offers material for another observation. In *Genera* it appears as 8. *Salmo vix pedalis, pinnis ventris rubris, maxilla inferiore paullo longiore* ('*Salmo*, barely one foot long, fins of belly red, lower jaw somewhat longer'). It is a cold-water fish native to mountain lakes. Artedi apparently never visited the Swedish mountains, where it is called *Fjällröding*, and therefore failed to dissect it while still in Sweden; he probably found it instead at one of his London taverns and therefore knew that it was called, in Wales, *Torgoch*.<sup>113</sup> Linnaeus, however, had come across this species during his travels in Lapland, and added a description of

<sup>112</sup> Cum hoc eundem puto esse *Cyprinum minimum*, qui in *Lapponia* ad Templum *Lyckselense*, ab Amico nostro Cel. *Linnaeo* in *itinere Lapponico*, detectus est; perfectior<em> autem ejusdem piscis descriptionem dedit laudatissimus Auctor in itinere suo Dalecarlico inter *zoologica* primo die observata, in quo curiosissimo itinere per totam Dalecarliam in rivulis saepe minimis repertus est. [Typographical error in source text corrected within pointed brackets.]

<sup>113</sup> He also knew its Swiss name, *Reutele*.

it in *Descriptiones*, calling it 5. *Salmo*. His contribution to this part is worthy of a full translation.

5. *Salmo*, barely one foot long, fins of belly red, lower jaw somewhat longer.<sup>114</sup>

*SALMO Laponicus Alpinus* of Linnaeus, described in *Iter Laponicum*, called, by the new population<sup>115</sup> of Lapland, *Rödfisk* and *Röding*; on this Linnaeus *op. cit.*

Very common in the highest lakes of the Lapland Alps and there, this fish is the only one to occur in real quantities. The Lapps fish it during the summer, it is grilled fresh before a fire, is eaten without butter, salt or bread, very delicious on the palate. It is suspected to be found in the same shape under the name of *Torgoch* in the Welsh Alps, and to be described in the *Acta Anglicana*, since its flesh is bright red, its colour silvery and its locality the mountains. One may wonder, and not without reason, that this fish manages to keep alive in the mountains of Lapland, because neither vegetables nor fishes nor insects are found there at all. The author also believes that this very fish was transported there during the universal Flood, as horrible waterfalls everywhere hinder any fish from making its way up the mountains. Other details deserve to be described in full when the Author's highly desired work, *Iter Laponicum* shall be published.

Compared to Artedi's careful and systematic descriptions of his fishes,<sup>116</sup> Linnaeus's contribution is definitely inferior in quality. True, he does mention three vital characteristics of the species: its silvery colour, its bright red flesh, and its restricted habitat. He does not mention its

---

<sup>114</sup> 5. *Salmo vix pedalis, pennis ventralibus rubris, maxilla inferiore paullo longiore.*  
*SALMO Laponicus Alpinus* Linnæi, in itinere Laponico descriptus, *Roedfisk* Novaccolis Lapponiæ et *Roeding* dictus; de quo Cl. Linnæus loco citato: in lacubus summis Alpium Lapponicarum frequentissimus, et in his fere solus hic occurrit piscis sat magna in copia, qui a Lapponibus per æstatem piscatur, assatur ante focum recens, editur absque butyro, sale et pane, palato gratissimus; suspicatur, et eundem reperiri sub nomine *Torgoch* in alpibus *Walliæ*, inque *Actis Anglicanis* descriptum esse, cum caro ejus sit ruberrima, color argenteus, locus alpinus; miratur, nec sine causa, quod piscis hic in alpium Lapponicarum lacubus vitam sustentare queat, cum in istis nec vegetabilia, nec pisces alii, nec insecta facile reperiantur ulla; putat et eundem sub diluvio universali eo delatum fuisse, cum horrendæ cataractæ ubique impediunt, quo minus ullus piscis alpes ascendere possit. Merentur et omnia reliqua evolvi, cum prodierit desideratissimum diu opus Auctoris Lapponicum.

<sup>115</sup> The Swedish population, recent immigrants, as opposed to the original inhabitants, the Lapps. The two names mentioned are clearly Swedish.

<sup>116</sup> Cf. his treatment of *Clupea*, below.



number of vertebrae, a fact that permits us to believe that the problem recounted above was felt by the young Artedi himself.

The diagnostic descriptions are usually identical in the three parts but the ordinal numbers of the species, as noted above, are quite often widely different. The genus *Pleuronectes*, containing ten species of the flounder, proved particularly troublesome to Artedi, who sometimes created one diagnostic name in *Descriptiones* and another one in *Genera*. One instance is the common dab, or *Limanda limanda* L., which is called in *Genera* 2. *Pleuronectes oculis a dextra, squamis asperis, spina ad anum, dentibus obtusis* ('P. with eyes on the right side, sharp scales, spine at the anus, blunt teeth') but in *Descriptiones* 2. *Pleuronectes squamis asperis, spina ad anum* ('P. with sharp scales, spine at the anus'). In *Synonymia*, Artedi or Linnaeus tried to compensate for this double naming and offered both names, the longer one first and the shorter one underneath (with a page reference to *Descriptiones*), but gave the species a new ordinal number: 9. *Pleuronectes*.

On the other hand, when Artedi entered the result of his study of the swordfish, the only species attributed to genus 24, *Xiphias*, he did not do so in the expected fashion by giving the generic diagnosis in *Genera* and the dissection results in *Descriptiones*: instead, he entered both sets of information in *Genera* and gave the literary references to the species, without diagnostic details, in *Synonymia*, but did not mention either the genus or species at all in *Descriptiones*. The literary references cover half a page in *Synonymia*, ranging from Aristotle to Ray and offering names in Greek, Latin, Swedish, English, and Italian. This is evidence that he knew this species quite well, even from personal inspection, although the descriptive part covers only the outer aspects: length, snout, jaws, mouth, dorsal fin, shape of the tail, anus, pyloric appendices, air bladder, and cartilages. This is much more than would be needed for a diagnostic name but far shorter than his normal dissection reports. It is hard to find an explanation for this unique approach, unless we assume that Artedi, at the time when he tackled the swordfish, regarded *Descriptiones* as a finished work and therefore entered an adapted version of his dissection report in one of the two books that was still open for additions, viz. *Genera*.

Artedi's unfinished work, the contribution to Seba's *Thesaurus*, rather remarkably, does not systematically follow his three-tier system but presents the species in a sequence that appears somewhat haphazard. The reason is, quite simply, that he was committed to follow the presentation of Seba's collections as offered by Plates 21 through 31

in Volume 3 of *Thesaurus*. They appear to have been prepared under Seba's own supervision and were already printed at the time when Artedi wrote his manuscript.

It is reasonable for us to assume that the dissections Artedi carried out on fishes caught at Nordmaling and Uppsala, and his descriptions of them, predate the more succinct but also more wide-ranging information contained in *Genera*, and that the diagnostic naming originated during Artedi's dissection labours at Nordmaling and Uppsala. Hence, the ordinal numbers and names given in *Descriptiones* were the original ones, sometimes to be criticised and changed by Artedi himself during the preparation of *Genera*. While preparing *Synonymia*, Artedi then attempted to bring order into this chaos by giving both diagnostics. His untimely death put an end to his labours before he had had time to edit this mass of text and left this rather thankless task to Linnaeus and his assistants, who in their turn failed to arrange the information in a perfect order, a failure that shines through most clearly in the confused ordinal numbers.

### Methods compared

Artedi's particular gift was to observe, note, and provide an orderly progression and high precision to his descriptions of the physical properties of his specimens, but it is very clear from all of his descriptions that he never sought to increase precision by using a microscope or even a magnifying lens. All the body parts he mentioned and described can be seen by the naked eye—this is the essence of his 'natural' method.

The practical results obtained by Artedi's mode of observation are best demonstrated by direct comparison between his own description of one particular species with those of Willughby and Ray before him, and Linnaeus after him. Our comparison will deal with the species *Clupea harengus* L., that is, the Atlantic herring. Both Artedi and Willughby described the North Sea herring, which is considerably larger than that of the Baltic Sea. Artedi emphatically maintained that this difference is one of size, not of quality, a position also upheld by Professor Sven O. Kullander.<sup>117</sup> The original descriptions, written in Latin, are far too

<sup>117</sup> *Nationalnyckeln*, 2012, p. 98. The Atlantic herring is regularly called 'Sill', a name also employed in the south of Sweden, while 'Strömming', which is the name used by Artedi, is a commercial name given to herrings caught north of the town of Kristianopel in the province of Blekinge. The difference in size incidentally gave rise to a grammatical example in Hjalmar Hjort's German grammar (1897), 'Die

lengthy to be reproduced here. The reader is therefore referred to the original works.<sup>118</sup> All translations are my own.<sup>119</sup>

Sir Francis Willughby (pp. 218–19) assigned to this genus those fishes that fall under the general description:

Fishes, not spiny, which have a single fin on their back, sea-living. Their characteristic mark is a saw-shaped line, composed of scales, at the lowest keel of the belly, a shining silvery colour on the flanks and belly, and large scales that easily fall off.<sup>120</sup>

§1. *Harengus* Rondel. Gesn. p. 486. Aldrov. *lib.* 3. *cap.* 1. *Chalcidius species* Bellonio.

A Herring.

The Herring, a very well-known fish, is nine inches and sometimes one foot in length, in width<sup>121</sup> two or three inches. The head is compressed; the mouth is turned upwards; the back is darkish blue; the belly and sides are white; when scaled it is silvery. No spots on its flanks. The scales are large and rounded. The belly is pointed, full of spines, with tooth-shaped scales in a continuous row from the head all the way to the tail. Lateral lines with spots are barely visible on this fish. The iris of the eye is reddish. The lower jaw is longer or more prominent than the upper one, with little sharp teeth, as are on the tongue and the middle of the palate: but the tongue is pointed. The gills are four as in most other fishes: their comb-like filaments on their outer sides are much longer than in other fishes, red in colour. The first, second, and third gill arches have only one row of filaments, the final one has two, but the inner ones are small. Nay, even on the small bone outside the gills there grows a single row of comb-like filaments. The single fin on its back is about half the length of the whole fish, that is, it is placed

---

Heringe der Ostsee sind magerer als die der Nordsee' ('The herrings of the Baltic Sea are leaner than those of the North Sea').

<sup>118</sup> References to printed sources are given in the bibliography.

<sup>119</sup> Prof. T. W. Pietsch very kindly gave a more professional touch to the wording of my translation of Willughby. My reasons for not adhering to this principle in my translations of Artedi are given in the introduction to *Ichthyologia*.

<sup>120</sup> [Page heading] Pisces non aculeati, quibus unica in dorso pinna, marini. [Text] Cap. IX. De Harengiformibus. Horum nota characteristicum est linea serrata e squamis composita in ima ventris carina, color in lateribus et ventre argenteus splendens, squamæ grandes et facile deciduæ.

<sup>121</sup> Willughby: *latitudine*, literally 'in width'; this probably to the vertical dimension of the fish (when swimming), that is, its height or depth. Willughby probably observed his specimen when it was lying flat on a plate or a board, in which case its height became its width. Artedi employs the adjective *latus* 'wide' and the noun *latitudo* in exactly the same way, adding when necessary, an amplification, *horizontalis* or *perpendicularis*.

at equal distances from the point of the snout and the end of the tail, furnished with about seventeen gristly rays, the fourth or fifth of which are the longest. The tail is forked. The branchial fins have 17 rays each. The ventral fins, at the lowest point of the belly in the same region as the dorsal fin, have nine. From the anus it is furnished with 17 tendons placed rather far from each other. At the roots of the fins, scales can be seen, placed crosswise and drawn out to a point.

The swim bladder extends along the back throughout the whole length of the abdominal cavity, a passage or long channel is drawn to it from the stomach, where the bladder penetrates the recess: or, better, the stomach itself degenerates into the channel. The bladder is silvery in colour. The gall bladder is large, full of green gall. The spleen is red. The intestine runs down straight from the stomach to the anus.

They die very quickly if out of the water, owing to a large cleft in their gills (Rondelet). It expires as soon as it reaches clear air, without any delay. Hence the famous English adage: 'As dead as a Herring.'

It has fat, soft, and delicate flesh. When grilled fresh on a small grid-iron or fried in a frying-pan and seasoned with butter, it finds its greatest favour with the palate, and thanks to its excellence of taste it hardly cedes place to the most elegant fishes, whence it is called by our countrymen, The King of Fishes.

Whether the Herring lives on water only or not, is the question. Schönevelde says that the latter is not likely, as the stomach of the Herring is never so empty that it does not contain something, either black slime or, when the time for mating has come, something like red eggs. The pyloric caeca, which it does possess, being rather long and seventeen in number, in a continuous row from the pylorus, from the beginning of its one intestine, are never empty of their proper juices.

The Herring (Schönevelde says) is used in various ways in the kitchen. It is boiled fresh and eaten with radishes and vinegar, or (as we said above) it is grilled on a small grid-iron or fried with butter in a frying-pan, a great boon to the poor. But when the fish is soft and like excrement it will easily send a fever on those who enjoy it carelessly.

Among our countrymen it is considered as healthy as it is tasty, particularly when grilled on a grid-iron, nor has it been vilified for causing attacks of fever or other maladies; but in the beginning of autumn, when it first swims to our shores, it is sought very eagerly by everybody, and is eaten to satiety.

When preserved in salt and brine it is packed tightly in a jar and is therefore called 'preserved', that is, 'pickled'. When this has reached its right age and

has imbibed the brine enough, it is eaten, first of all mainly raw, with great enjoyment, then during the whole season either alone or with onions, the skin having first been removed. After being soaked for a couple of days it is also eaten with vinegar and butter or only vinegar. Our countrymen fry them, pickled in salt and brine, on a grid-iron and eat them with butter and a little vinegar. But if it should be too salty, which often happens, it must first be soaked in water. Pickled or preserved herring is not eaten raw by our countrymen: nor are they familiar with the art of preserving that the Dutch use.

Lightly sprinkled with salt and afterwards hung in smoke and hardened, the Herring is called 'dried and smoked', in English a Red Herring, in French *Harenc Saure*. Mr. Philippus Skippon has carefully written this to us concerning the capture of the Herring, and on the ways of salting it and hardening it in smoke.

In the sea that laps the shores of Suffolk and Norfolk, around the towns of Yarmouth, Lestoffe<sup>122</sup> and Southwold, it is thought that the most suitable season for catching Herring is from the middle of September to the middle of October. The nets used by the fishermen are about two and a half lasts wide, that is, deep, twenty ells long, without any sack hung from their rear ends. They join this kind of net, as many as necessary, to each other, so that they extend to the length of an entire mile. A thick and strong cable (they call it a Wallop) is firmly tied with short ropes called Seafins to the middle and extreme ends of the ropes that are stretched to the separate nets and hold small balls of cork. This is done to strengthen the ropes just mentioned, in case of a stormy wind rising or if the nets are weighed down by a great load of caught fish, so that it takes a great effort to pull them up. The fishermen form an opinion of the places where the schools of Herring might be from the sea birds flying above: for these birds always follow the fish in order to catch them and observe every move they make. The fishermen sink their nets into the sea, while gently rowing forwards, and steer a course, as much as they can, across the swelling of the waves, but in a following wind they often drag their nets. The herrings sometimes swim along with the current, sometimes against it, sometimes they travel on a course across its direction. As soon as any small boat is sufficiently loaded with caught fish, they hurry to the shore, and show the fish there; the fish are then received by the man to whom the task of washing, salting and drying them was entrusted [the tower].

They separate Herrings into six species or rather grades.<sup>123</sup> The first is called *Harengus pinguis* [fat herring], which is large and fatty and hardens for two

<sup>122</sup> Now Lowestoft.

<sup>123</sup> In this section, 'species' is a commercial grading.

or three months. 2. *Harengus carnosus* [the meat herring] which is equally large and rich in meat, but less fat than the foregoing. 3. *Harengus nocturnus* [the herring of the night]. This is of middle size, but less fat or rich in meat than the two preceding kinds. 4. *Harengus ruptus* [called pluck], which was partly damaged or torn when being hauled up, entangled in the nets or stuck in them. 5. *Harengus vacuus* [a shotten herring], which has recently mated and is empty of roe or milk, that is spawn. 6. Finally, *Harengus acephalus* [a copen], which has had its head removed by one accident or other while being pulled out of the net.

All these species they salt in the following manner. Into a barrel of one last or of at least half that capacity they first put a sufficient amount of salt, then about 500 Herring in one lot [they call this measure a swill], those that have been put in they turn over once and again with a pole, all the time sprinkling salt while turning; in this manner they repeat the same job of salting and turning the Herring just put in, until the barrel is filled. The Herring that were put into the bottom of the barrel and then salted become rigid at once, and they do not mix with those higher up that are agitated during the salting. After 16 or at the most 24 hours they remove the Herring and put them into wicker-work baskets with a structure so loose that they easily let pass the salt, the scales and other waste, when the fish are drenched in water and washed.

They take out the fish, stick them on thin and long wooden javelins and hang them indoors to be smoked, on wooden implements made for this purpose and affixed to the top part of their houses, and the fish hang so far down from the ceilings that a man of middle size will easily touch them with his arm stretched. These javelins, laden with Herring, are attached in rows on long wooden staffs, called Loves, which are affixed in either end to a kind of trunk [they call them bawks], a distance of five twelfths (of a foot) being left between each. The trunks [the bawks] are inserted into poles affixed to the ceiling and the tiers, as it were, of javelins are very many, an interval of ten or more fingers being left between each. On the floor beneath they build pyres of wood chipped into thin twigs, which they put on fire every four hours. With closed doors, the fire, suppressed by some method, will smoke out as no air-hole is left, while the smoke escapes through cracks and spaces between the tiles. About five hundred chips [billets] suffice completely to smoke one last.

After a space of one single month they are ready for domestic sale; those, however, that are exported into transmarine regions inside the Straits of Cadiz, require six weeks. If the weather should be rainy or windy, the Herring will dry more slowly in the windward side of the house. Therefore, as far as possible, they build their houses in places that are safe from the wind thanks to shelter from other buildings, or trees, walls, mountains, or hedges.

For the preserving or curing (as they say) of the Herring they use Spanish salt, believing this to be the most suitable quality compared to others. One and a half *cadus* (a large vessel) [a barrel] of salt suffices for salting one Last. One vessel, that is one barrel, takes about seven hundred fat Herring; of the other qualities a thousand, more or less, will fill a vessel. Ten vessels [*barrelli*] make one said Last.

Fishermen very often, when they have caught few fish, preserve or cure them on board their boats in the middle of the sea; but these fish are considered not as good as those that are preserved on shore, where they are cured more conveniently.

White Herring, that is, preserved ones, called Solstitials as they are caught around the summer solstice, are very large and fat indeed, and these are preserved in brine but empty of gills, intestines, and roe, and therefore called Pickled Herring. The Dutch have learned to prepare these more neatly and elegantly than our countrymen. Three, more or less, *cadi* of Spanish salt suffices to salt one Last.

The French and others are clever at drying Herring in the Sun, and exercise this art. The season of the year that is most suitable for the drying of Herring is when they visit the shores of Norfolk and Suffolk.

The Herring swim in schools and love the littoral regions; they mate once a year at the time of the autumnal equinox; while carrying [their eggs] in the ovaries, they are better and more excellent. Schwenckfeld.

John Ray, *Synopsis methodica*, London 1713, pp. 103–04, treated this species more succinctly.

A I. *Harengus* Rondelet, Gesner, Aldrovandi. *Chalcidius* species Bellonio. A Herring.

This species of fish is nowadays so well-known and famous all over Europe that it would be superfluous to look for its characteristic marks. Its length is nine inches or a foot, its width<sup>124</sup> two or three inches. The head is compressed, as is the whole body, dressed in large and somewhat rounded scales that fall off easily; with a back that is darkish blue, belly white, silvery when scaled. It has a pointed belly full of spines, denticulated scales, ordered in a continuous row from the head all the way to the tail. The lower jaw is longer than the upper one, and sharp with small teeth, as are also the tongue and palate. It expires extremely quickly when out of the water.

---

<sup>124</sup> That is, depth.

When cooked fresh on a small grid-iron or fried in a frying-pan and seasoned with butter, it is considered as healthy as it is tasty and agreeable to the palate. However, many write that it gives a fever to those who heedlessly enjoy it when it is soft. Salted or cured in smoke it is transported to distant regions, with a great profit to the sellers. Every year Herring are captured in a number clearly defying belief. Herring swim in schools.

Peter Artedi, *Catalogus piscium maris Balthici*,<sup>125</sup> must be held to be Artedi's oldest finished ichthyological work, seeing that he handed his manuscript over to Sir Hans Sloane in November 1734 at the earliest or in May 1735 at the latest. His nomenclature and description are, in this work, to a great extent consistent with that of his authorities, particularly Willughby and Ray.

Fourth Genus: *Clupea*.

1. *Harengus*. Rondelet bk. 7, p. 222

— — Gesner p. 408 and 486

— — Willughby p. 219

— — Ray p. 103.

*Chalcis*. Wotton bk. 8, ch. 183, fol. 162b.

'A Herring' in England. 'Sill' in Sweden.

Note: To this Species (1) should also be referred:

*Harengus minor sive Pilchardus* (*Harengus*, smaller, that is, Pilchard). Willughby p. 223

— — Ray p. 164. *Alosa minor*. Charleton p. 151, line 2.

'The Pilchard' in England. 'Strömning' in Sweden, but in the Denmark Sound and in other locations it is also called 'Sill'.

#### Observation.

These fishes are in no way a separate species but differ only by their *size*. All their parts, external as well as internal, agree in Numbers, Shape, Place, and Proportions. Indeed, in both fish the Vertebrae of the back are 56 in

<sup>125</sup> Based on an earlier publication that appeared in the *Zoological Journal of the Linnean Society of London* 189 (3), 2019, 975–97: H. Aili and T. W. Pietsch, 'Peter Artedi's Catalogue of the Fishes of the Baltic Sea: An English translation, with an introduction and commentary'; used with permission of Oxford University Press.



number, although, through eight years of observations, I have made the certain observation that these differ in number in all Species of any particular Genus.

### Peter Artedi *Ichthyologia sive opera omnia de piscibus*. Leiden 1738

In this, his major work, Artedi presented the various aspects of his information on the different genera and species, first in Part III *Genera piscium*, then in Part IV *Synonymia nominum piscium*, and finally in Part V *Descriptiones specierum piscium*. The information given in *Synonymia*, offered in a highly compressed form, shows that the species ultimately named by Linnaeus, *Clupea harengus*, was called Χαλκίς and Ἄρας by Aristotle,<sup>126</sup> *Chalcis* by Pliny,<sup>127</sup> and *Harengus* by Rondelet, Gesner, Schonefeld, Jonston, Willughby, and Ray. Artedi named it 1. *CLUPEA maxilla inferiore longiore, maculis nigris carens* [*Clupea*, lower jaw longer, lacking black spots'], and referred to it not only Pliny's *Chalcis* but also Isidorus's *Halec* and Rondelet's and many others' *Harengus*.

*Clupea*, on the other hand, was the name Pliny assigned to a freshwater species called Θρίττα by Aristotle,<sup>128</sup> a fish that Pliny described in the following manner:<sup>129</sup>

*Attilus* in Po, by sloth it sometimes fattens up to a thousand pounds; if caught by a hook on a chain it will only be hauled up by means of the yoke of oxen. And the smallest fish of all, called *Clupea*, attacking it with remarkable eagerness, kills it by biting a certain vein in its gullet.

Later ichthyologists, from Charleton to Willughby and Ray, chose instead to apply the name *Clupea* to a saltwater fish. Artedi, walking in their footsteps, named it 3. *CLUPEA apice maxillae superioris bifido, maculis nigris utrinque* (*Clupea*, tip of the upper jaw two-cleft, black spots on each side') and offered a number of vernacular names applied to it, for example *Alosa*, *Clupea*, *Sarda*, *Sardina*, shad, and pilchard, commenting that they all appeared to refer to the same species. Why he settled on *Clupea*, first mentioned by Pliny, as the generic name remains a mystery, as *Chalcis*, *Thritta*, and *Aras*, used by Aristotle, clearly

<sup>126</sup> *Historia animalium*, 4, 9; 6, 14; 8, 20; 9, 37; and 6, 15.

<sup>127</sup> *Naturalis historia*, 32, 11.

<sup>128</sup> *Historia animalium*, 9, 32.

<sup>129</sup> *Naturalis historia*, 9, 17: *Attilus* in Pado, inertia pinguescens ad mille aliquando libras, catenato captus hamo nec nisi boum iugis extractus. Atque hunc minimus, appellatus *Clupea*, venam quandam eius in faucibus mira cupidine appetens morsu exanimat.

have the greater authority, and *Harengus* was the name preferred by a number of Artedi's own predecessors. *Synonymia*, however, is only a vast collection of names of authorities and species without offering any detailed reasoning on Artedi's part.

In Part III *Genera piscium* Artedi presents this genus thus:

#### IV. CLUPEA.

*Branchiostegal*<sup>130</sup> *membrane* contains eight small bones on each side. *Belly* very pointed, that is serrated, so to speak, owing to the individual location of its scales. *Dorsal fin* somewhat closer to the snout than ventral fins.

1. CLUPEA, *lower jaw longer, lacking black spots*. Artedi *Synonymia* p. 14, *Specierum descriptiones* p. 31.

*Harengus* and *Chalcis* of the Authorities, *Herring* and *Hering* in England, Germany, Holland.<sup>131</sup> *Harang* today in France. In Sweden those born smaller are called *Strömming* and *Hering*, the larger are called *Sill*. Vertebrae 56. Pyloric appendices 17. Small teeth in each jaw, tongue and palate.

Part IV *Synonymia nominum piscium*, offers a very brief comment.

CLUPEA, Genus of Fishes No. 4.

1. CLUPEA *lower jaw longer, lacking black spots*. Art. *Specierum descriptiones* p. 31.

Part V *Descriptiones* contains Artedi's own observations. The herring of the Baltic Sea was one of those species that Artedi had dissected completely and probably more than once.

CLUPEA, Fourth Genus of Fishes.

1. CLUPEA, *lower jaw longer, lacking black spots*. *Strömming* in Sweden.

<sup>130</sup> The adjective *branchiostegal*, 'pertaining to the membrane which protects the gill chamber' (OED), was first attested in *Philosophical Transactions of the Royal Society* of 1752. It was not used by Willughby in his description of the herring, nor was it used in 1751 by John Hill, who preferred *branchiostege* when quoting Artedi in his satirical attack on the Royal Society (quoted in Appendix II) and in his outright plagiarism (1752) of *Ichthyologia* (Pietsch and Aili 2023e); it is nonetheless tempting to assume that the adjective entered the English language from Artedi's frequent use in *Ichthyologia*, and it is therefore a constant, although possibly anachronistic, feature of my own translations of Artedi's works.

<sup>131</sup> Artedi consistently called the Dutch *Belgae*, a convention faithfully observed by many Swedish authors and diplomats of this time; cf. Helander (2004, 243).

1. *Head* compressed from the sides, at front somewhat pointed.
2. Upper part of the head between the snout, the eyes, and the back is carved out, that is, somewhat concave.
3. The *open mouth* is large compared to the body.
4. When the mouth is opened, the snout rises somewhat, and the maxillary ossicle of the upper jaw, which covers the lower jaw on both sides, juts strongly forward.
5. The lower *jaw* projects much in front of the upper jaw, and when the mouth is closed it is hidden and covered on each side by the maxillary bone of the upper jaw.
6. The *nostrils* are conspicuous, provided with a double opening, of which the front one cannot be observed by the bare eyes; they are slightly closer to the snout than the eyes.
7. The *eyes* are large, sited on the sides of the head. Iris of silvery colour.
8. *Teeth*, some extremely small ones: (a) at the tip of the lower jaw but on the upper jaw they are so small that they can hardly be seen by the less experienced; the same obtains in the tip. (b) The lateral bone of the upper jaw, which covers and closes the lower jaw, is also lightly serrated in its circumference. (c) In an oblong area, in the middle of the front part of the palate, sown with little teeth, there are two rows of little teeth located longitudinally straight on the part of the palate closest to the snout. (d) The tongue, somewhat pointed and free below, is armed with very small teeth, blackish in colour, directed toward the rear.
9. *Spots*, mostly pretty, red, or violet, on both sides at the end of the gill covers.
10. The *gill covers* — except the named spots (9) — are silvery in colour and consist of three or four bony laminae and eight ossicles that are a little bent and joined below on both sides by a membrane.
11. The *lateral line* is straight, closer to the back but not very conspicuous.
12. The *scales* are large compared to the body, of silvery colour, fall off easily, situated like gutter-tiles.
13. The *back* is dark grey, but more bluish in the spring season. Flanks and belly of silvery colour.
14. The *belly* is in its entirety, from the gills to the anus, somewhat rough and contracted into a sharp keel; the back is convex, that is, neither pointed nor flat.

15. Four *gills* on each side of which the three outermost or largest are provided with a single row of apophyses shaped like rakes that are very long in the outermost, that is, the largest, gill, not dissimilar to the feathery parts of the wings of birds. The bottom, or smallest, gill has a double row of sharp apophyses of which the lowest are the shortest.
16. *Dorsal fin* in the middle, single and whitish, of nineteen rays of which the first four are simple, all the others slightly divided at the tip; the first two are small.
17. *Pectoral fins*, whitish, sited by the belly, of eighteen rays of which the first is simple, all the others slightly split at the tip; the outermost are smallest; the first one is largest along with those nearest.
18. The *ventral fins* are white and small, with nine rays, of which the first is simple, the others split in four at the tip; the first one is large along with the nearest ones, the end one smallest.
19. The *anal fin* is white, very close to the tail, of 18 or 19 rays (if one decides to count the final one as two that are extremely close to each other) of which the first two or three are simple, the others slightly branching at the tip; the first and the end ones are smallest.
20. The *tail* is two-pronged, greyish, of eighteen long rays of which two are simple, except the outermost smaller ones, the others, in the middle, branching at the tip.
21. *Locality*: In Sweden only the sea, the Ocean, etc.
22. The *heart* is four-sided, furnished with sharp angles.
23. The *liver* is red, small, angled, with the gall bladder underneath.
24. Two *ovaries*, large, simple, and wide, extended along the entire abdomen, joined beneath, packed with innumerable whitish eggs.
25. The *ventricle* is somehow double, divided below the oesophagus; however, on its right side, that is, by the appendices of the pylorus, there are also oblong diverticles containing chylus, 16 or 17 in number, located below the pylorus but only on one side of the intestine, which from there extends straight to the anus. The other, that is, the left side of the intestine, is joined at its end with the former by a kind of membrane and has its duct into the swim bladder. The *spleen* is small, oblong, by the beginning of the intestine.
26. The *air bladder* is long and narrow, extended along the entire abdomen, simple, of silvery colour, easily separated from the back.
27. The *peritoneum* is dark or blackish. The *viscus of the kidney* has the colour of coagulated blood; it adheres to the spine along all its length.

28. The *ribs* are thirty-five on each side; the vertebrae are generally fifty-six or fifty-seven. In the *Sprat* of England I have counted only 48 vertebrae; the *Herring* of England has, however, 56 or rather 57 vertebrae (and as to the species, it is one and the same as the Sill or Strömming in Sweden); in *Encrasicholus*, that is, Anchovies, there are 45 or 46 vertebrae and 9 false, not stiffened, ribs.

Full length	5 inches	3 lines
Length to middle of the eye		5
to the pectoral fins	1	2½
to the dorsal fin	2	4
to the ventral fins	2	5½
to the end of dorsal fin	2	9
to the anal fin	3	4
to the end of same	3	9½
to the beginning of the tail	4	3
Perpendicular width at the middle of the eye		6
at the pectoral pins		8½
Maximum width behind the pectorals		9½
at the dorsal fin		9
at the ventral fins		8
at the anal fin		6
Minimal width just in front of the tail		3
at the beginning of the tail		3½

Linnaeus added observations of his own in *Systema naturae* (1758, 318) concerning the genus *Clupea* but retained Artedi's diagnostic name for the species he now called *Clupea harengus*:

160. CLUPEA. *Head* with the moustaches of the upper jaws serrated. *Gill membranes* of 8 rays, gills hairy internally. *Body*: abdominal keel serrated. *Ventral fins* often with nine rays.

Harengus. 1. Body without spots, lower jaw longer. Art. gen. 7. syn. 14. spec. 37.<sup>132</sup> CLUPEA *with longer lower jaw, lacking black spots*. [...] Lives in European oceans. A fish very frequent in northern Europe.

<sup>132</sup> Reference false: the correct page in *Descriptions* is 31.

Even a cursory comparison of the various descriptions given for the genus *Clupea* and the species *Herring*<sup>133</sup> by Willughby, Ray, Artedi, and Linnaeus will demonstrate that Artedi did receive some inspiration from Willughby but sought a greater precision in his choice of salient characteristics. On page 218, Willughby gives the *Harengiformes* six characters: 'Fishes, not spiny, with a single fin on their back, sea-living' and 'a saw-shaped line, composed of scales, at the lowest keel of the body, a shining silvery colour on the flanks and belly, and large scales that easily fall off'. Artedi did accept the character of the belly and the dorsal fin as diagnostic and added the number of small bones in the branchiostegal membrane but ignored the question of habitat—true to the principles he laid down in *Philosophia* §§ 126ff. in which he distinguished between natural and genuine classes on the one hand, and artificial and hypothetical, which should be rejected, on the other. Among the latter he counted locality, time of flowering, method and time of spawning, food, and size.

It is quite clear that Artedi sought for maximum precision through condensation: not Willughby's six characters for the genus *Clupea* and more than a dozen for the species *Harengus* but three for the genus *Clupea* and two for the species 1. *Clupea*. At least, it is clear that Artedi intended these characters for systematic classification, while Willughby seemed more concerned with offering complete descriptions. Ray, however, despite denying that a list of characters was necessary for a species as well known as the herring, nonetheless offered a description that comes closer to a tool for classification, and he differed from Artedi mainly by not mentioning the branchiostegal rays. Linnaeus, finally, followed Artedi in principle by giving a small number of characters for the genus (but not the same as Artedi gave), and repeated word for word Artedi's diagnosis of the species.

When it comes to the physical description of the herring, not intended as a tool for classification, Artedi, like Willughby, started off by enumerating and describing a number of external aspects. Willughby provided a list in the margins to highlight the physical qualities he described: *magnitudo* (size), *caput* (head), *os* (mouth), *color* (colour), *squamae* (scales), *venter* (belly), *lineae laterales* (lateral lines), *mandibula* (jaws), *dentes* (teeth), *branchiae* (gills), *pinnae* (fins), and *cauda* (tail),

<sup>133</sup> My comments deal exclusively with what can be read in the quotations given and must not be construed as attempts to generalise the differences in approach between these four authorities.

plus two internal ones: *vesica natatoria* (swim bladder) and *viscera et intestina* (internal organs and intestines). This progression does not follow as fixed and formal a route as that employed by Artedi, who in this instance proceeded from left to right: head, upper part of the head, snout, mouth, jaws, nostrils, eyes, teeth, branchiostegal small bones, gill covers, lateral line, scales, back, belly, gills, dorsal fin, pectoral fins, pelvic fins, anal fin, and tail. Artedi then went on to comment very briefly on the locality before entering into descriptions of the internal organs, also more or less from left to right: heart, liver, ovaries, stomach, intestines, air bladder, peritoneum, kidney, ribs, and vertebrae (with a short discussion on the number of vertebrae in different varieties of the herring). His account ends with detailed information on length, height, and width at different points of the body. The detail offered by Artedi's description is in many ways amazing, but for the layman it is difficult to see the practical use any ichthyologist could find in it, except the undoubted pleasure of possessing exact knowledge.

Having presented this mass of detailed information on the physical properties of the species, Artedi appears to have drawn the line, indicating that he felt no need to follow Willughby further. Willughby, indeed, spent only half a page on the physical description, after which he offered information on entirely different things, such as the quality of the herring's flesh and the various ways of cooking it, noting that it was named 'the King of Fishes'. He continued by mentioning the vexed question whether the herring lived on water only; he then returned to its culinary uses, describing them in detail including information on various ways of preserving and eating it. No less than two pages (220 to 221) is then devoted to the various local methods of catching herring. We may note that the only attempt Willughby made at subdividing the genus herring is the commercial grading employed by the fishermen on their catch. The various aspects are offered in an order that is not perfectly logical, from the reader's point of view, but more resembles a ramble through an environment full of diverse and pleasing aspects.

Artedi's unique contribution lies in his careful and economical selection of diagnostic features of each genus. These physical qualities are easily observed and shared by all its species. While the roots of the generic names were given by tradition, many of them stemming from Aristotle's *Historia animalium*, Artedi chose to join the conventional *Clupea* with a longer description in Latin, the two forming a new, complete generic name. For the species, he also used the traditional name, now followed by another set of unique characters.

Artedi's novel hierarchy of three tiers, all carefully constructed to offer the maximum amount of information in the shortest possible manner, is not only a novelty through its introducing names for these tiers. It also provides a remarkable practical tool for finding the proper place of any fish within Artedi's system. This is the first of two practical roads into his system.

When aspiring ichthyologists had identified which order their fish belonged to—this was easily determined by the description contained in the very name of the order—they could work their way through the descriptions of the genera, until they found one whose short list of significant characters fitted his observation. After that they could proceed to the species listed within that genus. Their names are built up on the same principle as the description of the genera: to the proper name of the genus is added, as part of the name itself, a description defining two constant characters, now pertaining to the species, in the present instance 'Clupea with lower jaw longer, no black spots' or, in Linnaeus's binomial nomenclature, *Clupea harengus* L.<sup>134</sup> While the generic names were given by tradition, many of them stemming from Aristotle's *Historia animalium*, Artedi chose to combine this conventional name with a description in Latin, the two forming a new, complete name for the species. As noted above, Artedi had already tried out this kind of description on eight species in *Catalogus*.

The second gateway into Artedi's system offers itself to the students who know one vernacular name of the fish in question. They can turn to the alphabetical name lists printed at the end of Part IV *Synonymia*. All fish names mentioned by Artedi, in Latin, Swedish, Danish, German, Dutch, English, French, Italian, Spanish, and, finally, Greek, are listed there with page references, which instantly refer the reader to the short article of the correct species in *Synonymia*. The names of the genus and species presented there guide the reader further along the road of discovery, to Part III *Genera piscium*, which contains brief descriptions of every genus and species and also page references to Part IV *Synonymia* and, perhaps more rewarding to the devoted student, to Part V *Descriptiones*.

<sup>134</sup> Linnaeus's binomial system strikes the unwary Latinist as rather confusing, as the two names do not show any syntactical connection (the expected form would be *Clupeae harengus*): *Clupea* is a name attested from Pliny (who used it for a species of *Lampetra*), while *harengus* is a Latinised derivation of Ger. 'Hering', Eng. 'herring', Fr. 'hareng' and therefore not Latin at all. This nomenclature is remarkably similar to human personal names: a family name plus an individual name.



It will be abundantly clear that Artedi's diagnostic names for the genera and species, although cumbersome to learn by heart, are the result of an immense labour, as no two descriptions of the genera could be permitted to appear identical or even similar; the same rule applies to the specific names within each genus. We may appreciate the difficulties surrounding Artedi's labours even more if we consider that the material conditions at hand probably did not permit him to line up fishes of different species on a table for the sake of comparison. We may imagine that he wrote down a number of characteristics for each individual fish observed, and then, by comparison with other recorded observations, deleted details that agreed too closely with those of other species, until he reached the desired result: a list of species in which each had its unique description. The net result of his labours can be seen in two ways: he ordered the apparent chaos of fishes into a hierarchy of three tiers, *Ordo*, *Genus* and *Species*, all identified by significant words in Latinised Greek or phrases anchored in the old generic names and amplified with phrases describing significant characters; in addition, he performed this miracle of organisation not only on the fishes but also on the 'hairy animals', which, however, required four tiers, *Ordo*, *Sectio*, *Genus*, and *Species*, but with the same underlying principle. He also—almost *en passant*, for he did not explain this explicitly—provided his readers with a method in three or four easily understood steps for the examination of one particular fish or hairy animal and finding its right place within his system.

In terms of readability, usefulness, and general interest, Willughby is undoubtedly superior to Artedi, whose detailed descriptions would only interest a small circle of really devoted ichthyologists or those studying the history of sciences. Inevitably, Willughby's account is the most entertaining one by far. Ray's treatment is merely a powerful condensation of Willughby's, offering the same kind of information but in smaller quantities and without the entertainment value. This observation, however, does not diminish the reader's admiration of Artedi's magnificent *magnum opus*, itself a convincing demonstration of the Poet's words: *labor omnia vicit / improbus*.<sup>135</sup>

### The printing of *Ichthyologia*

When preparing *Ichthyologia* for printing, Linnaeus employed the help of assistants, most of whom he did not mention by name. However,

<sup>135</sup> Vergil, *Georgica*, 1,145: 'Indomitable labour conquered everything.'

one of them was a Swedish student named Tiburtius Kiellman (1718–c.1743), who made a number of notes about the progression of his work<sup>136</sup> and the remuneration he received. The diary, written in Latin, contains notes on his work on parts of *Ichthyologia* between 16 November and 27 December 1737 [?].

16 Nov.: *Scripsi opus Artedij* ('I wrote Artedi's work').

23 Nov.: *Tota die scripsi* ('I wrote all day').

28 Nov.: *Scripsi in opus Art:i* ('I wrote on Artedi's work').

29 Nov.: *Scripsi Domino Doctori Linnaeo* ('I wrote for Doctor Linnaeus').

30 Nov.: *Tota die scripsi* ('I wrote all day').

1 Dec.: *Tota die scripsi et finivi MSS. ichthyographica Artedi Domino Doctori Linnaeo [...] Liberalitate summa mihi dedit Dominus Doctor Linné f. 8-0-0, cum tamen non debuisssem habere ultra f. 5-14-0 pro scriptis* ('I wrote all day and finished Artedi's ichthyographical mss. for Dominus Doctor Linnaeus [...] With the greatest generosity Doctor Linné gave me Fl. 8-0-0, although I ought not to have more than Fl. 5-14-0 for the writings').

10 Dec.: *A Domino Doctore Linnaeo assumsi scribendus Bibliothecam Artedi Ichthyographicam: exscripturus, ex MSS. Artedi, haud ordinatis* ('From Doctor Linnaeus I received for copying the Ichthyographical Library by Artedi in order to copy it from Artedi's manuscripts [*sic!*], not brought in order').

21 Dec.: *Scripsi Bibliothecam, seu historiam literariam Ichthyologiae Artaedi Domino Linnaeo* ('I wrote the Bibliotheca, that is the literary history of Artaedi's *Ichthyologia* for Mr Linnaeus').

22 Dec.: *Scripsi opus Artaedi* ('I wrote Artaedi's work').

23 Dec.: *Tota die scripsi in opus Artaedi* ('I wrote all day on Artaedi's work').

24 Dec.: *Scripsi in opus Artaedi* ('I wrote on Artaedi's work').

25 Dec.: *Dies prima festi Nativitatis Christi. tota antemeridie scripsi in opus Artedi* ('The first day of the feast of the Nativity of Christ. I wrote the whole forenoon on Artedi's work').

26 Dec.: *Dies secunda festi Nativitatis Christi. tota die scripsi in opus Artaedi* ('Second day of the feast of the Nativity of Christ. I wrote all day on Artaedi's work').

<sup>136</sup> Uppsala University Library ms. X 386.

27 Dec.: *Absolvi Historiam literariam Ichthyographicam Arthedi: fuere folia 16. accepi propterea a Domino Doctore Linnaeo f. 6-8-0* ('I finished the history of ichthyographic literature of Arthedi. They made 16 folios. For this I received from Doctor Linnaeus Fl. 6-8-0').

Between 16 November and 1 December Kiellman thus copied an unnamed manuscript of one part of Artedi's *Ichthyologia* and received Fl. 8-0-0 for this labour. He commented that this remuneration was too generous, the correct sum being 5-14-0. We do not know the reason for Linnaeus's generosity. Kiellman then seems to have enjoyed nine days of rest before he resumed work, this time on the *Bibliotheca*, the text of which had not been brought into order. The work was therefore both scriptorial and editorial and took Kiellman until 27 December. The whole text covered 16 folio sheets; these were probably folded twice and cut to make 64 pages; the text covers 66 pages of print in *Ichthyologia*. The remuneration this time was Fl. 6-8-0, from which we may conclude that the work copied in November, according to Kiellman's reckoning, was a somewhat shorter text. This, however, is not possible, as *Philosophia* covers 92 numbered pages, *Genera* 84, *Synonymia* 118 (not counting the indexes), and *Descriptiones* 102 pages. The only conceivable solution to this mystery is that Kiellman in November took over a copying task started by some other scribe, the whole being worth Fl. 8-0-0. This sum would fit the copying of *Philosophia* fairly well. Linnaeus therefore seems to have paid Kiellman the sum total for the whole book, possibly forgetting the earlier copyist's contribution.

This argument presupposes that the five parts of *Ichthyologia* were copied and subsequently printed in reverse order. The arguments for this theory were presented by Pietsch and Aili (2014) and may be summarised thus: in Part III *Genera* the names of every species are followed by references to those pages of Part IV *Synonymia* and Part V *Descriptiones* in which the same species is named; in *Synonymia* there is one reference per species: to *Descriptiones*; in *Descriptiones*, however, there are no references backwards to pages in *Synonymia* or *Genera*. The fact that the internal references only point forwards, not backwards to previous parts, leads us to the conclusion that these parts were printed in reverse order: Part V was printed first, inevitably lacking internal reference to earlier parts, then Part IV with references to relevant locations in Part V, and finally Part III with references now given to both following parts. If all three parts were present in page proofs at the time when references

were added, it is impossible to understand why the editor failed to provide references to Parts III and IV in Part V.

From the above observations it is tempting to draw up an organisational scheme, as it were, for the development of the five parts of *Ichthyologia*. The fishes Artedi caught in his native Ångermanland and in the countryside around Uppsala had given him the material for the careful dissection and systematic recording of their physical properties. This was the fundamental collection of facts that allowed him to arrange the fishes he knew from his own observation into large groups sharing the same properties of their branchiostegal membranes. These groups he gave, eventually, the name *Ordines*. When attempting a finer set of distinctions, he found that the quality of the branchiostegal lids and the number and placing of their fins offered him useful and secure leads for assigning the fishes to two of the smaller groups, called *Genera*, and to these fishes he gave the generic names handed down even from Aristotle plus the particular characteristics of each genus. This appears as the genesis of *Opus ipsum* or 'the Work Itself', later called, by Linnaeus, *Genera piscium*. Finally, the precise knowledge of the external characters of individual fishes within each genus permitted him to identify the smallest category within the hierarchy, the *Species*. Choosing for each species significant traits that were not repeated in other, unrelated species, certainly appears to be a Herculean task, particularly as he could not very often collect fresh specimens of each putative species on his desk for direct comparison: inevitably, he had to rely on his detailed notes and his capacious memory. Here, his immense knowledge of the authorities who had worked in this field before him may have offered him the impetus towards creating the book of synonyms, a labour that must have been fraught with great uncertainty, as his authorities did not offer the same precise analyses as he himself had performed. His book learning also permitted him to write the history of ichthyological literature, an amazingly learned work carried through with a very high degree of precision in its page reference, his only significant failure being the omission of a sizeable report on the works of Pierre Belon.

*Ichthyologia* was finally printed at Leiden in the spring of 1738. A revised version, edited by Johan Julius Walbaum, was published at Greifswald in 1788. To date, it has not appeared in any modern translation; however, a Swedish translation by H. Aili, edited by J. Christensson, reviewed from an ichthyologist's standpoint by S. O.

Kullander, and furnished with a bibliography on Artedi's literary sources by C.-O. Strandberg, was published in 2022 under the aegis of the Royal Academy of Forestry and Agriculture, Stockholm.

*Catalogus piscium maris Balthici*, surviving in an autograph manuscript at British Library, was edited in 1934 by Orvar Nybelin, and an English translation by Hans Aili with commentaries by Theodore W. Pietsch appeared in the *Zoological Journal of the Linnean Society* in July 2020 (see the bibliography). A new Latin edition with a revised English translation is part of the present work.

*Manuscriptum ichthyologicum* is also published here in a first Latin edition with an English translation, while *Trichozootologia*, which was first published in a Latin edition by O. Nybelin, 1934, is published here in a new Latin edition an English translation by H. Aili (see Pietsch and Aili 2023b, 2023c).

## Peter Artedi: innovator of examination

Artedi and the tradition from Aristotle to Willughby

### *Artedi in opposition*

The traditional way of assigning all fishes into a class of its own and dividing this into three genera was established by Aristotle. In the words of Willughby, who rejected Rondelet's division of fishes, according to their habitat, into Maritime and Lacustrian (or *Fluviatiles*):<sup>137</sup>

More correctly in our opinion, Aristotle divided fishes by their genus into *Cetacei*, *Cartilaginei*, and *Spinosi*. *Cetacei* are those that breathe with lungs in the same way as viviparous Quadrupeds, and mate, conceive, give birth to live offspring and feed them on milk. *Cartilaginei* are those that conceive within themselves biggish eggs, as birds do, and nourish and enclose them in their uterus and finally give birth to live offspring. *Spinosi* are those that have thin bones in their flesh, thereby supporting it, and are oviparous. Their eggs are very small. This division of the fishes is certainly good enough and least of all to be discarded.

<sup>137</sup> Francis Willughby, *Historia piscium*, London 1686, Book I, p. 21: Rectius, nostra sententia, pisces in genere ab Aristotele dividuntur in *Cetaceos*, *Cartilagineos* & *Spinosos*. *Cetacei* sunt qui Quadrupedum viviparorum more pulmone respirant, coeunt, concipiunt, vivos foetus pariunt & lacte alunt. *Cartilaginei* sunt, qui ova intus concipiunt majuscula, Avium modo, eaque in utero fovent & excludunt adeoque vivos foetus pariunt. *Spinosi* sunt qui spinas in carne habent ad eam fulciendam, & ovipari sunt. Eorum ova exigua sunt. Hæc sane piscium divisio satis proba est, & minime rejicienda.

There is a noticeable lack of agreement between the meaning of the Latin words themselves and Willughby's definitions of them. *Cetaceus* means 'whale-like' and chiefly describes the exterior aspect of the animals. *Cartilagineus* is 'cartilaginous', a quality of the skeleton.<sup>138</sup> *Spinosus* is 'spiny', a quality of the supporting elements of the fins, while Willughby instead referred to the thin interior bones that support the muscles. Therefore, as used by Willughby, the names become more like labels, not descriptions of external distinctive properties, and Willughby's main contribution here is the use of Latin words, not Greek ones. These three groups were then subdivided by the use of adjectives, for example *Cartilaginei longi* (long cartilaginous fishes), *Cartilaginei plani* (flat cartilaginous fishes), *Spinosi plani* (flat spinous fishes), *Anguilliformes* (eel-shaped fishes), and so on. Within each of these adjectival subgroups various fishes are listed; for instance, among the spinous fishes, the turbot, *Rhombus maximus asper non spinosus* ('*Rhombus*, very large, rough, lacking scales'); the plaice, *Passer Bellonii* ('Belon's passer'); the sole, *Buglossus seu Solea*, and others. These fishes are not brought together under a common generic name and the description is not always diagnostic but contains information on the naming authority or an alternative name.

This method, although traditional and supported by great authorities, failed to satisfy Artedi's sense of scientific order. He offered severe criticism in *Ichthyologia*, Part II *Philosophia*, and demonstrated his own method in practical use all through Parts III *Genera piscium*, IV *Synonymia*, and V *Descriptiones specierum*. The hypothesis as offered in *Philosophia* is moreover sometimes affected by Linnaeus's emendations and additions, whereas the practice remains Artedi's own throughout in *Catalogus*, *Manuscriptum ichthyologicum*, and *Trichozoologia*.

*Catalogus* is more conventional than his other works, as Artedi arranged all the fishes of the Baltic Sea under Willughby's three headings, albeit in a different order and with new names culled from the Greek language, but Artedi does offer the Latin words as translations: I. *Osteopterygii* or *Spinosi* ('bony-finned' or 'thorny' fishes), II. *Chondropterygii* ('gristle-finned' fishes), III. *Plagiuri* or *Cetacei* ('flat-tailed' or 'whale-like' fishes).

<sup>138</sup> That is, characteristic of the sharks, skates, and rays, the bones of which do not ossify but remain cartilaginous.

### Nybelin's observations

Orvar Nybelin, the first editor of *Catalogus*, remarked in his introduction (pp. 46–47) when discussing the difference between *Catalogus* and *Ichthyologia*:

Since the Sloane manuscript<sup>139</sup> must be held to form an extract of Artedi's manuscript of fishes at the time of his arrival in England, and thus mirror the opinion he had formed during his time at Uppsala, while, in *Ichthyologia*, the experience he gained during his residence abroad also finds an expression, then existing differences between the two works must demonstrate if, and to which extent, the new impulses gained during his residence abroad acted in a fruitful and deepening manner on Artedi as an ichthyologist.<sup>140</sup>

Nybelin noted that the very concept expressed by the word *Ordo* was introduced by Artedi. He therefore regarded *Catalogus* as a condensation of an early version of Artedi's *Ichthyologia*, which, in his view, was radically influenced and expanded during Artedi's stay in England, thanks to fishes that Artedi found and examined there. These observations entered the manuscript of *Ichthyologia*. We find them in Part III *Genera*, in which notes on ten species of genus *Ostracion* contain comments like (pp. 56–57): *Vidi in museo Hans Sloane d. 15 May 1735* and *Vidi apud Sir Hans Sloane & in Naggshead*—besides the Nag's Head he also reported finding interesting specimens at, for instance, the White Bear, and the Green Dragon in Stepney. His work on Seba's collection also contributed, but only three of these specimens entered the text of *Ichthyologia*.<sup>141</sup> These notes appear within the body text of each species concerned.

Another indication that Artedi saw and described species of fishes he had not seen in Sweden is given by the distribution of Swedish fish names in *Descriptiones*, the title page of which affirms that this part deals with fishes Artedi himself had dissected and examined:<sup>142</sup>

<sup>139</sup> Artedi's autograph ms. of *Catalogus*, now in the British Library (Sloane MS 3870).

<sup>140</sup> 'Då Sloane-manuskriptet måste anses utgöra ett utdrag ur Artedis fisk-manuskript vid tiden för hans ankomst till England och alltså avspegla hans under Uppsalatiden vunna uppfattning, under det att i *Ichthyologia* även hans erfarenheter från utlandsvistelsen kommit till uttryck, så måste förefintliga skillnader mellan de tvenne arbetena kunna visa, om och i vad mån de nya impulser, som utlandsvistelsen medfört, verkat befruktande och fördjupande på Artedi som ichthyolog.' My translation.

<sup>141</sup> 9. *Ostracion*, 13. *Ostracion*, and 14. *Ostracion*.

<sup>142</sup> *Descriptiones specierum piscium quos vivos præsertim dissecuit et examinavit, inter quos primario pisces regni Sueciæ facile omnes accuratissime describuntur cum non paucis aliis exoticis.*

Descriptions of the Species of Fishes, particularly those which the Author Dissected and Examined in a Live State, first among which easily all the Fishes of the Kingdom of Sweden are most accurately described with not a few other exotic Fishes.

This statement (probably by Linnaeus) is no exaggeration. If the presence of a Swedish name is an indication that the description originated in Sweden, we find that, in the 73 species described, 61 Swedish names are given for 42 species (many synonyms are mentioned). Thirty-one species lack Swedish names, while an English, Cornish, or Welsh name is given in 12 instances and, for the remaining 19 species, a French, Dutch, or Brazilian name, or no vernacular name at all, is offered.

Finally, we may note that *Descriptiones* accounts for species belonging to only 23<sup>143</sup> of the 52 genera listed in *Ichthyologia*; the remaining 29 genera<sup>144</sup> appear to represent fruits either culled from his reading of the authorities or encountered during his stay in England and Holland.

Nybelin's opinion is therefore well founded in fact: the contents of *Ichthyologia* was indeed expanded during Artedi's sojourn in England and Holland.

The above-mentioned comments were either written into the body text during a major revision or added as marginal notes to be entered into the manuscript to be used as an exemplar for the printers. We have no information concerning the state of Artedi's final manuscript but it is reasonable to assume that it resembled other authors' original manuscripts by being replete with marginal notes, additions above the lines, or even long marginal additions, all of these subsequently incorporated into the body text when a clean copy was made by Linnaeus's disciple Tiburtius Kiellman (and possibly others) before printing; this is a very simple and normal procedure.

It is less easy to believe, as Nybelin clearly did, that the observations Artedi made in England resulted in a major reappraisal and re-arrangement of the entire work, as his division of the fishes into five orders is effective in Part III *Genera*, Part IV *Synonymia*, and Part V

<sup>143</sup> 1. *Syngnathus*; 2. *Cobitis*; 3. *Cyprinus*; 4. *Clupea*; 6. *Exocoetus*; 7. *Coregonus*; 8. *Osmerus*; 9. *Salmo*; 10. *Esox*; 13. *Ammodytes*; 14. *Pleuronectes*; 16. *Gadus*; 18. *Muraena*; 25. *Scomber*; 26. *Mugil*; 30. *Perca*; 34. *Cottus*; 36. *Chaetodon*; 37. *Gasterosteus*; 42. *Petromyzon*; 44. *Squalus*; 45. *Raja*; 48. *Balaena*.

<sup>144</sup> 5. *Argentina*; 11. *Echeneis*; 12. *Coryphæna*; 15. *Stromateus*; 17. *Anarhicas*; 19. *Ophidion*; 20. *Anableps*; 21. *Gymnotus*; 22. *Blennius*; 23. *Gobius*; 24. *Xiphias*; 27. *Labrus*; 28. *Sparus*; 29. *Sciæna*; 31. *Trachinus*; 32. *Trigla*; 33. *Scorpæna*; 35. *Zeus*; 38. *Balistes*; 39. *Ostracion*; 40. *Cyclopterus*; 41. *Lophius*; 43. *Acipenser*; 46. *Physeter*; 47. *Delphinus*; 49. *Monodon*; 50. *Catodon*; 51. *Trichechus*; 52. *Siren*.



*Descriptiones*—a matter of over 300 printed pages. Admittedly, Peter Artedi was an extremely prolific writer, but the task of completely re-arranging a manuscript of this size would have been a Herculean one. The foundations of his work clearly must have been laid even during his student days at the University of Uppsala.

Nybelin did not comment on the fact that the names of the orders, as used in *Ichthyologia*, are in themselves descriptions and serve as the entry level, as it were, for the examination of single species contained therein.

Nybelin offered, indeed, a number of important differences in detail between the two works. He pointed out that Artedi, in *Ichthyologia*, was the first to formulate a definition of ‘genus’ as used in systematic zoology, and that the same definition was used in *Catalogus* as well as in *Trichozoologia*. He (p. 47) also offered evidence that Artedi’s nomenclature was a project under constant revision. Thus, in the list of 24 generic names given in *Catalogus* no fewer than eight differ from those later employed in *Ichthyologia*: genus *Acus* of *Catalogus* is *Syngnathus* in *Ichthyologia*; *Albula* equals *Coregonus*; *Eperlanus* equals *Osmerus*; *Lucius* equals *Esox*; *Rhombus* equals *Pleuronectes*; *Conger seu Anguilla* equals *Muraena*; *Lumpus* equals *Cyclopterus*; and *Lampetra* equals *Petromyzon*.

These observations do, indeed, demonstrate a difference in nomenclature between *Catalogus* and *Ichthyologia*. One thing is constant: the first name in each pair is the traditional one, used since classical antiquity and maintained by both Willughby and Ray,<sup>145</sup> the second name appears as Artedi’s own innovation and is a derivation of a Greek word.<sup>146</sup> On the whole, therefore, Artedi followed the traditional nomenclature as it had been established long before his time, but when he listed species that had escaped observation by previous ichthyologists he made an important innovation in that no fewer than seven species of *Cyprinus*, ‘not named by the famous Willughby, Ray and others’, as he stated, were named in the same manner in *Catalogus* as in *Ichthyologia*, and follow the diagnostic method he had formulated and consistently used in the latter work. These were species he had observed in Sweden and, in the numbering he employed in *Catalogus*:<sup>147</sup> 8. *Cyprinus spithalma minor; ossiculis viginti quinque in Pinna ani*

<sup>145</sup> Artedi’s *Synonymia*, Part IV of *Ichthyologia*, confirms this statement.

<sup>146</sup> Artedi explained the origins of his Greek generic names in Part II *Philosophia*, pp. 71ff.

<sup>147</sup> Cf. Aili and Pietsch (2020, 7ff).

(‘*Cyprinus*, smaller than one palm, twenty-five small bones in the anal fin’), Swedish: Björkna. 9. *Cyprinus iride flava et pinna ani ossiculorum triginta septem* (‘*Cyprinus* with yellow iris and thirty-seven small bones in the anal fin’). Swedish: Faren. 10. *Cyprinus spithalmis, oblongus, maxilla superiore paulo longiore* (‘*Cyprinus*, one palm, oblong, upper maxilla slightly longer’). Swedish: Stämm. 11. *Cyprinus toto dorso acuminante et pinna ani ossiculorum viginti quatuor* (‘*Cyprinus* with entire back forming a point and anal fin of twenty-four small bones’). Swedish: Wimba. 12. *Cyprinus maxilla inferiore longiore sursum reflexa et pinna ani ossiculorum quindecim* (‘*Cyprinus* with lower maxilla longer and bent upwards, and anal fin of fifteen small bones’). Sweden: Asp. 13. *Cyprinus pinna ani ossiculorum quadraginta* (‘*Cyprinus* with anal fin of forty small bones’). Sweden: Blicka. 14. *Cyprinus biuncialis, iridibus rubris et pinna ani ossiculorum novem* (‘*Cyprinus*, two inches, with red irises and anal fin of nine small bones’), with various Swedish names.

Artedi added an important observation:<sup>148</sup>

The names I gave to those species of the aforementioned *Cyprini* that were not described by the famous Willughby I chiefly took from the number of rays, that is small bones, in the anal fin, as other external parts of those fishes that belong to the same genus agree very much in numbers, shapes, and proportions.

In the genus *Cottus*, he gave a diagnostic name to one additional species: 3. *Cottus scaber; capite polyacantho et tuberculis quatuor ceratoidibus in medio* (‘*Cottus*, rough, with a head of many thorns and four horn-like tuberculi in the middle’). Sweden: Simpa. He added: ‘This fish has as yet not been described, either by the famous Willughby or by any other Ichthyologist.’

Nybelin (pp. 49ff.) noted two further points of difference between *Catalogus* and *Ichthyologia*, more precisely, Artedi’s manner of naming two particular species within the genus *Cyprinus*. Nybelin’s first remark displays some confusion, not only on Artedi’s part but also on his own: it concerns the *Ide* (Sw. Id, *Leuciscus idus*), which in *Genera*, *Synonymia*, and *Descriptiones* Artedi consistently named *Cyprinus*

<sup>148</sup> Artedi, *Catalogus*, 14. *Cyprinus*, *Observatio*: Nomina specifica Cyprinorum præcedentium à Nobil. Willoughbejo non descriptorum, e Numero Radiorum seu Ossiculorum in Pinna Ani imprimis sumsi, quum aliæ partes externæ horum piscium ad unum idemque Genus pertinentium, in Numero, Figura et Proportionem multum conveniant.

*iride sublutea, pinnis ventralibus anique rubris* ('Cyprinus, somewhat yellow, ventral and anal fins red'), while he entirely failed to mention it, either in Latin or in Swedish, in *Catalogus*. Nybelin, probably correctly, identified the *Ide* with that named in *Catalogus*, *Rutilus latior vel Rubellio fluviatilis* ('*Rutilus*, wider, or River-Rubellio') for which Artedi offered the English name *Rudd* (no Swedish synonym given, although it is known as 'Sarv', *Scardinius erythrophthalmus*). In *Synonymia*, Artedi identified the *Rudd* with *Cyprinus Orfus dictus*, a name form that runs contrary to his own stated principles, and noted that Willughby and Ray called this species *Rutilus latior vel Rubellio fluviatilis*. He did not mention this species at all in *Genera* or *Descriptiones*. Nybelin's comments unfortunately do not help to clarify this confusion on Artedi's part, but we may take it to indicate that Artedi's work was not yet brought to perfection nor were its different parts fully harmonised.

Nybelin's second observation concerns the 'Stämm', a species for which Artedi did not know the English name 'common dace'. It is named and described in two different ways: in *Catalogus*, it is called 10. *Cyprinus spithalmis, oblongus, maxilla superiore paulo longiore* ('C. one palm, oblong, upper maxilla slightly longer'); in *Synonymia* and *Descriptiones* it is 4. *Cyprinus oblongus figura rutili, pinna ani ossiculorum decem* ('C., oblong, roach-shaped, anal fin of ten small bones'). *Descriptiones*, as we recall, to a large extent consists of notes on dissections made by Artedi when he was still in his home country and therefore provides his first word on the identity of a species, and in § 22 he noted: *Pinna Ani radiorum undecim* ('Anal fin of eleven rays'). Nybelin noted that the number of small bones in the anal fin (10) given in the diagnostic name was wrong, as the species has been observed to have 11 or 12 rays in the anal fin, never ten. In the name given in *Catalogus*, the number of rays is not given, but in § 1 of its description Artedi gives the correct number of 11. *Genera* actually offers both descriptions: 13. *Cyprinus oblongus, iride argentea et pinnis albescentibus*. A. *Cyprinus oblongus, figura rutili, pinna ani ossiculorum decem*, thus repeating the faulty number. Nybelin was inclined to attribute the second of the two diagnoses to Linnaeus, observing that, contrary to Artedi's principles, it contains a comparison between this species and *Rutilus* (roach). Nybelin failed to note that the words *figura rutili* are a direct loan from Willughby's description of this species (p. 263): *Figura corporis Rutilo similis est* ('the body shape is similar to that of *Rutilus*'). The incorrect number of rays in the anal fin was also taken from Willughby: *ano subjectae decem concessae* ('ten rays are given to the anus of our

subject'). This diagnostic is therefore evidence of Artedi's progression, from a reliance on his authorities, to reliance on his own observation.

The four articles on this species demonstrate Willughby's and his own different ways of naming the rays of the various fins. The traditional name was *radius* (ray), but Willughby, at least in this instance, used *arista* (thorn). Artedi's naming is more complicated: in his description of the various fins of this species in *Descriptiones* (4. *Cyprinus*), paragraphs 9 through 13, he used *radius*; in § 1 of his description of this species in *Catalogus*, he introduced *ossiculum*, a word he later also used in the diagnostic name of this fish in *Genera*, *Synonymia*, and *Descriptiones*. In the last-mentioned part he mixed traditional words and loans from Willughby with his own observations, apparently without noticing that they sometimes disagreed; later, when he wrote the descriptions intended for *Genera* and *Catalogus*, his more mature knowledge made him follow his own observations. The question remains why he did not correct the erroneous number he gave in *Synonymia* and *Descriptiones*, but it is possible that the double diagnoses in *Genera* were intended as a reminder to himself to carry through necessary corrections before submitting the manuscript to the printers. Linnaeus, of course, failed to understand this point, so printed both diagnoses.

Even if Artedi's three ichthyological works may have been initiated at different times, in their existing shape they appear to be perfectly contemporaneous. Indeed, in two appendices of *Catalogus*, written in Artedi's own hand (fols. 14v. to 18v),<sup>149</sup> we find first an extract culled from *Trichozoologia*, and then a short but very precise description of the contents and arrangement of *Ichthyologia*. There is, of course, a remote possibility that Artedi added the appendix to his *Catalogus* sometime after he had given it to Sloane, but it seems more likely that the appendix was part of the manuscript he submitted.<sup>150</sup>

When writing *Catalogus*, Artedi simultaneously followed two different principles for awarding diagnostic names: first, the traditional one and, second, his own innovative nomenclature that he permitted to shine through whenever it did not conflict with tradition or, more precisely, with the works of Willughby and Ray. The effect *Catalogus*

<sup>149</sup> Artedi numbered the leaves (recto and verso pages together) not the pages themselves.

<sup>150</sup> The folio numbering is consistent and runs all through the manuscript and there is no indication that the final pages were added later (they must have been present, at least on blank leaves, from the outset).

had on Sir Hans Sloane and the Royal Society is clear: he was admitted to their presence.

### Artedi's project

In *Nordmalings Flora* of 1729, written in Swedish, Artedi began a scientific project that would come to fruition in his later works written in Latin. In the words of Eriksson,<sup>151</sup> '[w]hat he consciously strove to achieve was to find a clear and lucid key to examination and a classification that could serve as an aid to memory' (my translation). He also, as Eriksson noted, carefully considered the question of nomenclature.

### Vocabulary

The nomenclature Artedi adopted for the systematic classification of fishes and of hairy animals into orders, genera, and species at first sight appears to be either a one-word composition in Latinised Greek or a list of one-word names, each followed by a string of anatomical features, the whole to be learned by rote as pointers to all the individual species of fishes and mammals known to Artedi. We must recall here that he used Latin as his preferred means of communication and Greek as his primary source of word stems. Bearing this in mind, we may state instead that he intended the polynomial of the orders to be understood as a precise description of one unique anatomical character; the traditional names followed by that long string of diagnostic statements actually create two separate members of a taxonomic hierarchy of three or four<sup>152</sup> levels of analysis and at the same time offer a simple and practical means of identifying any animal of these two classes and assigning it its proper place within Artedi's system. The really innovative characteristic of this process is that the zoologist will only have to search for large and easily identified external anatomical parts and will not need to be aided by pictures of the different orders, genera, and species.

The reverse situation is also possible, as was already mentioned above: an ichthyologist may have a fish in hand, knowing its vernacular name but wishing to find a quick way to establish its place in Artedi's system. The solution will be found in the section of Part IV *Synonymia* that starts on page 119. Entitled *Index nominum*, it consists of a series

<sup>151</sup> Gunnar Eriksson, 1969, *Botanikens historia i Sverige intill år 1800*, Uppsala, pp. 174–75: 'Vad han medvetet strävade efter var att finna en klar och redig examinationsnyckel och en indelning som kunde bilda ett stöd för minnet.'

<sup>152</sup> In *Trichozoologia*.

of alphabetical indexes of names with references to the relevant pages in the same part. The indexes are multilingual: species names in Latin, Swedish, Danish, German, Dutch, English, French, Italian, Spanish, and Greek are listed here, each in its proper section. The English name *Herring* refers the reader to page 16, where the article on the herring is replete with references not only to earlier authorities and other names used for the herring but also to the appropriate locations in Parts III *Genera* and V *Descriptiones*. This is, so to speak, the back entrance into Artedi's system.

Artedi consistently used Latin words of an everyday nature that were also widely used for human anatomy. They are very often metaphors, following the principle that, if an organ or a part of an organ looks like something to be seen in everyday life, it is given the same name. This is, of course, an ingenious and effective mnemotechnical device, provided that the medical student is perfectly familiar with Latin. Anatomical nomenclature in its purest form is in Latin:<sup>153</sup> *apertura* ('opening'), *cirrus* ('lock of hair'), *clavicula* ('little key'), *ductus* ('passage'), *foramen* ('hole'), *operculum* ('cover'). Artedi used them all, and more, probably as a result of his medical training.

It is very easy, when closely reading *Descriptiones*, to visualise Artedi's fixed procedure for dissecting fishes and recording his observations: he put the fish flat on its right side on a plate or board, snout pointing to the left. His observation and description then proceeded from left to right, from snout to tail, from greater to smaller, from outer to inner parts, and he used the Latin words of human anatomy in use even in classical antiquity: *corpus* ('body'), *rostrum* ('snout'), *caput* ('head'), *os* ('mouth'), *rictus* ('gape'), *mandibula* or *maxilla* ('jaw'), *nares* ('nostrils'), *oculus* ('eye'), *nasus* ('nose'), *auris* ('ear'), *occiput* ('neck'), *pectus* ('chest'), *dorsum* ('back'), and *venter* ('belly'). In the interior of the fish: *gula* ('gullet'), *cor* ('heart'), *vesica fellis* ('gall bladder'), *lien* ('spleen'), *ventriculus* ('ventricle'), *intestinum* ('intestine'), *anus* ('anus'), *renes* ('kidneys'), *ovarium* ('ovary'), *vesica seminalis* ('seminal vesicle'), *ossiculum*<sup>154</sup> ('little bone'), *vertebra* ('vertebra'), and *costa* ('rib'). Greek

<sup>153</sup> Greek is similarly used in pathology for naming various kinds of maladies.

<sup>154</sup> *Ossiculum* is more descriptive than *radius*, which is a metaphor; Artedi did use *radius* in many of those dissection notes in *Descriptiones* that dealt with fishes he caught and dissected in Sweden; in descriptions which deal with fishes dissected later he consistently used *ossiculum* instead, not only in *Catalogus* and *Ichthyologia* but also in *Manuscriptum ichthyologicum*—a use faithfully retained by Seba's editor.

words also used in classical Latin are, for instance, *hepar* ('liver') and *peritoneum* ('peritoneum').

Anatomical parts that fishes do not share with humans were given Latin names or names borrowed from the Greek, sometimes creating a mixed form. Some are obvious metaphors. Greek: *branchia* ('gill'). Latin: *linea lateralis* ('lateral line'), *spina* ('spine, thin bone'), *squama* ('scale'), *pinna* ('fin'), and *cauda* ('tail'); *vesica* (Latin) is joined to *aërea* (Greek) for 'air bladder'.

The Greek names of the genera are often of great antiquity, and Artedi handled them as proper names, although they had quite often started their existence as Greek metaphors. Most of them have their origins in the works of Aristotle, Athenaius, or Oppian, authorities very often quoted by Artedi. The dolphin, for instance, was Gr. δελφίς, genitive δελφῖνος, a word closely related to δέλφαξ ('pig'). Aristotle related having noticed that the dolphin can be heard snoring and grunting like a pig.<sup>155</sup>

### Three tiers of hierarchy: *Ordo, Genus, Species*

In *Ichthyologia* Artedi created a tool for the methodical classification of fishes, one that also offered a convenient and systematic way of identifying a newly caught fish and assigning it a place in his own system. The first step in this process is to determine whether a specimen is actually a member of the class called *Piscis* ('fish'). Artedi provides the required definition on the first page of Part II *Philosophia*, § 3, pp. 1–2:

*Piscis est animal apodum, pinnis semper praeditum, vel branchiis vel pulmonibus respirans, plerumque in aqua habitans ibique vel solis pinnis vel flexuoso corporis impulsu simul natans, interdum vero in terram sponte egrediens et quandoque in aëre supra aquam ope pinnarum pectoralium volans.*

A Fish is an *apod*, an animal without feet, always furnished with fins, breathing either through gills or lungs; often living in water and there swimming, either by means of its fins only or, simultaneously, by a forceful bending of

<sup>155</sup> Cf. Strömberg (1943, 11, 65, 77, 82). Artedi preferred another theory: DELPHINUS a δελφός *vulva*, uterus, seu δέλφαξ *porcellus*, quod per vulvam pariat ('Delphinus from δελφός, *vulva* or uterus, that is δέλφαξ 'little pig', because it gives birth through the vulva'), *Descriptiones*, p. 72. Artedi was obviously aware that *Porcella*, 'little sow', was ancient Roman slang for the *vulva*. The Greek word for 'womb', as used by Aristotle, was not δελφός but δελφύς (Liddell and Scott s.v.), which is close enough in spelling to explain the confusion.

its body, sometimes however on its own initiative departing onto dry land and at times flying in the air above the water by means of its pectoral fins.

Artedi's diagnostic tool is made up of a three-tier system for identifying and naming fishes. This will now be described by the following example taken from *Ichthyologia*.

As already mentioned, Artedi only found it necessary to name three levels of classification: *Ordo*, *Genus*, and *Species*. *Ordo* is the highest level, containing five groups. He managed this novelty by splitting the *Osteopterygii* (bony-finned fishes) of *Catalogus* into three new orders with names that were compositions of two Greek words in a Latinised form, partly of his own composition.

*Ordo* I, Genera 1 to 21: *Malacopterygii* ('soft-finned fishes') from the Greek μαλακός ('soft') πτέρυξ ('wing').

*Ordo* II, Genera 22 to 37: *Acanthopterygii* ('thorny-finned fishes') from the Greek ἄκανθα ('thorn') πτέρυξ ('wing').

*Ordo* III, Genera 38 to 41: *Branchiostegi* ('gill-cover fishes') from the Greek βράγχια ('gills') στέγος ('roof').

*Ordo* IV, Genera 42 to 45: *Chondropterygii* ('cartilaginous-finned fishes') from the Greek χόνδρος ('gristle, cartilage') πτέρυξ ('wing').

*Ordo* V, Genera 46 to 52: *Plagiuri* ('flat-tailed fishes') from the Greek πλάγιος ('flat, horizontal') οὐρά ('tail').

Each of these names is a compound of two Greek stems (adjective + noun, or noun + noun) and point to an anatomical detail shared by all the fishes of the same order. Properly speaking, the names are adjectives dependent on an understood *pisces* ('fishes'). My own translations are literal ones by intention and follow indications offered by Liddell and Scott, *Greek-English Lexicon* or Lewis and Short, *A Latin Dictionary*. The names, properly understood, define the most significant, and most quickly and easily observed, physical quality shared by all the species of each order. By their descriptive nature they lay the foundation for further classification and are by no means mere words or labels to be learned by rote.

The second highest rank was *Genus*; Artedi posited 52 genera in the body text of Part III *Genera piscium*, adding another 12 in an appendix. The latter were probably awaiting their proper location when his death intervened, but they may also be an addition by Linnaeus, whose contribution remains somewhat undefined.

The genera, in their turn, were subdivided into *Species*. These three are the only hierarchical levels that Artedi employed in practice all



through *Ichthyologia*, *Catalogus*, and *Manuscriptum ichthyologicum*. According to Nybelin (1934, 46), this hierarchy of three tiers was Artedi's own contribution, a novelty to the science of ichthyology. When classifying the *Trichozoa* (hairy animals), Artedi inserted a fourth tier, *Sectio*, between *Ordo* and *Genus*. As fishes and hairy animals form two distinct *Classes*, Artedi obviously did not find it necessary to use that word when discussing the lower levels. He did, however, on many occasions, find it useful to introduce an informal and nameless subdivision between genus and species, for example in Part III *Genera*, in which he graded the 19 species of the genus *Cyprinus*, arranging species numbers 1 to 7 under a shared heading, *Maxillis ejusdem fere longitudinis vel superiore in quibusdam tantillum longiore* ('Jaws equally long or with an upper jaw that is, in certain species, somewhat longer'), numbers 8 to 17 *Maxilla superiore vel parum vel notabiliter longiore* ('Upper jaw either somewhat or noticeably longer') and numbers 18 to 19 *Maxilla inferiore longiore* ('Lower jaw longer'). He did not give headings of this kind a formal name of their own within the hierarchy; this is actually surprising, as they undoubtedly form part of the diagnostic system. They are, indeed, far from uncommon, for, besides the genus *Cyprinus*, genera *Gadus*, *Sparus*, *Perca*, *Trigla*, *Cottus*, *Ostracion*, *Squalus*, and *Raja* also demonstrate such nameless subdivisions.

In Part II *Philosophia* we find remarks that were probably occasioned by this aspect of Artedi's practice:

§ 130 *Ita ipsa genera subalternata primo recte et naturaliter inter se collocari, et in certos quasi manipulos redigi, et exinde Classes postea construi debent, quae, quo pauciores sunt, eo faciliores.*

Thus these very subordinate genera ought, first, to be ordered within themselves, correctly and according to their nature and, second, be arranged in certain, so to speak, maniples; and thereafter Classes should be constructed, and the fewer, the simpler.

§ 136 *Tales ordines seu Familiae naturales in Ichthyologia numero quinque vel sex circiter constitui debent. Genera Piscium Naturalia prius in certos quasi Manipulos conquaeranda sunt, ex quibus postea Ordines Naturales sponte exurgunt; nec multum refert, an Ordines illi uno numero plures vel pauciores sint, modo ipse numerus illorum paucus existat, nam quo plures sunt Ordines, eo difficilior sit Methodus ipsa in inveniendis generibus Piscium naturalibus, quod praecipuus finis totius Ichthyologiae est.*

Such orders, that is, natural Families, ought in ichthyology to be established in a number of about five or six since, as mentioned, the natural genera of fishes should first be collected into certain, so to speak, Maniples, from

which then the Natural Orders will arise by their own accord; and it is not of any importance whether these Orders should be one more or less in number so long as their number is small, for the more Orders there are, the more difficult the very Method of finding the natural genera of fishes, and this is the chief purpose of Ichthyology in its entirety.

This passage offers the second instance of the phrase *in certos quasi manipulos*, but the word *manipulus*<sup>156</sup> is not used anywhere else in Artedi's ichthyological works<sup>157</sup> or in *Trichozoologia*, nor is the word *classis*, except when referring to fishes and hairy animals as classes separate from other animals. *Familia* is used somewhat more frequently, but still only in *Philosophia*, and never in Artedi's rules themselves but only in one section heading and in two *scholia* (commentaries) to his rules: § 6 (p. 2) *Historicus Naturalis Pisces pertractat*, ut [...] *omnes Pisces oblatos ad suas Familias naturales, Genera et Species [...] referre queat* ('The natural historian treats of the fishes in such a fashion that [...] he is capable of referring all the fishes encountered into their natural Families, Genera, and Species'). Section heading before § 124: *DIVISIO PISCIIUM IN CLASSES VEL POTIUS FAMILIAS SEU ORDINES* ('Division of fishes into Classes or rather Families, that is, Orders'). Finally in § 126 (p. 46):

*Haec observatio (124. 125) ansam praebuit Historicis naturalibus, ut non tantum Mineralia et Plantas, sed etiam Animalia, ut Quadrupedia pilosa, Amphibia, Aves, Pisces et Insecta, Primo et generaliter in Classes quasdam seu ordines et Familias dispescuerint, quod maximam utilitatem in historia naturali habet, si modo divisio illa Classium naturalis et genuina sit.*

This observation (§§ 124, 125) has furnished the natural Historians with the opportunity that they may separate not only Minerals and Plants but also Animals, such as the hairy Quadrupeds, Amphibians, Birds, Fishes, and Insects, first and generally into certain Classes, that is, orders and Families, which has the greatest usefulness in natural history, provided that this division into Classes is natural and genuine.

<sup>156</sup> *Manipulus* designates a Roman military unit. During the time of the kings and the early republic the *manipulus* was the chief tactical unit: 30 *manipuli* of varying size made up a legion of 4,200 men. After the military reforms of Marius, Sulla, and Caesar, the legion grew to 6,000 men with the following smaller units: *cohort* (the main tactical unit of 600 men), *maniple* (200 men), *centuria* (100 men). Artedi (or, more probably, Linnaeus) appears to have regarded the word *manipulus* as a metaphor for an intermediate, not tactical, unit.

<sup>157</sup> A point already made by Merriman (1941, 67): 'the resultant groupings apparently do not indicate an attempt to place related genera in maniples—the families of a later date.'

In § 6, *Familia naturalis* occupies the place in the hierarchy where Artedi normally puts *Ordo*; in the section heading, *Classis*, *Familia*, and *Ordo* appear to hold the same hierarchical rank; in § 126 *Classis*, *Ordo*, and *Familia* can also be construed as having equal rank in the hierarchy, unless *Familia* is meant to be subordinate to *Ordo*. This lack of terminological precision may be explained by the fact that *Ordo* is the only rank of the three that Artedi actually used; the other two appear as figments of a hypothesis not fully thought through and never put into practice. We cannot, therefore, exclude the possibility that these parts of the text were authored by Linnaeus, whose contribution can be observed at many places in Part II *Philosophia*.

### Artedi and the hairy animals

Artedi adapted his diagnostic principle for use with the *Trichozoa*, that is, the animals identified by their hairy coat, now included within *Mammalia*, a name established by Linnaeus (1735). In his *Idea institutionum Trichozoologiae*, which must be understood as a pilot study (Pietsch and Aili 2023c), Artedi was compelled by the very nature of his subject matter to arrange the hairy animals into two *Ordines*, five *Sectiones*, a varying number of *Genera* and an appropriate number of *Species*. The following examples will illustrate the principle.

*Ordo primus animalium pilosorum unguulatorum.*

(‘First Order of Hairy Animals with Hooves.’)

*Ordo secundus animalium pilosorum unguiculatum.*

(‘Second Order of Hairy Animals with Claws.’)

Each order, characterised by its possession of either hooves or claws, is subdivided into five sections, each section into a varying number of genera, and each genus into the requisite number of species. This provides for a four-tier progression.

Choosing Order 1 (containing three sections) as a typical example, we find:

*Sectio prima*

*Solipedorum seu Ungulam indivisam habentium*

1. *Equus*.

2. *Asinus cum Onagro et Mulo et Zebra*

First Section

of animals with solid feet, that is an unclown hoof.

1. The horse.

2. The donkey with the wild ass, the mule, and the zebra.

Genus 1, *Equus*, the horse of the first section, has four characteristic features:

- |  |  |
|--|--|
| 1. <i>Ungula indivisa.</i>   | Uncloven hoof  |
| 2. <i>Dentes numero sex tam primores utrinque quam molares in utroque latere utriusque maxillae figura lati et in apice plani. Spatium vacuum inter Primores et Molares. Summa 36.</i> | Teeth, six in number, front teeth on both sides as well as molars on each side of both jaws, wide in shape and flat at the tip. Empty space between the front teeth and the molars. Sum: 36. |
| 3. <i>Cauda longa.</i>   | Tail long.   |
| 4. <i>Mammae duae in feminis ad inguina.</i>   | Udders, two in the females by the groins.  |

In theory at least, any animal that is observed to possess a body covered with hair can be subjected to this process and assigned its proper place in Artedi's system. All characteristics (the teeth being a possible exception) are easily observed and form unique combinations. Just as in *Ichthyologia*, no picture of the animal in question should be required to ensure a successful examination.

It must be emphasised that *Trichozoologia* is an unfinished manuscript containing only the outline of the full zoology of the *Trichozoa*. The manuscript contains a considerable number of inconsistencies and even lacunae, and the four-tier identification is often marred by the complex diagnoses necessary to define each species properly. Nonetheless, the principle is there and Artedi would probably have developed it to greater perfection had he lived longer.

Artedi's diagnostic nomenclature is an ingenious construction when used for the systematic examination of a specimen in order to find its correct place within his own system. Both *Ichthyologia* and *Trichoozoologia* can be understood as a kind of zoologist's vade mecum: guides to the proper identification of unknown animals or, if the researcher started with a vernacular name, a quick way to find a lot of detailed information on the animal in question. As presented in *Ichthyologia* the system has two very obvious drawbacks: first, the names of the orders, genera, and species are unwieldy, to say the least. They are both too abstract and much too long to be memorised for everyday use. Second, the ordinal numbers given to the species listed in *Genera piscium* are very seldom the same as those offered for the same species in *Synonymia* and *Descriptiones*, a fact that cannot but

aggravate the reader's confusion. It is quite possible that Artedi intended to rectify the latter problem, and may have disregarded the former as irrelevant when compared to the enormous mass of anatomical detail he had had to memorise when studying medicine. Indeed, Linnaeus held on to this nomenclature long after Artedi's demise, and more than two decades passed before he published, in the tenth edition of *Systema naturae* of 1758, the famous binomial system that bears his name. What Artedi himself would have done had the method he propounded ever been published in print and practiced and criticised by colleagues is beyond our speculation. The fact that his scientific writings were long left either unprinted or published only in Latin, in a world that slowly lost its competence to read this ancient language of science, may have added to his glory in the world of the learned, but it also caused the novelties he introduced to remain hidden or to be published by others, and therefore deprived him of the wider fame that was by rights his own.

### Summary

In two of Artedi's major surviving works, *Ichthyologia sive opera omnia de piscibus* ('*Ichthyologia*, That Is, All His Works on Fishes'), and *Idea constitutionum Trichozoologiae* ('An Outline of the Principles of the Science of Hairy Animals'), we find evidence of two distinctly novel features: first of all, tiers of classification of fishes and hairy animals, namely orders, sections, genera, and species, furnished with names that are not merely proper names but instead carefully structured descriptions leading the student from a cursory external observation to precisely assigning the animal in question to its proper place within Artedi's system. Here, Artedi resolutely abandoned the system formulated by Aristotle and propounded even by Francis Willughby, and, indirectly, paved the way for Linnaeus's binomial system: for, there, the two words forming the name proper are followed by descriptions remarkably close to those formulated by Artedi.

Second, we find that Artedi's system of naming the orders, genera, and species of fishes, and the orders, sections, genera, and species of hairy animals, can be viewed from two perspectives: either as an apparently cumbersome way of naming animals that are already known by their vernacular names or by the binomial nomenclature created by Linnaeus, or, and more profitably, as a way of identifying unknown animals by following three or four steps and finding at the end their place in Artedi's system. The descriptions he formulated (in Greek or Latin) are ingeniously centred on easily observed, unique anatomical

features, and guide an investigator step by step through the process of identification. An important novel feature of this system is also that the researcher can successfully employ it without requiring the help of any pictorial representation of the animal. By making use of the indexes of *Synonymia*, the reader could also proceed in the opposite direction: from the knowledge of one vernacular name to a full description and classification of the fish within Artedi's system.

The fourth surviving work, written in Artedi's own hand and probably contemporary with the three others, is *Catalogus piscium maris Balthici* ('Catalogue of the Fishes of the Baltic Sea'), which gives eight instances of Artedi's nomenclature for the species but is otherwise, when it concerns species already described by earlier ichthyologists, very much in accord with the tradition they followed. This may be construed as evidence that the work belongs to an earlier period in Artedi's thinking, or that the fishes were intentionally presented in a way that did not break away from the traditional classification while it, in a few instances, presented specimens of Artedi's new and revolutionary model. As this tract appears to have been written in order to help Artedi gain entrance to Sir Hans Sloane's presence and to the Royal Society, his mixed mode of presentation appears not to have disturbed their sensibilities at all.



## 4. Peter Artedi, *Catalogus piscium maris Balthici*

### New Latin edition and English translation by Hans Aili

*Catalogus piscium maris Balthici* survives in Artedi's autograph, probably written in the autumn of 1734, and is now at the British Library (Sloane MS. 3870). The first Latin edition was prepared by Johan Markus Hulth (1865–1928), head librarian of Uppsala University Library (1918–1928); the very high quality of this edition is undoubtedly due to him; after his death, the proofs of this edition were published in print by Orvar Nybelin (1892–1982), together with an edition of Artedi's *Idea institutionum Trichozologiae*, for the bicentennial of Artedi's death, under the title, 'Tvenne opublicerade Artedimanuskript, inför 200-årsminnet meddelade av Orvar Nybelin', *Svenska Linné-Sällskapets Årsskrift* XVII, Uppsala 1934, pp. 35–90 (Latin edition of *Catalogus* on pp. 78–90). Nybelin did not offer translations of these two works. In the *apparatus criticus*, below, this first Latin edition is referred to as 'Hulth-Nybelin', although references to the article in which the edition was published are given as Nybelin 1934.

The English translation presented here is a revision of my first translation, published in 2020 by the *Zoological Journal of the Linnean Society* (Aili and Pietsch 2020). The two translations are, on the whole, identical but a small number of errors have been corrected and the formatting of the text adapted to conform with that of the two other editions and translations. Also, the original Latin text of Artedi's autograph is given in transcription and was used as the base text for the translation; for the earlier version, the edition of Hulth-Nybelin was used.

This new edition of *Catalogus* was prepared during the years of Covid lockdowns, and therefore without access to Artedi's autograph, BL MS Sloane 3870. A digital copy provided through the good services

---

#### How to cite this book chapter:

Aili, H. and Pietsch, T. W. 2024. *Peter Artedi: Reformer of 18th Century Zoology Volume I. Peter Artedi's Life and Works*, pp. 117–157. Stockholm: Stockholm University Press. DOI: <https://doi.org/10.16993/bcm.e>. License: CC BY-NC 4.0



of the British Library had to be used instead. My own, independent reading of this manuscript has, of course, always been cross-checked with Nybelin's print. In the *apparatus criticus* I refer to the *editio princeps* as *Hulth-Nybelin*.

As the text of this manuscript is in Artedi's own handwriting, this poses methodical limitations to the editor's freedom to correct even gross textual errors except by correcting it in a footnote, leaving the original wording unchanged. The names of the authorities mentioned are also left unchanged, although Artedi's spelling is somewhat erratic. It should be noted that author's names are consistently in the genitive case (*genitivus auctoris*), for instance *Raji* as the genitive of *Rajus*; the exact translation should be 'of Ray' but is here simplified into just 'Ray'. Punctuation and typography are normalised, however, as this makes the text much easier to understand.

Italics and bold type are everywhere by myself and represent Artedi's underlinings. Two long dashes — — indicate repetition, that is, the fish name given by one authority is identical with the one immediately preceding. In Artedi's original these dashes are placed on individual lines and vary in numbers as the authority's name is set to the far right of the page.

The etymologies of Greek names of genera are according to Reinhold Strömberg, *Studien zur Etymologie und Bildung der griechischen Fischnamen*, Gothenburg 1943, and Liddell and Scott, *Greek-English Lexicon*, 9th Ed., Oxford 1940. Translations into English of fish names are given in square brackets or footnotes.

Nybelin's 1934 paper, titled 'Tvenne opublicerade Artedi-manuskript. Inför 200-årsminnet meddelade av Orvar Nybelin', covers pages 35–90, comprising an historical and analytical section (pp. 35–77), the Latin edition starting on p. 78. On page 44 Nybelin formulates a very creditable hypothesis concerning the genesis of the *Catalogus*: when leaving Uppsala for London in September 1734 Artedi primarily wished to make himself known to Sir Hans Sloane and gain access to the learned man's collections. Possessing no letters of introduction and no influential sponsor, he wrote his own letter of recommendation in the shape of the present work, the *Catalogus piscium maris Balthici*. Nybelin thus dates the manuscript to the autumn of 1734.

Nybelin's idea offers an explanation why the *Catalogus* was never printed. Indeed, its fate appears to be highly similar to that of later manuscript also directed to Sir Hans Sloane, viz. Jacob Theodor Klein's

*Petri Artedi operum brevis recensio* of 1738 (published by Theodore W. Pietsch and Hans Aili, 'Jacob Theodor Klein's critique of Peter Artedi's *Ichthyologia* (1738)', in *Svenska Linnésällskapets Årsskrift* 2014, pp. 39–84). This text, too, only survives in a manuscript at the British Library (Sloane 4020, f. 194ff.).

## Latin edition

Petri Artedi, Angermanniæ-Sveci

*Catalogus Piscium Maris Balthici ut et fluviorum et lacuum Sveciæ cum synonymis præcipuorum Ichthyologorum*

Auctores in hoc catalogo citati:

1. Publii Ovidii Nasonis *Halieuticon Poematium*, variis in locis editum cum reliquis Ovidii operibus.

2. Caji Plinii Secundi *Historia naturalis*. Lugduni Batav. 1668 8°.

3. Ausonii Burdigalensis, viri consularis, *Mosella, Edyllium* tertia. Burdigalæ 1580 in Fol.

4. Ed. Wottoni Oxoniensis *De differentiis Animalium* libri decem. Lutetiæ Parisiorum 1552 in Fol.

5. Gulielmi Rondeletii M.D. Libri de *Piscibus Marinis* etc. Lugduni 1554 in Folio.

— — Ejusdem *Universæ Aquatiliæ Historiæ* pars altera. Lugduni 1555 in Folio.

6. Conradi Gesneri Medici Tigurini *Historiæ Animalium* liber quartus de *Piscium Natura*. Francofurti 1604 in Folio.

7. Stephani à Schonevelde *Ichthyologia et Nomenclatura Piscium Hamburgensium* etc. Hamburgi 1624 in Quarto.

8. Ulyssis Aldronvandi *De piscibus* libri V etc. Bononiæ 1638 in Folio.

9. Gualteri Charletoni *Onomasticon Zoicon*, etc. Londini 1668 in 4to.

10. Francisci Willoughbij *Historia Piscium*. Oxonii 1686 Folio.

11. Joh. Raji *Synopsis Piscium*. Londini 1713. 8°.

1. Pisces Osteopterygii, vulgo *Spinosi*.

Primum genus *Acus*.

Spec. 1. *Acus Aristotelis congener Pisciculus*, pueris Cornubiensibus Sea Adder, id est, *Vipera Marina* dictus. Willough. p. 160.

## English translation

Peter Artedi of Ångermanland, Sweden

*Catalogue of the Fishes of the Baltic Sea*<sup>165</sup> as well as of the Rivers and Lakes in Sweden with the Synonyms given by the Principal Ichthyologists

Authors quoted in this Catalogue:

1. Publius Ovidius Naso, *Halieutica*. Editions published in various locations with the rest of Ovid's *Works*.
2. Cajus Plinius Secundus, *Historia naturalis*. Leiden 1688, 8°.
3. Ausonius of Bordeaux, Ex-consul, *Mosella*, 3rd Book of *Edyllia*. Bordeaux 1580, fol.
4. Edward Wotton of Oxford, *De differentiis animalium libri decem*. Paris 1552, fol.
5. Guillaume Rondelet M.D., *Libri de piscibus marinis etc.*, Lyon 1554, fol.  
— Same Author's *Universæ aquatiliū historię*, Second Part. Lyon 1555, fol.
6. Konrad Gesner, Medicus of Zürich, *Historiæ animalium liber quartus de piscium natura*. Frankfurt 1604, fol.
7. Stephanus a Schonevelde, *Ichthyologia et nomenclatura piscium Hamburgensium etc.* Hamburg 1624, 4°.
8. Ulysse Aldrovandi, *De piscibus libri V etc.* Bologna 1638, fol.
9. Walter Charleton, *Onomasticon Zoicon etc.*, London 1668, 4°.
10. Francis Willughby, *Historia piscium*, Oxford 1686, fol.
11. John Ray, *Synopsis piscium*, London, 1713, 8°.

### 1. *Osteopterygii* fishes, generally called *Spinosi*.<sup>166</sup>

First Genus: *Acus*.<sup>167</sup>

1. Small Fish congener of Aristoteles' *Acus*, called, by boys in Cornwall, the 'Sea Adder', that is *Vipera marina*. — — Willughby p. 160.

<sup>165</sup> H. Aili, H. and T. W. Pietsch, 2020, 'Peter Artedi's Catalogue of the Fishes of the Baltic Sea with an English translation and commentary', *Zoological Journal of the Linnean Society* 189 (3), 975–97 (reprinted here in part with kind permission of Oxford University Press).

<sup>166</sup> That is, 'Bony-Finned' and 'Spine-Rich' respectively.

<sup>167</sup> That is, 'Needle'.

*Acus lumbriciformis seu Ophidion lumbriciforme*. Ray *Syn.* p. 47.

Svecis *Hafnål*. Abunde in sinibus maris Balthici reperitur.

2. *Acus Aristotelis* species altera, major. Will. p. 159. — — Raji p. 46.

Svecis itidem *Hafnål*.

\* Corpus in medio heptagonum est.

3. *Acus Aristotelis seu Acus secunda species*. Will. 158. — — Raji p. 46.

\* Corpus in medio hexagonum existit.

Secundum genus *Cobitidis*.

1. *Cobitis barbatula, aculeata*. Willug. p. 265. — — Raji p. 124.

*Cobites aculeata* Charleton *On. Z.* p. 157.

*Tånglake* prope Upsaliam ad lacum Melerum vocatur.

Tertium genus *Cyprini*.

1. *Rutilus sive Rubellus fluviatilis* Gesneri p. 820. — — Will. p. 262.  
— — Raji p. 122

à Roche or Roach Anglis. Mört Svecis.

\* Invenitur in magna copia in omnibus propemodum Lacubus Svecanis.

2. *Rootaug* i.e. Ἐρυθροφθαλμος *Germanis dictus, Bramis affinis*.  
Willough. p. 249. — — Raji p. 116.

*Saru* vel *Sarf* Svecis.

3. *Carassius simpliciter dictus, sive Carassii tertium Genus*. Gesneri  
*Paralip.* p. 1275. — — Ray. p. 116.

*Cyprinus latus, alius, 'Gorais' Ratisbonæ* Will. p. 249.

*Ruda* Svecis. *Karass* et *Karausche* Germanis.

*Acus lumbriciformis seu Ophidion lumbriciforme* (*Acus* shaped like an intestinal worm, that is *Ophidion lumbriciforme*), Ray *Synopsis* p. 47.

‘Hafnál’ in Sweden. Found in abundance in bays of the Baltic Sea.

2. Aristotle’s *Acus*, second species, larger. Willughby p. 159 — — Ray p. 46.

‘Hafnál’ identical in Sweden.

\* The middle body is hexagonal.

3. Aristotle’s *Acus*, that is, second species of *Acus*. Willughby 158 — — Ray p. 46.

\* The middle body appears as hexagonal.

Second Genus: *Cobitis*.<sup>168</sup>

1. *Cobitis* with small barbel, thorny. Willughby p. 265 — — Ray p. 124.

*Cobitis aculeata*. Charleton, *Onomasticon zoicon* p. 157.

‘Tånglake’, so called near Uppsala on Lake Mälaren.

Third Genus: *Cyprinus*.<sup>169</sup>

1. *Rutilus*, that is *River-Rubellus*. Gesner p. 820 — — Willughby p. 262 — — Ray p. 122.

‘A Roche or Roach’ in England. ‘Mört’ in Sweden.

\* Found in large numbers in almost every Swedish lake.

2. *Rootaug*, that is Ἐρυθροφθάλμος [Red-Eye] by its German name, related to *Brama*. Willughby p. 249 — — Ray p. 116.

‘Sarv’ or ‘Sarv’ in Sweden.

3. *Carassius* simply so named, that is third genus of *Carassius*. Gesner *Paralipomena* p. 1275 — — Ray p. 116.

*Cyprinus latus*<sup>170</sup> *alius*, ‘Gorais’ *Ratisbonæ* Willughby p. 249.

‘Ruda’ in Sweden. ‘Karass’ and ‘Karausche’ in Germany.

<sup>168</sup> Gr. Κοβίτις ‘like the Gudgeon’ L&S.

<sup>169</sup> Gr. Κυπρίνος ‘Coppery’. Strömberg (p. 41) notes that a large number of fish names are formed with the adjective-forming suffix -ῖνος, among them Κυπρίνος.

<sup>170</sup> Translator’s note: the curious use of the Latin adjective *latus* (‘wide’, ‘broad’) and the noun *latitudo* (‘breadth’), to denote the vertical dimension, that is, the height (or depth), of a fish, observed by Willughby and Artedi (often in his *Ichthyologia*), was probably caused by their seeing and describing specimens that were lying flat on a board or a plate. The vertical dimension of the fish was thus described as its horizontal one. The proper adjective and noun for ‘high’ and ‘height’ (or ‘deep’ and ‘depth’), *altus* and *altitudo*, occur only rarely.

4. *Tinca*. Ausonii in *Mosella*, versu 125. — — Charletoni p. 162. — — Gesneri p. 984. — — Willoughbij p. 251. — — Raji p. 117.

*a Tench* Anglis. *Linnare*, *Sutare*, *Skomakare* Svecis.

5. *Rutilus latior vel Rubellio fluviatilis*. Willough. p. 252 — — Raji p. 118. *Orfus* Gesneri in Ed. Germ. fol. 166.b.

*a Rudd vel Roud* Anglis, et in quibusdam locis *a Finscale*. *Winderfisch* Antwerpia.<sup>158</sup>

6. *Cyprinus latus sive Brama* Rondelet p. 154 — — Gesneri p. 316. 317. — — Willoug. p. 248. — — Raji p. 116.

*A Bream* Anglis. *Brax* Svecis. *Brachsem* et *Prasem* Germanis.

7. *Alburnus* Ausonii in *Mosella*, versu 126. Charletoni p. 161. — — Willoug. p. 263. — — Raji p. 123.

*A Bleack* Anglis. *Löja* et *Bén-Löja* Svecis. *Hamburgensibus* et *Slevicensibus* *Witinck*, *Witeke* et *Blicke*.

8. *Cyprinus* spithama minor, ossiculis viginti quinque in Pinna Ani.

Svecis *Björka*, *Björkna* et *Björkfisk*.

Locus est Lacus Melerus Uplandia.

à Nobili Willoughbejo, Rajo et aliis non descriptus.

---

<sup>158</sup> Antwerpia *Hulth-Nybelin*.

4. *Tinca*. Ausonius in *Mosella*, verse 125 — — Charleton p. 162 — — Gesner p. 984 — — Willughby p. 251 — — Ray p. 117.

‘A Tench’ in England. ‘Linnare’, ‘Sutare’, ‘Skomakare’ in Sweden.

5. *Rutilus* wider, or ‘River-Rubellio’. Willughby p. 252 — — Ray p. 118.

*Orfus* Gesner in German Edition fol. 166b.

‘A Rudd’ or ‘Roud’ in England and in certain locations ‘a Finscale’. ‘Winderfisch’ in Antwerp.

6. *Cyprinus* wide, that is, *Brama*. Rondelet p. 154 — — Gesner p. 316, 317 — — Willughby p. 248 — — Ray p. 116.

‘A Bream’ in England. ‘Brax’ in Sweden. ‘Brachsem’ and ‘Prasem’ in Germany.

7. *Alburnus*. Ausonius in *Mosella* verse 126. Charleton p. 161 — — Willughby p. 263 — — Ray p. 123.

‘A Bleack’ in England. ‘Löja’ and ‘Ben-Löja’ in Sweden. In Hamburg and Schleswig ‘Witinck’, ‘Witeke’ and ‘Blicke’.

8. *Cyprinus* smaller than one palm, twenty-five small bones in the Anal Fin.

In Sweden ‘Björka’, ‘Björkna’ and ‘Björkfisk’.

Its locality is Lake Mälaren in Upland.

Not described by noble Willughby, Ray, and others.



9. *Cyprinus* iride flava et Pinna Ani ossiculorum triginta septem.

*Faren* Svecis.

Invenitur solum, quantum scio, in Lacu Meleri, imprimis ad prædium Bjelkestad Comitissæ Sóp.

A Nobili Willoughbejo non describitur.

10. *Cyprinus* spithalmis, oblongus; maxilla superiore paulo longiore.

1º. Pinna Ani ossiculorum 11. Iris argentea.

2º. Pinnæ omnes albescentes.

*Stämm* Svecis.

Invenitur in Angermannia, Medelpadia, W-Botnia etc. In Uplandia vero ignotus est.

\* Synonymon quoddam hujus piscis in nullo auctore invenire potui.

11. *Cyprinus* toto dorso acuminato et Pinna Ani ossiculorum viginti quatuor.

1. Rostrum prominens et nasiforme est, multum tamen differt a *Naso Alberti* Auctorum.

*Wimba* Svecis.

Locus: Lacus Melerus Uplandiæ et fluvius Sala Upsaliam præterlabens. à Willoughbejo et Rajo non descriptus.

12. *Cyprinus* maxilla inferiore longiore, sursum reflexa, et Pinna Ani ossiculorum quindecim.

*Asp* Svecis.

Locus: Lacus Melerus in Uplandia et alibi. In Borealioribus Sveciæ partibus non invenitur.

9. *Cyprinus* with yellow Iris and thirty-seven small bones in the Anal Fin. 'Faren' in Sweden.

Only found, so far as I know, in Lake Mälaren, primarily by the Manor of Bjelkestad<sup>171</sup> belonging to Countess Soop.<sup>172</sup>

Not described by the noble Willughby.

10. *Cyprinus*, one palm, oblong, upper maxilla<sup>173</sup> slightly longer.

1. Anal fin of 11 small bones. Iris silvery.

2. All fins are whitish.

'Stämn' in Sweden. Found in Ångermanland, Medelpad, Västerbotten etc., but it is unknown in Upland.

\* I could not find any synonym of this fish in any authority.

11. *Cyprinus*, entire back pointed and anal fin of twenty-four small bones.

1. Snout is prominent and nasiform but differs very much from *Nasus* of *Albertus* of the Authorities.

'Wimba' in Sweden.

Localities: Lake Mälaren in Upland and the river Sala running past Upsala.

Not described by Willughby and Ray.

12. *Cyprinus*, lower maxilla longer and bent upwards, and anal fin of fifteen small bones. 'Asp' in Sweden.

Localities: Lake Mälaren in Upland and other places. Not known in the more northern regions of Sweden.

<sup>171</sup> Bjelkesta (modern spelling) is an estate located in the village of Örsundsbro, parish of Giresta, commune of Enköping, Uppsala län, Sweden, founded in 1705 by Count Karl Gyllenstierna af Steninge (1649–1723). It is not mentioned in the standard work *Svenska slott och herresäten*, 2, Upland, Stockholm 1933. Depicted in colour in: Göran Ulväng, 'Herrgårdsbyggandet i Mälardalen under 1700- och 1800-talet: när, var och av vem?', *Bebyggelsehistorisk tidskrift* 60, 2010, 48.

<sup>172</sup> Anna Maria Soop (1660–1735), wife of Count Karl Gyllenstierna. My thanks are due to Dr Jakob Christensson, who generously informed me on this point.

<sup>173</sup> Artedi used *maxilla* and *mandibula* indiscriminately for either jaw; for more precision, he added the adjectives *superior* and *inferior*, 'upper' and 'lower'.

A nobilissimo Willoughbejo non describitur, videtur tamen esse

*Capito fluviatilis, rapax* Gesneri fol. 169 et 170 Edit. German., sed ob imperfectam descriptionem nihil certi determinari potest, Willoughbejus enim, summus in descriptionibus Specierum Ichthyologus, hunc piscem nec vidit nec descripsit.

13. *Cyprinus* pinna ani ossiculorum quadraginta.

*Blicca, Panka, Braxenpanka* et *Flia* Svecis.

Locus: Melerus et alii Lacus in Uplandia etc. In Borealioribus Sveciæ locis non reperitur.

a Nobilissimo Willoughbejo non describitur, videtur tamen esse:

*Ballerus* Rondeletii Part. 2. c. 8. p. 154. — — Schoneveldii p. 28.

14. *Cyprinus* biuncialis, iridibus rubris et Pinna Ani ossiculorum novem.

Varia nomina secundum diversa loca Sveciæ obtinet.

Locus: Sinus Maris Balthici et portus; in fluviis vero et lacubus hucusque non observavi. Hujus synonymon nondum invenire potui apud ullum auctorem præter Schoneveldium, qui hunc pisciculum appellat *Aphyam*, cum tamen *Aphya* veterum longe alius sit piscis.

#### *Observatio.*

Nomina Specifica *Cyprinorum* præcedentium à Nobilissimo Willoughbejo non descriptorum, e numero Radiorum seu Ossiculorum in Pinna Ani imprimis sumsi, quum aliæ partes externæ horum piscium ad unum idemque Genus pertinentium, in Numero, Figura et Proportionem multum convenient.

Quartum genus *Clupeæ*.

1. *Harengus* Rondeletii l. 7. p. 222. — — Gesneri p. 408 et 486. — — Willough. p. 219. — — Raji p. 103.

*Chalcis* Wottoni l. 8. c. 183. fol. 162 a. b.

*A Herring* Anglis. *Sill* Svecis.

Nota. Ad hanc Speciem (1) etiam referri debet:

Not described by most noble Willughby, but appears to be:

*Capito fluviatilis, rapax* (River-Capito, rapacious), Gesner fol. 169 and 170, German Edition, but owing to a defective description nothing can be established for certain, for Willughby, the chief ichthyologist in describing species, neither saw nor described this fish.

13. *Cyprinus*, anal fin of forty small bones.

‘Blicca’, ‘Panka’, ‘Braxenpanka’, and ‘Flia’ in Sweden.

Locality: Mälaren and other lakes in Upland etc. Not found in the more northern regions of Sweden.

Not described by most noble Willughby, but appears to be:

*Ballerus*, Rondelet Part 2, cap. 8, p. 154 — — Schonevelde p. 28.

14. *Cyprinus*, two inches, with red irises and anal fin of nine small bones.

It has various names in different localities in Sweden.

Localities: Bays and harbours of the Baltic Sea; so far, however, I have not observed it in rivers and lakes. I have not yet been able to find its synonym in any authority except Schonevelde, who names this fish *Aphya*, although *Aphya* of the Ancients is an entirely different fish.

#### *Observation.*

The names I gave to those species of the afore-mentioned *Cyprini* that were not described by most noble Willughby I chiefly took from the number of rays, that is small bones, in the anal fin, as other external parts of those fishes that belong to the same genus agree very much in numbers, shapes, and proportions.

#### Fourth Genus: *Clupea*.<sup>174</sup>

1. *Harengus*. Rondelet book 7, p. 222 — — Gesner p. 408 and 486 — — Willughby p. 219 — — Ray p. 103.

*Chalcis* Wotton book 8, ch. 183, fol. 162b.

‘A Herring’ in England. ‘Sill’ in Sweden. Note: To this Species (1) should also be referred:

<sup>174</sup> Gr. Κλουπαῖα. Strömberg (p. 9) considers this a borrowing into Greek from some other language.

*Harengus minor sive Pilchardus* Will. p. 223. — — Raji p. 104.

*Alosa minor* Charletoni p. 151. lin. secunda.

*The Pilchard* Anglis. *Strömming* Svecis, ad Fretum Danicum vero et alibi etiam *Sill* dicitur.

*Observatio.*

Hi pisces nullo modo sunt distinctæ species, sed differunt tantum *magnitudine*; omnes enim partes externæ et intestinæ in Numero, Figura, Situ et Proportione conveniunt. Imo Vertebræ dorsi in Ambobus sunt numero 56, quas tamen in omnibus speciebus unius Generis numero dispares esse per *octo* annorum observationes satis expertus sum.

Qvintum Genus *Albulæ*.

1. *Albula nobilis* Gesneri p. 33. Schoneveldii p. 12. — — Willoughby p. 185. — — Raji p. 60.

*Sik* Svecis. *Snebbel* et *Helte* Danis, *Snepel* ad Albim. *Schelley* Cumberlandorum in Anglia.

\* Reperitur copiose in tota Svecia, tam in lacubus quam in Mari.

2. *Albula minima* Gesneri p. 34. — — Willough. p. 186. — — Raji p. 61.

Locus: In variis lacubus Sveciæ invenitur, et secundum diversa loca, diversa etiam sortitur nomina.

3. *Thymallus* Aldrovandi l. 5. c. 14. p. 594. — — Charletoni p. 155. — — Will. p. 187. — — Raji p. 62.

*Thymalus*. Wottoni l. 8. c. 190. fol. 170 a.

*A Grayling* Anglis. *Harr* Svecis. *Äsch* Germanis.

*Harengus minor sive Pilchardus* [Harengus minor, that is Pilchard] Willughby p. 223 — — Ray p. 164.

*Alosa minor*. Charleton p. 151, line 2.

‘The Pilchard’ in England. ‘Strömming’ in Sweden, but in the Danish Sound and in other locations it is also called ‘Sill’.

*Observation.*

These fishes are in no way separate species but differ only in size. All their parts, external as well as internal, agree in Numbers, Shape, Place, and Proportions. Indeed, in both fishes the vertebræ of the back are 56 in number, although, during eight years of observations, I have experienced well enough that these differ in number in all Species of one particular Genus.

Fifth Genus: *Albula*.<sup>175</sup>

1. *Albula nobilis*. Gesner p. 33. Schonevelde p. 12 — — Willughby p. 185 — — Ray p. 60.

‘Sik’ in Sweden. ‘Snebbel’ and ‘Helte’ in Denmark. ‘Snepel’<sup>176</sup> in the Elbe. ‘Schelley’ in Cumberland, England.

\* Found in large numbers in all of Sweden, in lakes as well as in the sea.

2. *Albula minima*. Gesner p. 34 — — Willughby p. 186 — — Ray p. 61.

Localities: found in various lakes in Sweden, and is also given diverse names in diverse locations.

3. *Thymallus*.<sup>177</sup> Aldrovandi book 5, ch. 14, p. 594 — — Charleton p. 155 — — Willughby p. 182 — — Ray p. 62.

*Thymalus*. Wotton book 8, ch. 190, fol. 170a.

‘A Grayling’ in England. ‘Harr’ in Sweden. ‘Äsch’ in Germany.

<sup>175</sup> *Albulus/alum*, adj. Latin, ‘whitish’.

<sup>176</sup> This word is very difficult to decipher in the MS; it is written in a cramped style between the lines, suggesting that it was a later addition.

<sup>177</sup> Gr. Θύμαλλος. According to Strömberg (pp. 60–61) the name refers to the thyme-like smell of the fish.

Sextum Genus *Eperlani*.

1. *Eperlanus* Rondel. Part. 2. p. 196. — — Charletoni p. 153. — — Willough. p. 202. — — Raji p. 66.

*Spirinchus* Schoneveldii p. 70.

A *Smelt* Anglis. *Smelte* Danis. *Nårs* Svecis, majores vero quibusdam *Slom* appellantur.

Septimum Genus *Salmonis*.

1. *Salmo* Ausonii, versu 97. — — Gesneri p. 824. — — Charletoni p. 150. — — Willough. p. 189. 190. — — Raji p. 63.

*Salmo nobilis* Schoneveldii p. 64.

*Salmon* Anglis. *Lax* Svecis. *Lachss* Germanis. *Lohi* Fennonibus.

\* Hujus Piscis copiosa piscatura est in tota fere Svecia, imprimis vero in Sinu Botnico.

2. *Salmo cinereus aut griseus* Jonsoni in *Ichthyol.* Willug. p. 193. — — Raji p. 63.

*The Grey* Anglis. *Grå-Lax* Svecis.

3. *Trutta Salmonata* Johnsoni in *Ichthyologia* Willoughbeji p. 193. — — Raji p. 63.

*The Scurf, or Bull-trout* Anglis. In Svecia secundum diversa loca, diversa nomina quoque obtinet.

4. *Trutta fluviatilis* Rondel. Part. 2. p. 169. — — Gesneri p. 1002. etc. — — Willough. p. 199. — — Raji p. 65.

A *Trout* Anglis. *Forell, Stenbit, Bäckerö* etc. Svecis.

Sixth Genus: *Eperlanus*.<sup>178</sup>

1. *Eperlanus*. Rondelet Part 2, p. 196 — — Charleton p. 153 — — Willughby p. 202 — — Ray p. 66.

*Spirinchus*. Schonevelde p. 70.

‘A Smelt’ in England. ‘Smelte’ in Denmark. ‘Nårs’ in Sweden, but larger specimens are called by some, ‘Slom’.

Seventh Genus: *Salmo*.<sup>179</sup>

1. *Salmo*. Ausonius verse 97 — — Gesner p. 824 — — Charleton p. 150 — — Willughby p. 189, 190 — — Ray p. 63.

*Salmo nobilis*. Schonevelde p. 64.

‘Salmon’ in England. ‘Lax’ in Sweden. ‘Lachss’ in Germany. ‘Lohi’ in Finland.

\* This fish is copiously caught in almost all of Sweden but chiefly in the Gulf of Bothnia.

2. *Salmo cinereus aut griseus*. [Salmon, ash-coloured or grey] Johnson in *Ichthyologia* Willughby p. 193 — — Ray p. 63.

‘The Grey’ in England. ‘Grå-Lax’ in Sweden.

3. *Trutta Salmonata*. Johnson in *Ichthyologia* Willughby p. 193 — — Ray p. 63.

‘The Scurf or Bull-trout’ in England. In Sweden it has different names in different locations.

4. *Trutta fluviatilis*. Rondelet Part 2 p. 169 — — Gesner p. 1002 etc. — — Willughby p. 199 — — Ray p. 65.

‘A Trout’ in England. ‘Forell’, ‘Stenbit’, ‘Bäckrö’ etc. in Sweden.

<sup>178</sup> No origin found.

<sup>179</sup> No origin found.



Octavum Genus *Lucii*.

1. *Lucius Ausonii* in *Mosella*, versu 123. — — Wottoni fol. 169 b. — — Gesneri p. 500. — — Charletoni p. 162. — — Willoughby p. 236. — — Raji p. 112.

*The Pike* Anglis. *Gjädä* Svecis. *Gedde* Danis. *Hecht* Germanis. *Snoock* Belgis. *Brochet* Gallis.

\* In omnibus Lacubus et fluviis Sveciæ reperitur.

2. *Acus vulgaris, sive Oppiani* Aldrovandi p. 106. — — Will. p. 231. — — Raji p. 109.

*The Horn-fish or Gar-fish* Anglis. *Hornfisk* Hamburgensibus et incolis ad Fretum Öresundense. *Näbbgjädä* Svecis.

*Observatio.*

Hic piscis (2) in Freto Öresundensi Sveciam inter et Daniam, ut et in Australiori Maris Balthici parte ad Germaniam satis communis est. In Australiore Maris Balthici parte Sveciam alluente reperitur etjam, sed multo rarius. In Sinu Botnico autem prorsus ignotus est.

Nonum Genus *Rhombi*.

1. *Passer* Gesneri p. 664 et 670. — — Willough. p. 96. — — Raji p. 31.

*Passer lævis* Aldrovandi l. 2. p. 243.

*A Plaise* Anglis. *Schickpleder* Danis. Svecis vulgo *Flundra*, aliis vero<sup>159</sup> *Risbätten*.

2. *Passer fluviatilis, vulgo Flesus* Will. p. 98. — — Raji p. 32.

*Passer niger* Charletoni *On. Zoic.* p. 145.

à *Flounder, or But, or Fluke* Anglis. *Flundra* itidem Svecis audit.

---

<sup>159</sup> vero scripsi: v. Artedi, *Hulth-Nybelin*.

Eighth Genus: *Lucius*.<sup>180</sup>

1. *Lucius*. Ausonius in Mosella verse 123 — — Wotton fol. 169b — — Gesner p. 500 — — Charleton p. 162 — — Willughby p. 236 — — Ray p. 112.

‘The Pike’ in England. ‘Gjädä’ in Sweden. ‘Gedde’ in Denmark. ‘Hecht’ in Germany. ‘Snoock’ in Holland. ‘Brochet’ in France.

\* Found in all lakes and rivers in Sweden.

2. *Acus vulgaris, sive Oppiani*. Aldrovandi p. 106 — — Willughby p. 231 — — Ray p. 109.

‘The Horn-fish or Gar-fish’ in England. ‘Hornfisk’ in Hamburg and among inhabitants along the Sound of Öresund. ‘Näbbgjädä’ in Sweden.

*Observation.*

This fish (2) is quite common in the Sound of Öresund between Sweden and Denmark, as well as in the more southern part of the Baltic Sea by Germany. In the more southern part of the Baltic Sea that flows close to Sweden it is also found but much more rarely. In the Bay of Bothnia it is wholly unknown.

Ninth Genus: *Rhombus*.<sup>181</sup>

1. *Passer* Gesner p. 664 and 670 — — Willughby p. 96 — — Ray p. 31.

*Passer lævis* Aldrovandi Book 2 p. 243.

‘A Plaise’ in England. ‘Schickpleder’ in Denmark. ‘Flundra’ in Sweden in general but among others ‘Risbätten’.

2. *Passer fluviatilis, vulgo Flesus* Willughby p. 98 — — Ray p. 32.

*Passer niger* Charleton *Onomasticon Zoicon* p. 145.

‘A Flounder’, or ‘But’, or ‘Fluke’ in England. ‘Flundra’ identically in Sweden.

<sup>180</sup> *Lucius* as personal male name, ‘Of the day’. Whether this is the origin of the name of the species of *Lucius* is uncertain.

<sup>181</sup> Gr. Ῥόμβος (‘Rhomb’).

Decimum Genus *Scombri*.

1. *Scomber Ovidii* Nasonis *Hal.* Poem. versu 94. — — Gesneri p. 841 et 1012. — — Willoug. p. 181. — — Raji p. 58.

*The Macrell* Anglis. *Makrill* Svecis.

*Observatio.*

Ad Fretum Danicum seu Öresundense, Insulam Bornholm et alia australiora Maris Balthici loca æstate una cum Harengis capitur, in Borealiore vero Maris Balthici parte et Sinu Bothnico prorsus ignotus est.

2. *Trachurus Schoneveldii* p. 75. — — Charletoni p. 143. — — Willoug. p. 290. — — Raji p. 92.

*The Horse Mackrell* Anglis. Cornubiensibus a *Scad.* Ekrefordiæ ad Mare Balthicum *Stöcker.*

*Observatio.*

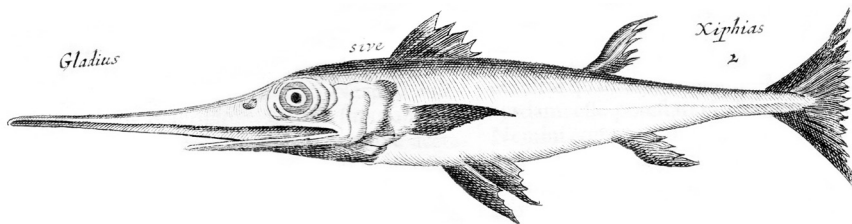
Hic piscis in Australiori tantum Maris Balthici parte ad Hollsteniam etc. reperitur, alias vero in toto Mari Baltico ignotus est.

3. *Thunnus seu Thynnus* Gesneri p. 957. — — Willough. 176. — — Raji p. 57.

*Thunnus* Charletoni p. 124.

*Observatio.*

Hic piscis in Mari Balthico hospes est, et proprie loquendo non invenitur; ex observatione Clarissimi Schoneveldii tamen Medici Hamburgensis, anno 1605, Mense Novembri unus hujus Speciei piscis 8 pedes longus in Sinu Ekrefordensi captus est.



**Figure 4.** The swordfish, *Xiphias gladius*, after Hendrik Ruysch (1663–1727), *Theatrum universale omnium animalium piscium, avium, quadrupedum, exanguium, aquaticorum, insectorum, et angium*, 1718 (vol. 1, pl. 4, fig. 2). License: Public Domain.

Tenth Genus: *Scomber*.<sup>182</sup>

1. *Scomber*. Ovidius Naso, Poem *Halieutica* verse 94 — — Gesner p. 841 and 1012 — — Willughby p. 181 — — Ray p. 58.

‘The Macrell’ in England. ‘Makrill’ in Sweden.

*Observation.*

In the Danish Sound, that is Öresund, by the Isle of Bornholm and other locations of the more southerly Baltic Sea, it is caught in the summer, along with Herring, but it is absolutely unknown in the more northern part of the Baltic Sea and the Bay of Bothnia.

2. *Trachurus* Schonevelde p. 75 — — Charleton p. 143 — — Willughby p. 290 — — Ray p. 92.

‘The Horse Mackrell’ in England. ‘A Scad’ in Cornwall. ‘Stöcker’ at Eckernförde by the Baltic Sea.

*Observation.*

This fish is found only in the more southern part of the Baltic Sea, by Holstein etc. but elsewhere, in the whole Baltic Sea, it is unknown.

3. *Thunnus seu Thynnus* Gesner p. 957 — — Willughby p. 176 — — Ray p. 57.

*Thunnus* Charleton p. 174.

*Observation.*

This fish is a visitor in the Baltic Sea, and is, properly speaking, not to be found; however, according to an observation by most famous Schonevelde, a doctor of Hamburg, in the month of November of the year 1605 one fish of this species, 8 feet long, was caught in the bay of Eckernförde.

---

<sup>182</sup> Gr. Σκόμβρος (‘Grunt’) (noun).

Undecimum Genus *Xiphiæ*.

1. *Xiphias* Ovidii Nasonis, versu 97. — — Plinii *H.N.* l. 34 c. 2 et 11.  
— — Wottoni l. 8. c. 189. fol. 167 b. — — Charletoni p. 124.

*Xiphias piscis*, *Latinis Gladius* Willough. p. 161. — — Raji p. 52.  
*The Sword-fish* Anglis. *Swärdfisk* Svecis.

*Observatio.*

Advena et hospes in Mari Balthico est, sed tamen contingit interdum ut ex Oceano per Fretum Öresundense in Mare nostrum penetret, anno enim 1704 hujusmodi piscis in Sinu Chiloniensi à piscatoribus captus est, quem singulari Tractatu descripsit et delineavit Gunth. Christ. Schelhamerus, Medicinæ in Academia Chiloniensi Professor.

Duodecimum Genus *Percæ*.

1. *Perca* Ausonii in *Mosella*, versu 115. — — Rondelet Part. 2. p. 196.  
*Perca fluviatilis* Gesneri p. 698. — — Willough. p. 291. — — Raji p. 97.  
*Perca major* Charletoni *O. Z.* p. 161.

*A Perch* Anglis. *Barss* et *Bersich* Germanis. *Abbor* et *Abborre* Svecis.  
*Aborn* Danis.

\* Ubique fere copiose in Svecia reperitur.

2. *Lucioperca* Gesneri *Paralip.* p. 28. v.<sup>160</sup> 1288. — — Schoneveldii p. 43. — — Willough. p. 293. — — Raji p. 98.

*Schilus*, *Nagemulus* Charletoni *O. z.* p. 164.

*Gjös* Svecis. *Sandat* Pomeranis, Holsatiis et Megalopolensibus. *Schindel* Augustæ Vindellicorum.

\* In Anglia non invenitur ex observatione Nobilissimi Willoughbeji.

---

<sup>160</sup> v. Artedi: vel *Hulth-Nybelin*.

Eleventh Genus: *Xiphias*.<sup>183</sup>

1. *Xiphias* Ovidius Naso verse 97 — — Plinius *Historia Naturalis* Book 31, cap. 2 and 11 — — Wotton Book 8 chapter 189 fol. 167b — — Charleton p. 124.

*Xiphias piscis, Latinus Gladius* Willughby p. 161 — — Ray p. 52.  
‘The Sword-fish’ in England. ‘Swärdfisk’ in Sweden.

*Observation.*

It is an immigrant and guest in the Baltic Sea, but it happens, nonetheless, from time to time that it penetrates from the Ocean through the Sound of Öresund into our Sea; for, in the year 1704, a fish of this kind was caught by fishermen in the Bay of Kiel. Gunth. Christ. Schelhamerus,<sup>184</sup> Professor of Medicine at the Academy of Kiel, described and depicted it in a unique treatise.

Twelfth Genus: *Perca*.<sup>185</sup>

1. *Perca* Ausonius in *Mosella* verse 115 — — Rondelet Part 2 p. 196.

*Perca fluviatilis* Gesner p. 698 — — Willughby p. 291 — — Ray p. 97.

*Perca major* Charleton *Onomasticon Zoicon* p. 161.

‘A Perch’ in England. ‘Barss’ and ‘Bersich’ in Germany. ‘Abbor’ and ‘Abborre’ in Sweden. ‘Aborn’ in Denmark.

\* Found in abundance everywhere in Sweden.

2. *Lucioperca* Gesner *Paralipomena* p. 28 or 1288 — — Schonevelde p. 43 — — Willughby p. 293 — — Ray p. 98.

*Schilus, Nagemulus* Charleton *Onomasticon zoicon* p. 164.

‘Gjös’ in Sweden. ‘Sandat’ in Pomerania, Holstein and Mecklenburg. ‘Schindel’ in Augsburg.

\* In England it is not to be found, according to an observation by most noble Willughby.

<sup>183</sup> Gr. Ξιφίας (‘Sword’).

<sup>184</sup> Günther Christoph Schelhamer (1649–1716).

<sup>185</sup> Gr. Πέρκη (‘many-coloured’).

3. *Cernua fluviatilis* Gesner p. 191. 192. — — Willoug. p. 334. — —  
Raji p. 144.

*Cernua fluviatilis, aliis Perca minor* Charletoni p. 158.

*A Ruffe, vel rectius Rough* Anglis. *Gjers* Svecis. *Kaulbarss, Stuerbarss*  
et *Stuer* Germanis.

Decimum tertium Genus *Trachini*.

1. *Draco marinus*. Wottonii l. 8. c. 178. f. 158b.

*Araneus* Charletoni O.Z. p. 149.

*Draco sive Araneus Plinii* Gesneri p. 77. 78 & 89. — — Willoug.  
p. 288. — — Raji p. 91.

*Weever* Anglis. *Viver* Gallis. *Fjärsing* Svecis et Danis ad Fretum  
Öresundense.

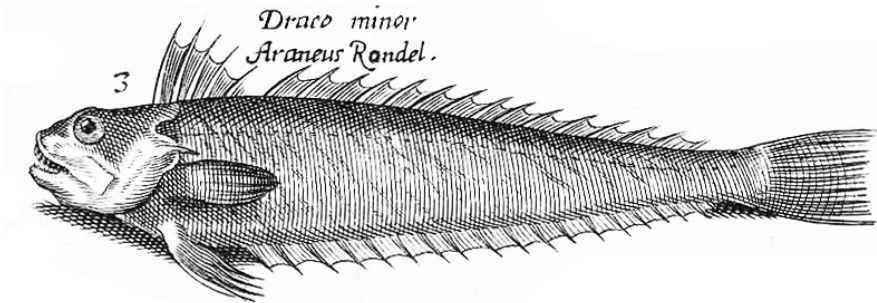
*Observatio.*

Hic Piscis non longe in Mare Balthicum penetrat, sed in australioribus  
ejus locis ad Fretum Danicum tantummodo reperitur.

3. *Cernua fluviatilis* Gesner p. 191, 192 — — Willughby p. 334 — — Ray p. 144.

*Cernua fluviatilis*, aliis *Perca minor* Charleton p. 158.

‘A Ruffe’ or, more correctly, ‘Rough’ in England. ‘Gjers’ in Sweden. ‘Kaulbarss’, ‘Stuerbarss’, and ‘Stuer’ in Germany.



**Figure 5.** ‘Draco marinus’, now known as the lesser weever, *Echiichthys vipera*, after Hendrik Ruysch (1663–1727), *Theatrum universale omnium animalium piscium, avium, quadrupedum, exanguium, aquaticorum, insectorum, et angium*, 1718 (vol. 1, pl. 21, fig. 3). License: Public Domain.

Thirteenth Genus: *Trachinus*.<sup>186</sup>

1. *Draco marinus* Wotton Book 8, chapter 178, fol. 158b.

*Araneus* Charleton *Onomasticon zoicon* p. 149.

*Draco sive Araneus Plinii* Gesner p. 77–78 and 89 — — Willughby p. 288 — — Ray p. 91.

‘Weever’ in England. ‘Viver’ in France. ‘Fjärsing’ in Sweden and Denmark at the Sound of Öresund.

*Observatio.*

This fish does not penetrate far into the Baltic Sea, but is only found in its more southerly regions by the Danish Sound.

<sup>186</sup> Gr. Τραχίς, -ῖνος (‘Of Trachis’). Not analysed by Strömberg. Trachis was a region and a town in ancient Greece.



Decimum quartum Genus *Mulli*.

1. *Mullus* Ovidii Nasonis, versu 123. — — Wottoni l. 8. c. 169. fol. 151.  
b. — — Schoneveldii p. 47. Willoughby p. 285. — — Raji p. 90.

\* Piscis in toto Mari Balthico ignotus est, sed in australiori ejus parte ad Hollsteniam autumno interdum capitur et Kiloniensibus appellatur *Petermanneken* et *Goldeken*, Piscatoribus Ekrefordensibus autem *Schmerbüttten* et *Baguntken* ex observatione Schoneveldii.

Decimum quintum Genus *Gasterostei*.

1. *Pisciculus aculeatus Rondeletii* Willug. p. 341. — — Raji p. 145.

*A Stickleback, Banstickle or Sharpling* Anglis.

*Skittspigg* et *Skittbårr* Svecis.

\* Aculeos Tres in dorso habet.

2. *Pisciculus aculeatus, minor* Willoug. p. 342. — — Raji p. 145.

*A Lesser Stickleback or Sharpling* Anglis.

*Skittspigg* itidem Svecis.

\* Aculeos 9 vel 10 in dorso habet.

*Observatio.*

*Mugil, Lupus marinus* seu *Labrax, Sudis* seu *Sphyræna, Spari, Salpæ, Turdi, Faber* seu *Zeus, Cuculi* et *Lyrae, Scorpaena, Umbra, Glauci* et *Amiae* Auctorum Mare Balthicum non intrant.

Decimum sextum Genus *Cotti*.

1. *Cottus Rondeletii* Part. 2. p. 202. Gesneri p. 157.

*Gobio fluviatilis capitatus* Gesner p. 401. 477. — — Willough. p. 137. — — Raji p. 76.

*Gobio capitatus* Charletoni p. 157.

*A Bull-Head or Millers Thumb* Anglis.

*Sten-Simpa* etc. Svecis.

Fourteenth Genus: *Mullus*.<sup>187</sup>

1. *Mullus* Ovidius Naso verse 123 — — Wotton Book 8, Chapter 169 fol. 151b — — Schonevelde p. 47 — — Willughby p. 285 — — Ray p. 90.

\* This fish is unknown in the whole Baltic Sea, but in its more southerly part by Holstein it is sometimes caught in the autumn, and in Kiel it is called ‘Petermanneken’ and ‘Goldeken’. By fishermen of Eckernförde it is, however, called ‘Schmerbüthen’ and ‘Baguntken’ according to an observation by Cl. Schonevelde.

Fifteenth Genus: *Gasterosteus*.<sup>188</sup>

1. *Pisciculus aculeatus Rondeletii* Willughby p. 341 — — Ray p. 145.

‘A Stickleback’, ‘Banstickle or Sharpling’ in England. ‘Skittspigg’ and ‘Skittbårr’ in Sweden.

\* It has three prickles on its back.

2. *Pisciculus aculeatus, minor* Willughby p. 342 — — Ray p. 145.

‘A Lesser Stickleback or Sharpling’ in England. ‘Skittspigg’ identically in Sweden.

\* It has 9 or 10 prickles on its back.

*Observatio.*

*Mugil*, *Lupus marinus* that is *Labrax*, *Sudis* that is *Sphyræna*, *Sparus*, *Salpa*, *Turdus*, *Faber* that is *Zeus*, *Cuculus* and *Lyra*, *Scorpæna*, *Umbra*, *Glaucus* and *Amia* of the authors do not enter the Baltic Sea.

Sixteenth Genus: *Cottus*.<sup>189</sup>

1. *Cottus* Rondelet Part 2, p. 202 — — Gesner p. 400 and 477.

*Gobio fluviatilis, capitatus* Gesner p. 401, 477 — — Willughby p. 137 — — Ray p. 76.

*Gobio capitatus* Charleton p. 157.

‘A Bull-head or Miller’s Thumb’ in England. ‘Sten-Simpa’ etc. in Sweden.

<sup>187</sup> No etymology found.

<sup>188</sup> *Gasterosteus* appears to be a composition of Greek noun γαστήρ (‘belly’) and Latin adj. *osteus/alum* (‘bony’) (of medical Latin, not in Classical Latin; cf. Gerhard Bendz, *Latin för medicinare*, Lund 1972, 476)—‘Bony-Belly’?

<sup>189</sup> Gr. Κόττος (‘Cock’).

2. *Scorpaenæ Bellonii* p. 201. *Edit. Gall. similis* Willough. p. 138. — — Raji p. 145.

*Father-Lasher* Cornubiensibus. In Svecia secundum diversa loca, varia nomina obtinet.

3. *Cottus scaber*, capite polyacantho et Tuberculis quatuor ceratoidibus in medio.

*Simpa* Svecis.

Litoribus Balthicis Sveciam alluentibus familiaris est, imprimis tempore autumnali.

\* Hic piscis neque à Nobilissimo Willoughbejo, nec ullo alio Ichthyologo hucusque descriptus est.

Decimum septimum Genus *Gadi*.

1. *Asellus varius vel striatus*. Schoneveldii p. 19. — — Willoug. p. 192. — — Raji p. 54.

*Små Tårsk* Svecis.

Hic piscis in Mari Balthico satis frequens est, imprimis in partibus ejus australioribus.

2. *Asellus minor et mollis* Charletoni O.Z. p. 121.

*Asellus mollis, major seu albus*. Willoug. p. 170. — — Raji p. 55.

*A Whiting* Anglis. *Hwitling* Svecis.

\* In Freto Öresundensi et australiori Maris Balthici parte invenitur, ceteras<sup>161</sup> ignotus.

3. *Callarias, Galerida, et Galaxia, piscis capitosus* Charletoni On. Z. p. 121.

*Asellus minor* Schoneveldii p. 18.

*Onos sive Asinus antiqvorum* Turneri in Epist. ad Gesnerum. — — Raji p. 55.

---

<sup>161</sup> ceteras Artedi, *Hulth-Nybelin*: cetera vel ceterum expectes.

2. *Scorpænæ Bellonii* p. 201. *Edit. Gall. similis* Willughby p. 138 — — Ray p. 145.

‘Father-Lasher’ in Cornwall. In Sweden it has different names in different localities.

3. *Cottus, rough, head of many thorns and four horn-like tubercles in the middle.*

‘Simpa’ in Swedish.

It is well-known on those shores of the Baltic that wash Sweden, chiefly in the autumn.

\* This fish has not yet been described, either by most noble Willughby or by any other Ichthyologist.

Seventeenth Genus: *Gadus*.<sup>190</sup>

1. *Asellus varius vel striatus* Schonevelde p. 19 — — Willughby p. 172 — — Ray p. 54.

‘Små Tårsk’ in Sweden.

This fish is quite frequent in the Baltic Sea, chiefly in its more southerly parts.

2. *Asellus minor, et mollis* Charleton *Onomasticon zoicon* p. 121.

*Asellus mollis, major seu albus* Willughby p. 170 — — Ray p. 55.

‘A Whiting’ in England. ‘Hwitling’ in Sweden.

\* It is found in the Sound of Öresund and the more southern part of the Baltic Sea, unknown elsewhere.<sup>191</sup>

3. *Callarias, Galerida, et Galaxia, piscis capitosus* Charleton *Onomasticon zoicon* p. 121.

*Asellus minor* Schonevelde p. 18.

*Onos sive Asinus antiquorum* Turner in a Letter to Gesner — — Ray p. 55.

<sup>190</sup> Gr. Γάδος (‘Donkey’). Thus Strömberg (p. 131), not in L&S.

<sup>191</sup> ‘elsewhere’, my translation of Artedi’s *ceteras*, a non-existent adverbial form of *ceterus*, possibly a neologism, created in analogy with *alias*. Nybelin prints it without comment.

*The Hadock* Anglis. *Källja* et *Kolljor* Svecis. *Koll* Danis.

\* Locus: Invenitur tantum in parte Maris Balthici Australiori ad Daniam, Hollsteniam etc. ceteras<sup>162</sup> in toto Mari Balthico ignotus. In Sinu Chiloniensi appellatur *Wijdtogen*.

4. *Mustela fluviatilis* Schoneveldii p. 49. — — Charletoni p. 159. — — Willough. p. 125. — — Raji p. 67.

*Eelpout* Anglis. *Lake* Svecis.

\* Hic piscis in magna copia ubiqve fere in Mari Balthico invenitur.

5. *Mustela vulgaris*. Gesneri p. 89 et 103. — — Willoughby p. 121. — — Raji p. 67.

*Mustela altera* Schoneveldii p. 49.

*Whistle-fish* in Cornubia.

\* Hic piscis in toto ferme Mari Balthico ignotus est, sed ad Hollsteniam ex observatione Schoneveldii reperitur, et imprimis in Sinu Chiloniensi, ubi appellatur *Elbqwappen*.

6. *Tertia Mustelarum species, vivipara et marina* Schoneveldii p. 49. 50.

*Mustela vivipara* Schoneveldii Willoug. p. 122. — — Raji p. 69.

\* Hunc Piscem solus Ichthyologorum Schoneveldius vidit et descripsit, ex quo posteriores sua desumserunt. Balthicis litoribus satis familiaris est, imprimis æstate. Varia Nomina ab accolis litorum Maris Balthici sortitur, quæ alibi in Opere meo Ichthyologico MSS. diligenter recensui.

Decimum octavum Genus *Siluri*.

1. *Silurus* Schoneveldii p. 69. — — Willoughby p. 128. — — Raji p. 70.

*Glanis, Glanus et Glanius* Charleton p. 159.

*The Sheat-fish* Anglis secundum Nobilissimum Willoughbejum.

---

<sup>162</sup> ceteras Artedi, *Hulth-Nybelin*: cetera vel ceterum expectes.

‘The Hadock’ in England. ‘Kållja’ and ‘Kålljor’ in Sweden. ‘Koll’ in Denmark.

\* Localities: It is found only in the more southerly part of the Baltic Sea by Denmark, Holstein etc., it is unknown elsewhere<sup>192</sup> in the entire Baltic Sea. In the Bay of Kiel it is called ‘Wijdtogen’.

4. *Mustela fluviatilis* Schonevelde p. 49 — — Charleton p. 159 — — Willughby p. 125 — — Ray p. 67.

‘Eelpout’ in England. ‘Lake’ in Sweden.

\* This fish is found in great numbers almost everywhere in the Baltic Sea.

5. *Mustela vulgaris* Gesner p. 89 and 103 — — Willughby p. 121 — — Ray p. 67.

*Mustela altera* Schonevelde p. 49.

‘Whistle-fish’ in Cornwall.

\* This fish is unknown in almost the whole Baltic Sea but, according to an observation by Schonevelde, it is found at Holstein and chiefly in the Bay of Kiel, where it is called ‘Elbqwappen’.

6. *Tertia Mustelarum species, vivipara et marina* Schonevelde p. 49, 50.

*Mustela vivipara Schoneveldii* Willughby p. 121 — — Ray p. 69.

\* Schonevelde, alone among Ichthyologists, has seen and described this fish, and from him later men took their descriptions. It is quite well-known on the Baltic shores, chiefly in the summer. It is given various names by the inhabitants of the shores of the Baltic Sea, and I have carefully accounted for these elsewhere, in my Ichthyological work in manuscript.

Eighteenth Genus: *Silurus*.<sup>193</sup>

1. *Silurus* Schonevelde p. 69 — — Willughby p. 128 — — Ray p. 70.

*Glanis, Glanus et glanius* Charleton p. 159.

The ‘Sheat-fish’ in England according to most noble Willughby.

<sup>192</sup> Artedi: ceteras, cf. note to 2. Asellus, above.

<sup>193</sup> Greek Σίλουρος. Strömberg (p. 48) offers no full etymology beyond the comment that it belongs to a number of fish names ending in -ουρος (-tail; cf. p. 22). The first element, σιλ-, is not explained either by Strömberg or L&S.

*Mal Svecis. Scheid, Schaeden, Wäls, Waller* etc. Germanis.

\* In lacu Båven prope Nycopiam in provincia Sudermannia, et in quibusdam lacubus Ditionis Calmariensis hic piscis reperitur, alias in Svecia rarissimus. Hominem procerum magnitudine interdum superat. Figura *Mustelam fluviatilem* quodammodo refert.

Decimum nonum Genus *Congri* seu *Anguillæ*.

1. *Anguilla* Plinii *H. Nat.* l. 9. c. 21. 22. et 51. — — Rondeletii Part. 2. p. 198. — — Gesneri p. 40. — — Charletoni p. 153. — — Willoughby p. 109. — — Raji p. 37.

*Eel* Anglis. *Ål* Svecis. *Ahl* Germanis.

\* In lacubus Svecanis ut et Sinibus Maris satis copiose reperitur.

*Observatio.*

*Conger* et *Muræna* Auctorum Mare Balthicum non intrant.

## II. Pisces *Cartilaginei* seu *Chondropterygii*.

Primum Genus *Lumpi*.

1. *Lumpus Anglorum* G. Turneri in Epistula ad Gesnerum. — — Gesneri *Paral.* p. 25 et 1284. — — Charletoni *On. Z.* p. 131. — — Willoughby p. 208. — — Raji p. 77.

*The Lump or Sea owl* Anglis. *Cock-Padd* Scotis. *Sjuryggfisk* Svecis, i.e. Piscis septem dorsis præditus.

Secundum Genus *Lampetræ*.

1. *Lampetra parva et fluviatilis* Gesneri p. 598. — — Willugh. p. 104. — — Raji p. 35.

*Lampetra fluviatilis* Schoneveldii p. 41. — — Charletoni p. 159.

*A Lampern* Anglis. *Nätning*<sup>163</sup> et *Neunögon* Svecis. *Neunaugen* Germanis.

\* In quibusdam fluviis Sveciæ copiose capitur.

---

<sup>163</sup> Nätning: Nating *Hulth-Nybelin*.

‘Mal’ in Sweden. ‘Scheid’, ‘Schaiden’, ‘Wäls’, ‘Waller’ etc in Germany.

\* This fish is found in lake Båven near Nyköping in the province of Södermanland and in some lakes in Kalmar län, but is extremely rare elsewhere in Sweden. In size it sometimes outdoes a large man. In shape it somehow resembles the *Mustela fluviatilis*.

Nineteenth Genus: *Conger* that is *Anguilla*.

1. *Anguilla* Plinius, *Historia naturalis* Book 9, ch. 21, 22, and 51 — — Rondelet Part 2, p. 198 — — Gesner p. 40 — — Charleton p. 153 — — Willughby p. 109 — — Ray p. 37.

‘Eel’ in England. ‘Ål’ in Sweden. ‘Ahl’ in Germany.

\* It is found quite copiously in Swedish lakes and bays of the Sea.

*Observation.*

*Conger* and *Muraena* of the Authorities do not enter the Baltic Sea.

## II. Cartilaginous, that is Chondropteryginous Fishes.<sup>194</sup>

First Genus: *Lumpus*.<sup>195</sup>

1. *Lumpus Anglorum* G. Turner in a Letter to Gesner — — Gesner *Paralipomena* p. 25 and 1284 — — Charleton *Onomasticon zoicon* p. 131 — — Willughby p. 208 — — Ray p. 77.

‘The Lump or Sea-owl’ in England. ‘Cock-Padd’ in Scotland. ‘Sjuryggfisk’ in Sweden, that is, a fish furnished with seven backs.

Second Genus: *Lampetra*.<sup>196</sup>

1. *Lampetra parva et fluviatilis* Gesner p. 598 — — Willughby p. 104 — — Ray p. 35.

*Lampetra fluviatilis* Schonevelde p. 41 — — Charleton p. 159.

‘A Lampern’ in England. ‘Nätting’ and ‘Neunögon’ in Sweden. ‘Neunaugen’ in Germany.

\* It is caught copiously in some Swedish rivers.

<sup>194</sup> That is, ‘Of Gristle’ and ‘Cartilage-Finned’, respectively.

<sup>195</sup> No etymology found.

<sup>196</sup> No etymology found.



*Tertium Genus Acipenseris.*

1. *Acipenser*. M.T. Ciceronis libr. *De fato, De finibus* l. 2. p.m. 69. — — Ovidii Nasonis *Hal.* Poëm. v. 132. — — Plinii *H. N.* l. 9. c. 17 et l. 32. c. 11. — — Gesneri p. 2.

*Sturio* Charletoni *On. Z.* p. 152. — — Willoughby p. 239. — — Raji p. 112.

*The Sturgeon* Anglis. *Stör* Svecis. *Støre* Danis.

\* In Albi Dalica, fluvio Angermanno aliisque, ut et sinibus Maris quandoque invenitur.

*Quartum Genus Squali.*

1. *Galeus acanthias* Gesneri p. 607. — — Charletoni p. 607.

*Galeas acanthias sive Spinax* Willough. p. 56. — — Raji p. 21.

*A Picked Dog or Houndfish* Anglis.

\* Hic Piscis Maris Balthici advena est, ex observatione Cl. Schoneveldii; tamen in Sinu Ekrefordensi ad Hollsteniam quandoque reperitur, sed raro.

*Observatio.*

*Rana piscatrix, Rajas, Galei et Canis* in Mare Balthicum non intrant.

**III. Pisces Plagiuri, vulgo Cetacei.**

*Unum Genus Delphini.*

1. *Phocæna* Wottoni l. 8. c. 194. fol. 172 a. — — Charletoni p. 168. — — Willough. p. 31. — — Raji. p. 13.

*A Porposse* Anglis.

*Marswin* Svecis, Dacis et Cimbris.

\* In toto Mari Balthico reperitur, sed raro capitur.

Third Genus: *Acipenser*.<sup>197</sup>

1. *Acipenser*. M.T. Cicero, *De fato, De finibus* Book 2 p.m. 69 — — Ovidius Naso poem *Haliutica* verse 132 — — Plinius *Historia naturalis* Book 9 Ch. 17 and Book 32 Ch. 11 — — Gesner p. 2.

*Sturio* Charleton *Onomasticon zoicon* p. 152 — — Willughby p. 239 — — Ray p. 112.

‘The Sturgeon’ in England. ‘Stör’ in Sweden. ‘Støre’ in Denmark.

\* It is sometimes found in Dalälven,<sup>198</sup> Ångermanälven, and in other rivers as well as in bays of the Sea.

Fourth Genus: *Squalus*.<sup>199</sup>

1. *Galeus acanthias* Gesner p. 607 — — Charleton p. 128.

*Galeus acanthias, sive Spinax* Willughby p. 56 — — Ray p. 21.

‘A Picked Dog’ or ‘Houndfish’ in England.

\* This fish is a visitor in the Baltic Sea, according to an observation by Cl. Schonevelde; in the Bay of Eckernförde by Holstein it is sometimes found, but only rarely.

*Observation.*

*Rana Piscatrix, Raja, Galeus,* and *Canis* do not enter the Baltic Sea.

### III. *Plagiurus*,<sup>200</sup> or, popularly, *Cetaceous* fishes.

One Genus only: *Delphinus*.<sup>201</sup>

1. *Phocæna* Wotton Book 3, ch. 194, fol. 172a — — Charleton p. 168 — — Willughby p. 31 — — Ray p. 13.

‘A Porposse’ in England.

‘Marswin’ in Sweden, Denmark and Cimbria.

\* It is found in the entire Baltic Sea but only rarely caught.

<sup>197</sup> No etymology found.

<sup>198</sup> Latin: *Albis Dalica* ‘The Elbe of Dalarna’; cf. Olof Silieström Larsson, *Exercitium academicum de lacu Siljan*, Uppsala 1730, p. 1 (Table of Contents §II) *Dalekarli fluvii, s. Albis Dalicæ cursum exprimit* (‘Describes the course of Dalälven, that is, the Elbe of Dalarna’).

<sup>199</sup> No etymology found.

<sup>200</sup> That is, ‘Flat-Tailed’.

<sup>201</sup> Greek Δελφίς, δελφίνος (adjective) (‘Pig-like’), as it emits grunting sounds; Strömberg (p. 77).

Numerus singulorum Piscium seu Specierum in hoc Catalogo est 58, quorum quinque vel sex novi et antea non descripti. Non dubito, quin præter hosce unus vel alter Piscis mihi ignotus in Mari Balthico reperiat, sed per octo annorum observationes in variis locis plures observare non potuerim.

## Appendix

Animalia aliquot Quadrupedia et Amphibia Sveciæ continens.

1. *Fiber* Gesner Edit. Germ. fol. 21. 22.

*Castor* Charletoni *On. Z.* p. 17.

*Castor sive Fiber* Raji *Syn. Qvadr.* p. 209.

*The Beaver* Anglis. *Bäwer* Svecis.

\* In Australiore Sveciæ parte ut Scania etc. non reperitur, in borealiore vero ut Medelpadia, Angermannia et imprimis Westro-Botnia abundantissime. In Svecia cibus horum Animalium est imprimis Cortex Populi tremulæ C.B.p. p. 429, soepius enim vidi truncos hujus arboris satts crassos a Castore abscissos et e terra in fluvium tractos, quorum corticibus deinde vescitur. Neque quis observavit in Svecia hoc Animal aliarum arborum folcorticibus<sup>164</sup> vivere, præter solius Populi tremulæ.

De ædificatione domorum hujus Animalis, ut vulgus credit, nihil certi habeo.

Ex Castoreo, seu folliculis odoriferis hujus animalis, Mercatores Westro-Botnienses non exiguum quæstum Holmiæ faciunt.

2. *Lutra* Gesneri Edit. German. fol. 129. — — Charletoni *On. Z.* p. 17. — — Raji *Syn. Qvadr.* p. 187.

*Otter* Anglis et Svecis. Quibusdam *Utter*.

\* Reperitur in omnibus fere Sveciæ provinciis, in borealioribus tamen copiosius. Vivit imprimis Piscibus.

\*

\*

\*

---

<sup>164</sup> folcorticibus *Artedi* qui foliis incepit scribere, deinde fol linea corr. et corticibus scripsit.

The Number of unique Fishes, that is Species, in this Catalogue, is 58, five or six of which are new and not described before. I do not doubt that, besides these, one Fish or other, unknown to me, may be found in the Baltic Sea, but during eight years of study in various localities I was not able to observe more than these.

## Appendix

Containing some Four-Legged Animals and Amphibians in Sweden

1. *Fiber*. Gesner, German Edition fol. 21, 22.

*Castor* Charleton *Onomasticon zoicon* p. 17.

*Castor sive Fiber* Ray *Synopsis quadrupedum* p. 209.

‘The Beaver’ in England. ‘Bäwer’ in Sweden.

\* Not found in the more southerly part of Sweden, as Scania etc., but in the more northerly parts, as Medelpad, Ångermanland and chiefly Västerbotten, it is found most abundantly. In Sweden the main food of these Animals is the bark of *Populus tremula* C.B.p. p. 429, for I have very often seen quite thick trunks of this tree cut off by Beavers and dragged from land into a river, and it thereafter feeds off their bark. Nor has anyone else in Sweden observed this Animal living off barks of other trees, save *Populus tremula* only.

Concerning how these Animals build their nests, as it is generally believed, I have no certain knowledge.

From the *Castoreum*, that is the smell-producing follicles of these Animals, merchants of Västerbotten make no mean profit in Stockholm.

2. *Lutra* Gesner, German Edition fol. 129 — — Charleton *Onomasticon zoicon* p. 17 — — Ray *Synopsis Quadrupedum* p. 187.

‘Otter’ in England and Sweden. ‘Utter’ among certain people.

\* It is to be found in almost every province of Sweden, but more copiously in the more northerly ones. It lives mainly on Fishes.

\*

\*

\*

3. *Phoca quadricubitalis*, cana.

*Phoca seu Vitulus marinus* Raji p. 189 cum hac Specie convenire videtur, sed ex descriptione nimis brevi et omnibus partibus non completa (Ipse enim Rajus Phocam suam non ad exemplar vivum descripsit) nil certi determinari potest.

Svecis dicitur *Grå-Själ*.

1. Color est cinereus maculis aspersus.
2. Longitudo soepe 4 cubitorum cum dimidio.
3. Parit ab ipsis Calendis Februarii ad Idus fere ejusdem, unicum catulum vitulo recens nato non minorem.
4. Foetus Phocæ proxime sequentis soepius enecat et carnem devorat, corio et adipe relictis.
5. Gregatim super glaciem in magna copia conveniunt, ubi ceu boves ferocissimi mugiunt et veluti canes rabidi morsu se invicem lacerant, et si nubilum est, *lucem* late de se spargunt, qvæ ultra milliare conspicitur. Sed notandum quod

\* hæc lux non observatur, nisi major fuerit concio Phocarum. Unde ejusmodi *Lux* proveniat, alii dijudicent.

6. Catuli hujus Speciei, ut lanugine prima amissa fiunt hirsutiores, matres deserunt atqve cursum recta austro-zephyrum versus dirigunt,

\* qvem cursum ita constanter tenent, ut si vel insula, vel istmus, vel mons occurrat, recta tamen procedant.

4. *Phoca tricubitalis*, pilis brevibus, nigrescentibus.

Svecis *Wikare* et *Wikar-Själ*.

1. Hæc Species ad magnitudinem prioris nunquam provenit et pilis nigrioribus donatur.
2. Circa Calendas Februarii foetum parit magnitudine Felis, et quidem unicum, raro geminos, idqve apud nos soepius super glacie.

3. *Phoca*, four cubits, white-grey.

*Phoca seu Vitulus marinus* Ray p. 189 seems to agree with this Species, but from his description, which is too short and not complete in every part (for Ray himself did not describe his *Phoca* from a living exemplar) nothing certain can be stated.

‘Gråsjäl’ in Sweden.

1. Its Colour is ashen sprinkled with spots.

2. Its Length is often four cubits and a half.

3. It gives birth, from the very beginning of February until about the middle of the same month, to one cub not smaller than a new-born bull-calf.

4. It very often kills the Seal-cub immediately following and devours its flesh, leaving its skin and fat.

5. They gather in great numbers in herds on the ice, where they bellow like wild oxen and tear at one another with angry bites like dogs; and if it is cloudy they spread from themselves far and wide a *light* that can be seen from over a mile away. It is worthy of note, however,

\* that this light cannot be observed unless there is a very large congregation of Seals. Whence this *light* comes, others may judge.

6. The Cubs of this Species, becoming more hairy as their first pelt is dropped, leave their mothers and direct their course directly towards the south wind,

\* and they keep to this course so persistently that, even if an island or an isthmus or a mountain should oppose them, they proceed straight ahead.

4. *Phoca*, three cubits, with short blackish hair.

‘Wikare’ and ‘Wikare-Själ’ in Sweden.

1. This Species never reaches the same size as the preceding and is furnished with blacker hair.

2. About the beginning of February it gives birth to a Cub the size of a Cat, and indeed only one, seldom twins, and in our country<sup>202</sup> this very often occurs on ice.

<sup>202</sup> That is, in Sweden.

3. Calidissimo suo halitu foramina in glacie facit ab inferiore glaciali parte vaporem calidum spirando, a superiore vero ad inferiorem id facere non potis est, ob frigus scilicet aëris.

4. Gregatim non convenit ut prior species.

5. Foetus licet ablactati ad tempus tamen matres suas sequuntur.

\* Præter has duas Species, enumerant quidem Piscatores Ostrobotnienses et Aboenses quatuor vel quinque alias, quarum nomina sunt

1°. 'Swin-själ', hæc est *Phoca porcina*.

2°. 'Brok-själ', hæc est *Phoca versicolor*.

3°. 'Små-själ', hæc est *Phoca exigua*.

4°. 'Morungar'.

5°. 'Natter'.

An vero distinctas species sint, vel potius variationes, non dixerim.

Phocarum præcedentium maxima piscatura vel captura est in Sinu Botnico Ostro-Botniam alluente.

With its very hot breath it makes holes in the ice, breathing its hot vapour from the lower surface of the ice; doing this from the upper to the lower surface is not possible, owing to the cold air.

- 4.<sup>203</sup> It does not congregate in herds like the preceding species.
5. The Cubs, although weaned, follow their mother for some time.

Besides these two Species,<sup>204</sup> some fishermen of Österbotten and Åbo (Turku)<sup>205</sup> enumerate four or five others, the name of which being

- 1°. ‘Swin-själ’, that is *Phoca porcina* (Pig-Seal).
- 2°. ‘Brok-själ’, that is *Phoca versicolor* (Party-Coloured Seal).
- 3°. ‘Små-själ’, that is *Phoca exigua* (Small Seal).
- 4°. ‘Morungar’.
- 5°. ‘Natter’.

I cannot tell whether these might be separate Species or rather varieties.

The greatest fishing or capture of the preceding Species of *Phoca* is in the Bay of Bothnia that washes Österbotten.

---

<sup>203</sup> Artedi omits number 3.

<sup>204</sup> No. 3 and 4, above.

<sup>205</sup> Province and city on the Finnish coast of the Bay of Bothnia, until 1809 forming the eastern half of the Swedish realm, Åbo (now Turku) being the capital city.





## 5. Peter Artedi, *Manuscriptum ichthyologicum quod Petrus Artedi elaboravit in usum Thesauri Sebani*

Latin edition and English translation by Hans Aili  
With an introduction by Theodore W. Pietsch<sup>206</sup>

### Introduction

Peter Artedi's *Manuscriptum ichthyologicum*, its origin and circuitous history of ownership, and its importance as a source for Albertus Seba's *Locupletissimi rerum naturalium thesauri accurata descriptio* (1759).

by Theodore W. Pietsch.

It is rather remarkable that Artedi's *Manuscriptum ichthyologicum* (Figure 6) was unknown to historians of natural history until 1941, when Daniel Merriman (1908–1984), then a professor of zoology at Yale University, became aware of it and published a short description, based on personal examination. Reiterating information that he found on the front flyleaf of the manuscript, Merriman (1941, 66) noted that it was a copy made by one Roel. Wilh. van Homrigh,<sup>207</sup> and given away by him in 1773. Various other notes, which Merriman claimed to be present on the flyleaf,

show that this manuscript eventually came to the hand of Richard Heber (probably at the Henry P. Hope sale of 18 February 1813), and that it was bought from him in a lot of 400 rare books at Sotheby, 30 May 1836, by Sir Thomas Phillipps for two shillings. It became listed among the accessions of

---

<sup>206</sup> Based on an earlier publication that appeared in the *Archives of Natural History* 50 (2), 2023a, 118–32: T. W. Pietsch and H. Aili, 'Peter Artedi's *Manuscriptum ichthyologicum*, a source for Albertus Seba's *Locupletissimi rerum naturalium thesauri accurata descriptio* (1759)'; used with permission of the licensor through PLSclear.

<sup>207</sup> Roeland Willem van Homrigh (1711–30 January 1801; see Gibbon and Someren 1801), who in 1734 married Johanna Seba (1710–1758) (Engel 1937, 88), the youngest of the four daughters of Albertus Seba; it was van Homrigh who took the steps required for publication of the third (1759) and fourth (1765) volumes of Seba's *Thesaurus* (see Engel 1961, 120; Holthuis 1969, 244).

---

#### How to cite this book chapter:

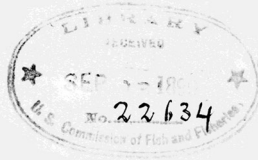
Aili, H. and Pietsch, T. W. 2024. *Peter Artedi: Reformer of 18th Century Zoology Volume I. Peter Artedi's Life and Works*, pp. 159–313. Stockholm: Stockholm University Press. DOI: <https://doi.org/10.16993/bcm.f>. License: CC BY-NC 4.0

*Specimen Ichthyologiae  
Exhibens*

*Pisces Amboinenses et Surinamenses  
praecipuos, plus centum, secundum me-  
thodum quodammodo naturalem dispo-  
sitos, cum*

*eorundem Generibus distinctis differen-  
tiis Specificis novis, et quod ad Pisces an-  
tea descriptos attinet Signonymis  
Auctorum praecipuis.*

*Pisces Trachydermati genus Ostracio-  
nis cuius xv Species novi.*



**Figure 6.** Title page of *Manuscriptum ichthyologicum*: ‘More than one hundred Fishes, principally from Ambon and Suriname, arranged according to a certain natural Method, with their distinct Genera, new Differences of Species, and, concerning Fishes already described, with the principal naming Authorities’ (courtesy of Michael North and the Library of Congress, Washington, DC; used with permission). License: Public Domain.

the library of the Bureau of Fisheries on 15 August 1899, and has remained in that library ever since.

A resurgence of interest in Artedi, stimulated in large part by the Petrus Artedi Tercentennial, an international symposium, sponsored by the Swedish Academy of Sciences and Swedish Museum of Natural History in Stockholm in September 2005,<sup>208</sup> led to a need to examine *Manuscriptum ichthyologicum* in more detail and, in particular, to make a critical comparison of its contents with the accounts that were eventually published in the third volume of Seba's *Locupletissimus rerum naturalium thesauri accurata descriptio* (generally referred to as *Thesaurus*), published posthumously in Amsterdam in 1759. A ten-year search, however, failed to discover its whereabouts. Efforts focused at first on the Bureau of Fisheries, an agency of the United States government established in 1903 as a result of a reorganization of the United States Commission of Fish and Fisheries.<sup>209</sup> In 1940, the Bureau of Fisheries was abolished to become part of the newly created Fish and Wildlife Service, under the United States Department of the Interior. During these decades of reorganization, library materials were routinely transferred from one agency to another and eventually made their way to the Central Library of the United States National Oceanic and Atmospheric Administration (NOAA).<sup>210</sup> Librarians there, however, could find no trace of the Artedi manuscript (at one point, a librarian speculated that it might have been discarded or stolen). Other potential repositories, such as the Library of Congress, were thoroughly searched as well, with the same result. Independent searches by others ended with the same negative result. Dániel Margócsy (2014, 243n91) wrote: 'Despite extensive research, the present location of this [Artedi] manuscript is unknown to me.'

Following a two-year hiatus, the hunt for the manuscript resumed in April 2019, and, although the online database of the Library of Congress had been thoroughly searched several times before, there it was: *Manuscriptum ichthyologicum quod Petrus Artedi elaboravit in usum Thesauri Sebani*. It had been sitting on a shelf of the library

<sup>208</sup> The Artedi Tercentennial Symposium on Ichthyology commemorating the birth of Artedi, 13–14 September 2005 (see [http://artedi.nrm.se/fishbase\\_se/artedi\\_symposium.shtml](http://artedi.nrm.se/fishbase_se/artedi_symposium.shtml), accessed 5 February 2022).

<sup>209</sup> For the history of the United States Commission of Fish and Fisheries, see [https://en.wikipedia.org/wiki/United\\_States\\_Fish\\_Commission](https://en.wikipedia.org/wiki/United_States_Fish_Commission), accessed 28 January 2022.

<sup>210</sup> Caroline Woods (NOAA Library) and Bruce B. Collette (NOAA Fisheries) to TWP, pers. comm., 1–2 December 2016.

uncatalogued for an unknown length of time. ‘We only discovered this item in our collections a few months ago, and just cataloged it back in February [2019], so we are very happy that someone wants to see it.’<sup>211</sup> When and how it got from the Bureau of Fisheries to the Library of Congress is unknown.

Although the binding is broken along the spine, the manuscript itself is in excellent condition. It consists of 83 numbered pages, bound in full calf, with gilt-tooled ornamental borders and centerpieces, gilt-tooled ornaments on the spine, marbled endpapers, and all edges gilt. It measures 25 × 19 cm in quarto. The note on the verso of the front free endpaper pertaining to van Homrigh is there, written in Latin but difficult to decipher. It appears to say, ‘Manuscriptum manu scri[psit] Cel. Rol. Wilh. van Homrigh qui me donavit AD MDCCLXXIII’—‘The distinguished Roeland Willem van Homrigh wrote this manuscript by hand and presented it to me AD 1773.’ While this supports the notion that van Homrigh was the copyist, we are left wondering who ‘me’ might have been.

The other notes claimed to be present on the front endpapers by Merriman (1941, 66), are absent.<sup>212</sup> There is no mention of Richard Heber or ‘that it had been bought from him in a lot of 400 rare books at Sotheby by Thomas Phillipps for two shillings’. However, ‘Phillipps MS 8328’ is present, as well as a tiny inscription at the top of the next free endpaper that appears to read ‘Hopes Sale, [?] 13, 1.6’. According to Hunt (2001, 158), Heber habitually noted the price, date, and place of purchase on the flyleaves of his books, thus this notation apparently confirms Merriman’s assertion that the manuscript was purchased from the Hope library in 1813 for 1s. 6d.

On the upper margin of a following front endpaper, is written ‘Rec. Aug. 15/99’ and an oval ink stamp indicates formal acquisition by the Library of the U.S. Commission of Fish and Fisheries, registration no. 22634, dated 13 September 1899.<sup>213</sup> In addition, at the bottom of the title page there are five lines of somewhat inaccurate description,<sup>214</sup> apparently written at the time of its arrival at the Commission:

<sup>211</sup> Michael North, Rare Book and Special Collections Division, Library of Congress, Washington, DC, to TWP, pers. comm., 29 April 2019.

<sup>212</sup> TWP, personal examination, Library of Congress, 24 May 2019.

<sup>213</sup> Call number QL618.15.A78 1735 available at <https://loc.gov/resource/rbcoo01.2019gen56155>, accessed 8 August 2019.

<sup>214</sup> The quote contains a number of errors: Artedi was actually born on 27 February 1705 and drowned in an Amsterdam canal in the very early hours of 28 September

Peter Artedi was born in Sweden Feb. 22, 1705, died at Leyden? Sept. 27, 1735. An Eminent Swedish Naturalist, especially noted as an Ichthyologist. His Manuscript[s] 'Bibliotheca Ichthyologia' and 'Philosophia Ichthyologia' came into the hands of Linnaeus and were published in 1738. This Manuscript [was] probably written between 1728–32?

Finally, headings appear on each page: 'Manuscriptum' at the top of odd-numbered pages and 'P. Altedi' [*sic*] on even-numbered pages.<sup>215</sup>

### Henry Philip Hope (1774–1839)

The earliest published mention of *Manuscriptum ichthyologicum* is found in the sale catalogue of the library of a wealthy Anglo-Dutch collector of the arts, especially precious gems, Henry Philip Hope,<sup>216</sup> who was born in Amsterdam into a wealthy banking family (Kurin 2006, 141–42). When his father, John, died in 1784 and his mother, Philippina Barbara van der Hoeven, in 1790, Henry and his two older brothers became wards of their father's cousin, an enthusiastic art collector also called Henry Hope (1735–1811). The older Henry Hope fled from the Netherlands in 1794 during the French occupation, taking the boys to London, along with as much art as they could carry (Kurin 2006, 143; Sawinski 2015). He had no children, and his heirs included the sons of John Hope. It turns out that John was a member and one-time director of the Koninklijke Hollandsche Maatschappij der Wetenschappen (Dutch Society of Science), so it is likely that he was the one who acquired the Artedi manuscript and it may even have been copied for him. It was probably then brought to London in 1794 and later inherited by Henry Philip Hope the younger.

Henry Philip Hope's books and manuscripts were auctioned by the London booksellers Leigh and Sotheby, beginning on 18 February 1813 and continuing for the following 17 days (Leigh and Sotheby 1813, 129). The Artedi manuscript, listed under 'Manuscripts in Quarto', Item 3636, 'Manuscriptum Ichthyologicum, quod Petrus Artedi, elaboravit, in usum Thesauri Sebani', was sold on 11 March 1813, the last

---

1735; the original manuscript was written in 1735, the copy apparently in 1773 (see Wheeler, 1961).

<sup>215</sup> The consistent misspelling of Artedi's name is a good indication that the manuscript is a copy.

<sup>216</sup> Henry Philip Hope, best remembered for his one-time ownership of, and whose name is forever attached to, the famous Hope Diamond (see Kurin 2006).

day of the auction.<sup>217</sup> As surmised by Merriman (1941), the buyer was most probably English book collector Richard Heber.

### Richard Heber (1773–1833)

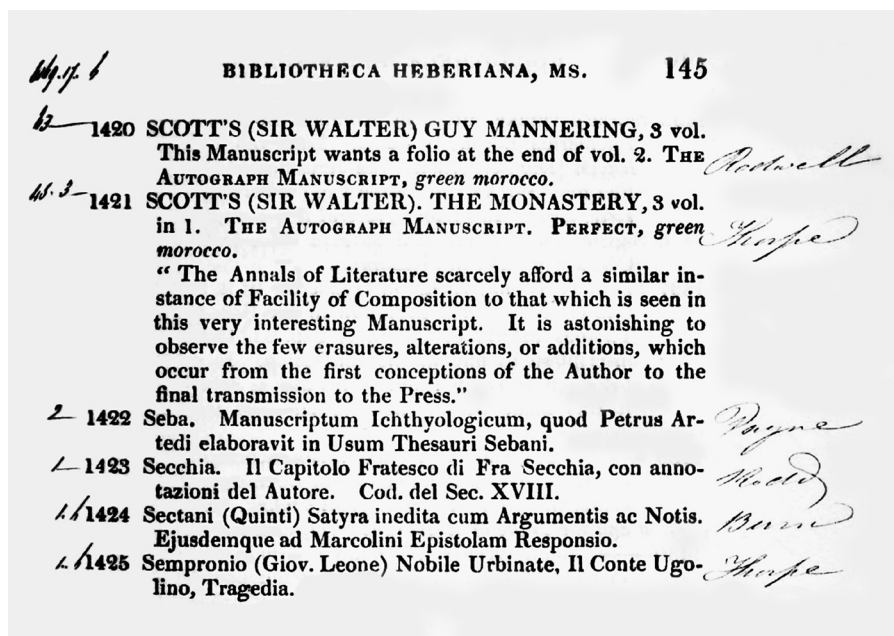
We next find *Manuscriptum ichthyologicum* listed in *Bibliotheca Heberiana*, one of the sale catalogues of the library of Richard Heber (Evans 1836, 145). An indefatigable bibliophile, Heber owned one of the largest and most celebrated libraries ever assembled (Hunt 1993, 185). He was thought to have owned at least 150,000 volumes (including 1,717 manuscripts),<sup>218</sup> filling eight houses, four in England and one each in Ghent, Paris, Brussels, and Antwerp (Tedder 1891; Chisholm 1911; Munby 1954, 73; Basbanes 1999, 110; Hunt 2001, 144). A single copy of a desired book was not enough. No gentleman, he purportedly remarked (Basbanes 1999, 110–11; Sherbo 2015),

can comfortably do without three copies of a book. One he must have for his show copy, and he will probably keep it at his country house. Another he will acquire for his own use and reference; and unless he is inclined to part with this, which is very inconvenient, or risk the injury of his best copy, he must needs have a third at the service of his friends.

Following Heber's death on 4 October 1833, his library was auctioned off in a series of 16 sales (each with its own published catalogue), 13 of them in England (covering the period from 10 April 1834 to 22 February 1837) and three dealing with European sales (in Paris, on 15 March and 7 October 1836, and in Ghent, on 26 March 1835) (Basbanes 1999, 114). Listed under 'Manuscripts in Quarto', Item 1422, *Manuscriptum ichthyologicum, quod Petrus Artedi elaboravit in Usum Thesauri Sebani* was included in the eleventh sale, which took place over a ten-day period from 10 to 20 February 1836 (Hunt 2001, 154; Sherbo 2015). It was sold on 19 February 1836, the ninth day of the auction. An annotated copy of *Bibliotheca Heberiana* (Evans 1836, 145; Figure 7) confirms that it was purchased for two shillings by the bookdealer John Thomas Payne (c.1796–1880) of the London-based firm Payne & Foss (Courtney 1895, 123; Munby 1954, 43; Munby

<sup>217</sup> See <https://babel.hathitrust.org/cgi/pt?id=mdp.35112105138889&view=1up&seq=139&skin=2021&q1=artedi>, accessed 17 January 2022.

<sup>218</sup> Some estimates go much higher, between 200,000 and 300,000 by one guesstimate (Basbanes 1999, 110).



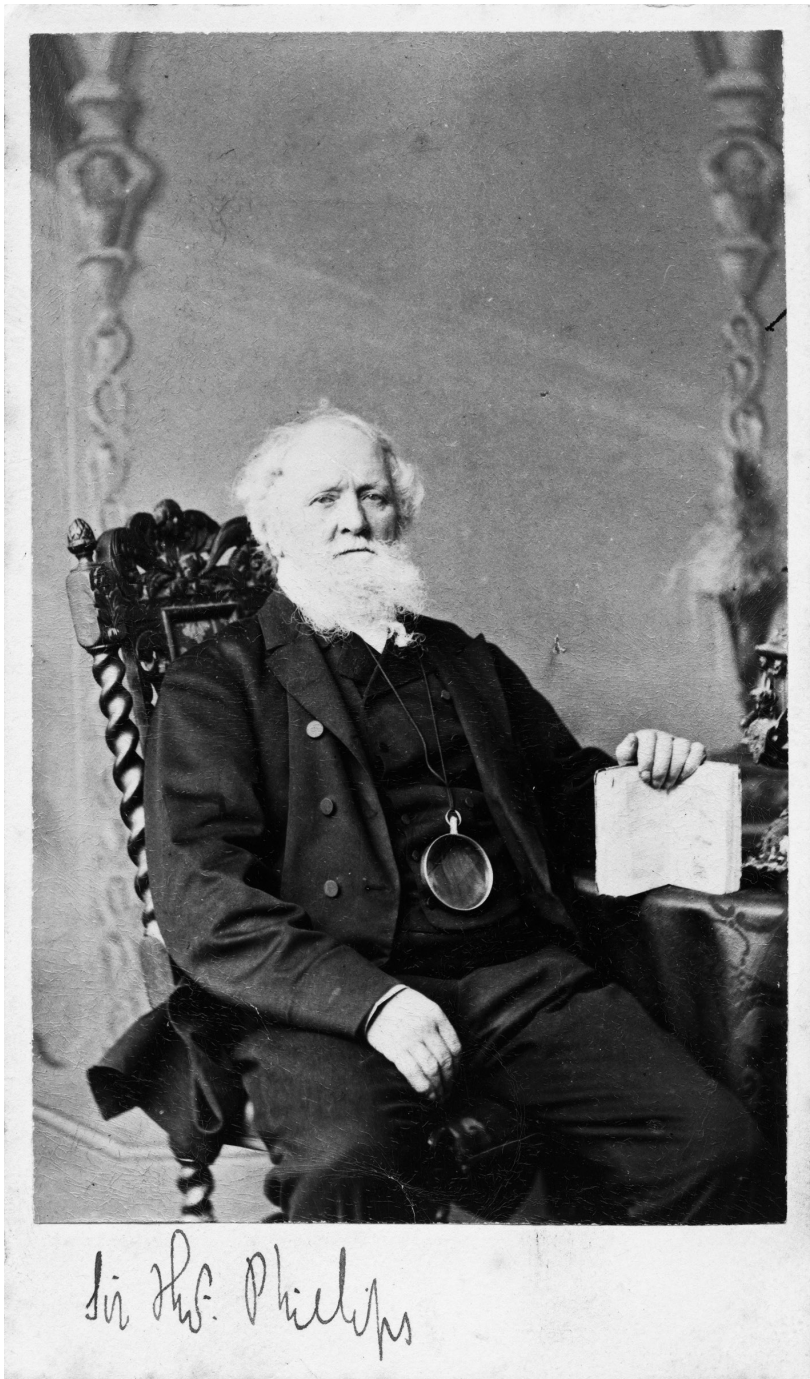
**Figure 7.** A page from an annotated copy of *Bibliotheca Heberiana*, confirming the purchase of the Artedi manuscript (Lot 1422) by bookdealer John Thomas Payne for 2 shillings (after Heber 1836). License: Public Domain.

1956, 1–3; Hunt 2001, 149, 152, 158, 161).<sup>219</sup> Payne, in turn, passed it almost immediately thereafter to English antiquary and book collector Sir Thomas Phillipps.<sup>220</sup>

<sup>219</sup> John Thomas Payne was the nephew of the better-known London bookseller Thomas Payne the younger (1752–1831). Thomas, the eldest son of Thomas Payne Sr. (1719–1799), was educated at the classical school of M. Metayer in Charterhouse Square, London, and trained in modern and dead languages for the further development of the family business. After 20 years of partnership with his father, the latter retired in 1790 in favor of his son. In 1813, Thomas Jr. took into partnership his apprentice, Henry Foss, thus establishing the firm of Payne & Foss. In 1820, Thomas's health began to decline and by 1825, no longer able to properly conduct business, he passed the responsibility on to John Payne, who continued the establishment, in partnership with Foss, until 1850 (Munby 1954, 43; 1956, 78; Alter 2004).

<sup>220</sup> The Artedi manuscript was one of 428 Heber manuscripts (Phillipps Nos. 8070–8497) acquired by Phillipps at the February 1836 auction, at a cost of £2,568 15s. 6d. (Munby 1954, 78; Burrows 2018, 46). It is well known that Phillipps authorized Payne and others (for example, Thomas Thorpe 1791–1851; see Munby 1954, 45, 94–95) to bid for him at auctions and also to give way to him whenever necessary so as not 'to take money out of his pocket' (Munby 1954, 79; Hunt 2001, 162).





**Figure 8.** Sir Thomas Phillipps (1792–1872), antiquary, bibliophile and collector; photograph by Alexander George Tod, albumen *carte-de-visite*, late 1860s–early 1870s (© National Portrait Gallery, London, NPG x12731; used with permission).

### Thomas Phillipps (1792–1872)

That the Artedi manuscript was acquired by Sir Thomas Phillipps (Figure 8) in 1836 or early 1837 is certain, based on its listing in the 1837 Phillipps catalogue (Munby 1951, 1968): item 8328 (followed by Heber MS No. 1422), ‘Artedi Ichthyologia Sebana, 1773, 4to. ch. cf.’<sup>221</sup> (Anonymous 1837, 127). Even more so than Heber, Phillipps was a fanatic collector, once writing, ‘I wish to have one copy of every book in the world’ (Basbanes 1999, 120). With an estimated 50,000 printed books and pamphlets and some 60,000 manuscripts, he had, at the time, the largest private collection in the world (Anonymous 1896, 194; Munby 1956, 166; Burrows 2017, 308; 2018, 45; Bell 2021). During his later years, Phillipps attempted to turn over his collection to the British nation, hoping that it would be acquired for the British Museum, but negotiations proved unsuccessful (Munby 1956, 103–09; Basbanes 1999, 121; Burrows 2017, 308; 2018, 51). In his will, he stipulated that his books and manuscripts, which he bequeathed in trust to his youngest daughter, Katharine Fenwick (1823–1913), should remain intact, no bookseller or stranger should ever be allowed to rearrange them, and no Roman Catholic should ever be permitted to view them (Munby 1956, 35, 134, 155; 1960, 1–2; Basbanes 1999, 122). In 1885, the Chancery Division of the High Court of Justice<sup>222</sup> declared his will to be too restrictive, thus allowing the sale of the library,<sup>223</sup> which Phillipps’s grandson, Thomas Fitzroy Phillipps Fenwick (1856–1938), supervised over the next 50 years (Munby 1960, 19–21; Burrows 2018, 52). The manuscripts, however, did not become available until June 1893, when a series of 11 auctions were initiated that extended into late May 1913 (Munby 1960, 55–56).<sup>224</sup> Based on an annotated copy of the 1837 Sotheby catalogue (bearing names of buy-

<sup>221</sup> Note that ‘4to. ch. cf.’ describes the format or size of the manuscript (in this case quarto), followed by ‘ch.’, an abbreviation for the Latin *charta* (paper) (in contrast to vellum), and ‘cf.’, meaning bound in calf.

<sup>222</sup> The Court of Chancery, a court of equity in England and Wales that had jurisdiction over all matters of equity, including trusts, land law, the estates of lunatics, and the guardianship of infants, functioning from the reign of King Edward I (1272–1307) until its dissolution in 1875, when it was replaced by the Chancery Division of the High Court of Justice (Carne 1927, 400).

<sup>223</sup> The library was left to Katharine Fenwick as part of a trust in which she only had a life-interest. It was only after the passing of the Settled Lands Acts of 1882 and 1884 that it became possible to sell this kind of property. In 1885, Fenwick applied to the Chancery Division for permission to sell the library, which was granted (Munby 1960, 20–21; Burrows 2018, 51–52).

<sup>224</sup> This lengthy process of dispersal scattered the Phillipps manuscripts around the world (Burrows 2017, 309).

ers and hammer prices; Anonymous 1837, 127), held by the British Library, *Manuscriptum ichthyologicum* was offered at the Sotheby sale of 5–10 June 1899, as lot 70 (Figure 8).

Subsequently, according to an annotated copy of the 1899 catalogue (see Sotheby *et al.* 1899, 9), held by the Bodleian Library, the manuscript—therein titled ‘Artedi (p.) Specimen Ichthyologiae exhibens Pisces Amboinenses et Surinamenses praecipuos, plus centum, secundum methodum quodam modo naturalem dispositos, &c. &c. calf gilt, 4to., XVIII Cent’ (‘An example of ichthyology that presents the outstanding fishes of Ambon and Suriname, more than a hundred, arranged according to some natural method’)—was purchased on the first day of the sale for 8 shillings by a certain ‘Wesley’ (Figure 9), who was almost certainly Edward Francis Wesley (1855–1929), then manager of the London-based antiquarian book firm William Wesley and Son.

In 1855, Edward’s father, William Wesley (1814–1891), had established a bookshop in London (Anonymous 1891, 518), where his business, which became Wheldon & Wesley Ltd. in 1921, must have been doing quite well since by May 1862 he was made purchasing agent for departments of the United States government (as well as for the Smithsonian Institution), appointments that lasted until Wheldon & Wesley moved from London to the country in 1957 (Anonymous 1885, 584; Swann 1991, 70). Edward joined the firm in 1875 and became a full partner in 1885, after which his father retired and died in 1891 (Anonymous 1891, 518; Swann 1991, 71). Following his purchase of the manuscript in June 1899,<sup>225</sup> Edward, still acting as agent for the United States government, turned it over almost immediately; thus, it arrived at the Fish Commission on 15 August 1899, as indicated on the front flyleaf. The only remaining unknown is the pathway leading from the Fish Commission to the Library of Congress, which has so far eluded discovery.

### Peter Artedi’s contribution to Seba’s *Thesaurus*

It is well known that Peter Artedi, having left England sometime in late June 1735, met Carl Linnaeus unexpectedly in Leiden on 8 July

<sup>225</sup> A list of expenditures in the United States Department of Agriculture for the fiscal year ending 30 June 1899 shows a reimbursement of \$46.10 for ‘books’ to William Wesley and Son, on 19 August 1899 (Anonymous 1899, 9). By remarkable coincidence (or perhaps not), the 8 shillings that Edward Francis Wesley paid for the manuscript in 1899 was in 1900 equivalent to \$46.91.



**Bibliotheca Phillipica.**

CATALOGUE

OF

A FURTHER PORTION OF THE

CLASSICAL, HISTORICAL, GENEALOGICAL

AND OTHER

**Manuscripts and Autograph Letters,**

OF THE LATE

**SIR THOMAS PHILLIPPS, BART.**

F.R.S. &c.

*Of Middle Hill, Worcestershire, and Thirlestaine House, Cheltenham.*

---

FIRST DAY'S SALE.

---

LOT 1.



BELARD. Lettera di Eloisa ad Abelardo

18 pp. 4to

2.

ACTORS. EXTENSIVE COLLECTIONS FOR THE LIFE OF ALFRED BUNN and his Wife, by JAS. WINSTON, Proprietor of the Haymarket and Manager of Drury Lane Theatre, with very numerous autograph letters, also playbills, press cuttings, &c. 2 vol. 4to

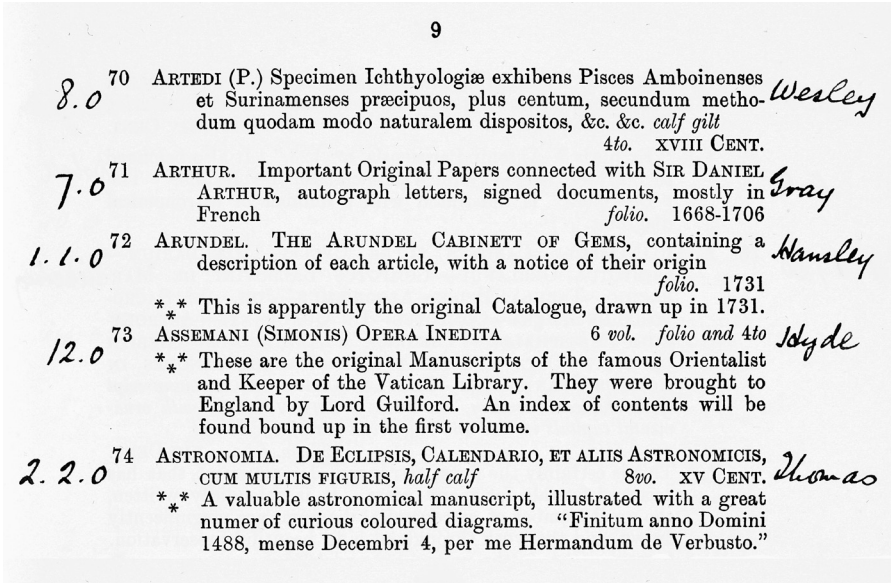
3 ACTORS. COLLECTIONS FOR THE LIFE OF RALPH WEWITZER and Miss WEWITZER, including Autograph Letters, cuttings, numerous original playbills, papers in the autograph of Sheridan, with original cheque, written and signed by Sheridan, paying £60 for the farce called the "Rake's Progress"

\* \* The above collections were made by James Winstone, Manager of Drury Lane, &c.

B

Figure 9. *Bibliotheca Phillipica*, title page of the Sotheby, Wilkinson & Hodge auction catalogue, 5 June 1899 (after Phillipps, 1899). License: Public Domain.

1735 (Lönnerberg 1905, 17). Learning that Artedi was penniless and badly in need of employment, Linnaeus (1738: [7]) introduced him to the wealthy Dutch pharmacist Albertus Seba (1665–1736) who, by this time, had accumulated one of the largest cabinets of curiosities in



**Figure 10.** A page from an annotated copy of *Bibliotheca Phillippica*, Sotheby, Wilkinson & Hodge auction catalogue, 5 June 1899, confirming the purchase of the Artedi manuscript (Lot 70) by Edward Francis Wesley for 8 shillings (courtesy of Jo Maddocks, © Bodleian Libraries, University of Oxford, Lawn A d.754, page 9; used with permission).

the Netherlands (Engel 1937, 1961; Holthuis 1969; Boeseman 1970). Artedi himself, in a letter to his mother (Walde 1951, 47), stated that he sought Seba's acquaintance on his own initiative, having heard that Seba was preparing a major work on natural history. In any case, Seba, who had in turn heard about Artedi and needing help to complete the text for the third volume of his *Locupletissimi rerum naturalium thesauri accurata descriptio* (1759), hired Artedi to describe the fishes. The work was nearly finished when, on the evening of 27 September 1735, Artedi dined with friends at the house of Seba on the Haarlemmerdijk in Amsterdam and, leaving the party sometime in the early-morning hours of 28 September, he fell and drowned in a canal (Pietsch 2010, 2023). Thus, having died prematurely and without having published his work, Artedi has been largely forgotten, despite many suggestions and some convincing evidence that he made significant contributions to Linnaeus's thinking about biosystematics (Lönnerberg 1919, 2, 35; Merriman 1938, 39; 1941, 69; Wheeler 1961, xx; Broberg 1983, 168; Eriksson 1983, 71; Lindroth 1983, 36; Koerner 1999, 34; Blunt 2001, 7, 29–30, 102–03; Stearn 2001, 6–9).

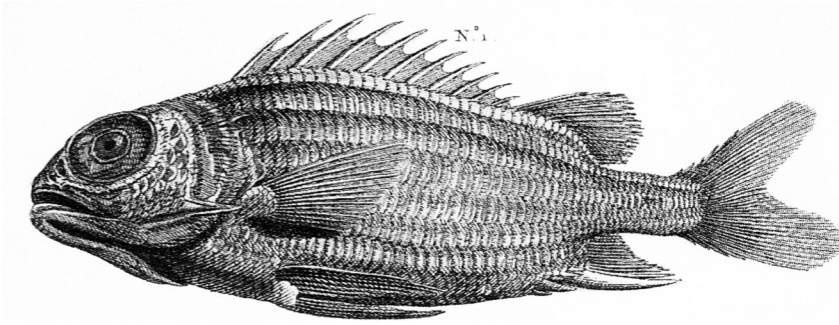
Of the four volumes of Seba's *Thesaurus*, only the first two were published during his lifetime—volume 1 appeared in 1734 and volume 2 in 1735. When Seba died on 2 May 1736, production came to a halt, but part of the text (found later in his library) and most of the plates for at least the third volume were ready for the press (Engel 1937, 93; Holthuis 1969, 245). The task of editing volume 3 fell to Arnout Vosmaer (1720–1799), the well-known Dutch naturalist and director of the natural history cabinet of Prince Willem V, Stadtholder of the Netherlands (Engel 1961, 120).<sup>226</sup> Vosmaer made use of Seba's manuscripts, which evidently included Artedi's notes on the fishes, but heretofore it was unknown how much Seba changed Artedi's text and how much was later altered by Vosmaer (Holthuis 1969, 245).

A close examination of *Manuscriptum ichthyologicum*, made possible by an English translation prepared by one of us (HA), shows that the accounts in Seba (1759, 58–109) generally follow the same order of presentation as those in Artedi, the latter starting with the genus *Orbis* (that is, *Ostracion*) and ending with *Labrus*. Artedi's generic names and lengthy polynomials are generally followed as well. Although the last page of the manuscript stated that 112 species were cited, only 98 are present, all but three of which were included in the *Thesaurus*. On the other hand, the *Thesaurus* contains 137 species, thus Seba, or more likely Vosmaer, added 39 species gleaned from a variety of other sources.

Artedi's Latin text, as it stands in the copy, appears to consist of observational notes, hastily jotted down without due consideration of a consistent syntax. The manuscript copy additionally contains a large number of errors, often in the shape of misspellings and grammatical inconsistencies, which are probably the result of careless reading on the part of the copyist (presumably van Homrigh)—Artedi's autograph manuscript of the almost contemporary *Catalogus piscium Maris Balthici* (see Aili and Pietsch 2020), which contains very few errors of spelling or inconsistent or faulty grammar, is a sure indication of this carelessness. The errors, however, do not offer significant variants to the wording in Seba's *Thesaurus* and, although plentiful, they merely serve to confuse the text.

The main contribution made by the editor of Seba's text was to embellish Artedi's Latin by employing rhetorical devices. Artedi wrote in

<sup>226</sup> Vosmaer, in his job as editor, was apparently assisted by several other well-known naturalists (see Engel 1961, 120; Holthuis 1969, 245).



**Figure 11.** A squirrelfish, *Holocentrus* sp., after Albertus Seba (1665–1736), *Locupletissimi rerum naturalium thesauri accurata descriptio* (1759, 73, pl. 27, fig. 1). License: Public Domain.

a dry and factual style, offering statements based solely on personal observations, which gave rise to hypotheses that he supported by providing convincing examples. His main clauses stated the facts, but he added, wherever necessary, subordinate clauses offering descriptions (thereby often serving the same function as adjectives) or comments. Seba's editor did not alter the factual contents of Artedi's text, and faithfully retained his vocabulary even in cases where this ran counter to established practice.<sup>227</sup> For comparison, parallel descriptions of the genus *Holocentrus* (Figure 11) are provided in the appendix.<sup>228</sup>

APPENDIX: Comparison of the description of the genus *Holocentrus* provided by Artedi in *Manuscriptum ichthyologicum* (pp. 30–32), with Seba's (1759, 73) published account in Volume 3 of *Locupletissimi rerum naturalium thesauri accurata descriptio* (both translated from the Latin by Hans Aili).

<sup>227</sup> A good example is Artedi's use of the term *ossiculum*, 'small bone', to signify the rays of the fins, although the usual term at the time was *radius*. In his early student days at Uppsala University, when describing fishes to be found in northern Swedish waters, he mainly used *radius*, with an intermittent but increasing use of *ossiculum*; in his later descriptions, including all those that appear in *Manuscriptum ichthyologicum*, he consistently used *ossiculum*.

<sup>228</sup> Given Artedi's lengthy and accurate description of *Holocentrus*, and knowing that it was available to Linnaeus in 1735, it is surprising that he failed to recognize it in *Systema naturæ*; the genus was not described until 1777 by the Italian physician and naturalist Giovanni Antonio Scopoli (1723–1788).

**Artedi**

*Holocentrus* derives from ὅλος 'whole' and κέντρον 'prickle', for all external parts of this fish, head, fins, scales, and the tail itself, are prickly. Fishes of this kind, and also my own specimen, have been unknown.

**Seba**

Now follows another genus of fishes, hitherto, so far as I know, not described; it will be permitted to assign to this species a new name taken from a certain particular quality it has. I shall name this fish *Holocentrus*, from the Greek ὅλος 'altogether', and κέντρον 'prickle'; for all its external parts, head, fins, scales and the very tail are with prickles. This fish I shall now describe with all the accuracy I possess, in order that all species that may become known as belonging to this genus, will all the easier be recognised.

*Description.*

Head and body compressed from the sides; back convex, belly rather wide. Mouth is of moderate size, jaws equal, double nostrils on each side. Eyes very large, round, covered with skin. Gill openings very large. Laminae of the head all end in many prickles; the middle one ends in one single prickle, very much stronger than the others, and the end ones in two large prickles on each side. Small teeth or rather rough tubercles in the jaws, palate, and gullet. Colour of the body white from silvery, into which, however, some gold is intermixed mainly in adult specimens, and, furthermore, 6 or 7 lighter and more shiny lines are extended lengthwise on each side. Scales very large, very hard, shiny and pretty, serrated at the posterior end by a large number of small prickles. Pectoral fins whitish, of 14 small bones. Ventral fins sited slightly lower, very close to each other, white, of 8 small bones of which the first is prickly, the rest soft.

No. I. Description of *Holocentrus*.

Head and body compressed from both sides. Back is convex. Belly rather wide. Mouth of moderate size. Maxillae mutually equal. Twin nostrils gape on each side. Eyes very large, spherical, covered with skin. Gill openings open very wide. Laminae of the head all end in many prickles, but the middle of them stretches out into one single prickle, very strong compared to the others; the outer ones end in two rather big prickles on each side. Small teeth, or rather rough tubercles are prominent in the maxillae, palate and throat. Body shines with silvery whiteness, but this is intermixed, particularly in the adults, with some gold; moreover, six or seven lines, shiny in clear white, extend lengthwise on each side. Scales, very large, very hard, shiny, very pretty, at their posterior end rough with very many small prickles, protect the body. Pectoral fins, whitish, made up of 14 small bones; ventral fins, sited somewhat lower, very close to one another, white, have 8 small bones of which the first is thorny, the rest soft. This number of eight small bones in the ventral

(Continued)



**Artedi**

*Note.* The number of eight small bones, mainly in the ventral fins, is very rare in fishes of the acanthopterygian order, for generally, all of them have only six small bones. Dorsal fin large, at its posterior end incised almost to its base with 24 to 25 small bones, of which the first are prickly, the others soft and branching. This fin extends into a kind of furrow. Anal fin is whitish, of 13 small bones of which the first four with prickles, the rest soft and branching. The third prickle is very strong and thick, in its posterior part ploughed into a furrow. The tail is whitish, much two-pronged, of 19 small bones, rather long; on each side of the tail there are 4 or 5 prickles, which is very rare and shared by very few fishes. Length of specimen described 6 inches, largest width 1 inch, 9 lines.

*Inner parts.*

Liver divided into two lobes of which the left is much larger. Ventricle not large. Intestine bent backwards once. Some slightly fatty appendices by the pylorus. Air bladder very large, affixed to dorsal spine. Ribs, 9 on each side.

**Seba**

fins is peculiar to this fish, as it is extremely rare in Acanthopterygian fishes, since all of them generally have only six small bones at that place.

Dorsal fin large, incised at its posterior end almost to its base, enjoys 24 to 25 small bones of which the 11 first with prickles, the rest are soft and branching; indeed, this fin, too, ends in a kind of furrow. Anal fin, whitish, has 13 small bones of which the first four are prickly, the others soft and branching; here, the third prickle is strongest, very thick and at its posterior end ploughed into a furrow. Tail whitish, much two-pronged, contains 19 very long small bones. On both sides by the side of the tail there are 4 to 5 prickles, a very rare phenomenon indeed, and shared by very few. Length of our specimen is 6 inches, greatest width of one inch and 9 lines.

Concerning internal parts: The liver is divided into two lobes of which the left is much bigger. The ventricle is not very capacious. The intestine is curled only by one bend. By pylorus some rather fat appendices can be seen. Air bladder is very large and affixed to dorsal spine. 9 ribs on each side strengthen the body.

## Latin edition

Peter Artedi: *Manuscriptum ichthyologicum quod Petrus Artedi elaboravit in usum Thesauri Sebani*

by Hans Aili

Editor's note

The manuscript used for the present edition, which must be considered the *Editio princeps*, is the only surviving example of Artedi's own text as it stood before the editorial process for fitting it into Albertus Seba's *Thesaurus*.<sup>229</sup> A note on the front flyleaf, although the first words are difficult to read, appears to say:

Manuscriptum manu scri<psit> Cel. Rol. Wilh. van Homrigh  
qui me<sup>230</sup> donavit AD MDCCLXXIII.

The eminent Roeland Wilhelm van Homrigh wrote this manuscript by hand.<sup>231</sup>

He presented me with it AD 1773.

The present edition was prepared during the years of the Covid pandemic, when travel to the USA was not an option, and is therefore based on a digital copy of the manuscript, provided by the kind services of the Library of Congress.

Artedi's Latin text, as it stands in the copy, does not represent a grammatically consistent text but has the form of observation notes, hastily jotted down, and sometimes with incomplete syntax; the manuscript copy also contains a large number of textual errors, often in the shape of grammatical inconsistencies, that are probably the result of careless reading on van Homrigh's part—Artedi's autograph manuscript of the almost contemporary *Catalogus* contains very few errors in the form of inconsistent or faulty grammar and therefore permits this conclusion. One almost consistent trait of Homrigh's text is his writing *longiorum* (gen. pl. of *longior*) for *longorum* (gen. pl. of *longus*). In most cases this seems to be a plain error, but, as we cannot exclude the possibility that Artedi actually intended *longiorum* as an absolute comparative, 'rather long' or 'very long', this form is retained in the Latin text published here, but it is normally simply translated as 'long'. He is also rather careless with the case endings of nouns: whenever these errors violate the syntax of the sentence, they are here corrected without comments.

<sup>229</sup> See also Merriman (1941, 66) and Pietsch (2010, 134; 2023, 168).

<sup>230</sup> *me* appears to be written over *michi*, both to be construed as En. 'me'.

<sup>231</sup> This should probably be taken to mean 'by his own hand'.

Homrigh's errors only rarely offer significant variants of the wording offered by the edited version found in Seba's *Thesaurus*. The errors are, however, not only plentiful but often confuse the text without offering any new information; for this reason, only the grossest of them have been recorded in the *apparatus criticus*. Seba's edited text was therefore, in this edition, utilised to correct all pure errors in morphology and syntax. Remaining textual errors are corrected in the printed Latin text with a footnote reporting the error. A rather curious phenomenon, difficult to evaluate, is the very frequent use of the accusative instead of the nominative, where the latter is undoubtedly correct. The very first instance is the article on *Ostracion tetraodon*, in which the text of paragraph d reads: *Nares magnæ. Oculi ovales. Aperturas branchiarum exiguas*. As both *nares* and *oculi* are in the nominative, the accusative used in *aperturas [...] exiguas* lacks syntactical sense. A probable explanation is that Homrigh failed correctly to interpret Artedi's ligature *æ* (in his autograph of *Catalogus*, this ligature is, indeed, very often difficult to distinguish from the ending *-as*). All errors of this kind have therefore, without further comment, been corrected, mostly into conformity with the text of *Thesaurus*.

Whenever my correction follows Seba's text, this is reported in the *apparatus criticus* by the words *scripsi Sebam secutus* ('I wrote this, following Seba'). Further information is, if necessary, given in a corresponding footnote under the translation.

The main contribution made by the editor of Seba's text was, indeed, to improve the literary style of Artedi's text through the addition of finite verbs and a varied style avoiding too much repetition, not to alter its factual contents. The present edition does not adopt Seba's stylistic improvements, however, but offers instead the corresponding sections of *Thesaurus*, printed in smaller type under each article of *Manuscriptum*. This information, although often redundant, will offer the reader the chance to evaluate the contributions made by Seba's editor. A translation into English of Seba's text was deemed superfluous.

The text of *Manuscriptum* itself lacks almost any kind of typographical finesse, written in a cursive script with mainly small letters, the use of capital initials being restricted to some rubrics, beginnings of sentences, and proper names. This usage is followed in this edition and, indeed, made the consistent norm. In Artedi's *Ichthyologia*, the names of the genera and species, containing a proper name and a diagnostic description, Linnaeus established the principle of giving the name of the genus or species in capital letters, and the descriptions in italics.

This usage is consistently followed here, too, in the Latin text as well as in the English translation, in order to facilitate comparison with *Ichthyologia* and *Catalogus*.

Extract from the Editor's *Præfatio* to *Thesaurus*, Part III, second page:

*Ista autem hujus operis pars, quæ de piscibus agit, tanto carior esse Ichthyophilis debet, qui per constantes characteres diversa horum animalium genera ac species, systematice, quod dicunt, ordinare ac distinguere amant, quia celeberrimo illi piscium Scrutatori, ARTEDIO, tantum non omnes, quæ hic prostant, piscium descriptiones debeantur. Summus ille Ichthyologus propemodum universam piscium Musei Sebani historiam confecerat, quum sera nocte ab ædibus B. SEBÆ domum suam reversurus, per tenebras forte aberrans, in quandam hujus urbis fossarum delaberetur, misereque aquis demersus, magno Auctoris nostri damno ac dolore, vitam finiret.*

Page Headings:     *Manuscriptum* [odd-numbered pages]  
                          *P. Artedi* [*sic*, even-numbered pages]

The page numbers offered within brackets in the Latin text refer to those given in the manuscript text, not to the frame numbering of the digital file.

[After the flyleaf (verso) follow two blank pages and one unnumbered title page (recto):]

Manuscriptum ichthyologicum quod Petrus Artedi elaboravit in usum *Thesauri* Sebani,

[blank page (verso)]

[p. N<sub>11</sub>r]

specimen Ichthyologiæ exhibens

Pisces Amboinenses et Surinamenses præcipuos, plus centum, secundum methodum quoddammodo naturalem dispositos, cum eorundem generibus distinctis, differentiis specificis novis, et, quod ad Pisces antea descriptos attinet, synonymis<sup>232</sup> Auctorum præcipuis.

I. Pisces Trachydermati. Genus Ostracionis cujus xv Species novi.

[p. 1v blank]

---

<sup>232</sup> signonymis *ms.*

[p. N2r]

X. OSTRACION *tetraodon, subrotundus, dorso lineis nigris vario; aculeis brevissimis undique.*

- a. Caput obtusum.
- b. Corpus crassum, ambitu subrotundum.
- c. Os angustum, dentibus duobus maximis et sibi contiguis in utraque maxilla præditum. Labia crassa.
- d. Nares magnæ. Oculi ovales. Aperturæ branchiarum exiguæ.
- e. Cutis tenax aculeis creberrimis, singulis caudam versus inclinatis undique contacta. Versus caudam vero et in antica parte capitis nulli aculei sunt.
- f. Color in ventre et tota inferiore<sup>233</sup> parte albescens, in dorso autem obscure fuscus, lineis quinque nigris, transversis et latis, variis.<sup>234</sup>
- g. Pinna dorsi ossiculorum xi, pinnæ pectorales xvij, pinna ani x.

Cauda in extremo æqualis vel parum convexa [p. 3] ossiculorum xiii exilium, quorum media reliquis paulo largiora. Pinna dorsalis in extremo corpore ad ipsam caudam sita eique contigua, alta,<sup>235</sup> ossiculorum xvj circiter mollium, quorum ultima admodum brevia. Pinna ani huic ex adverso sita ac similis, ossiculorum xvij vel xvij. Cauda lata corpus extremum cingit, ossiculorum xix mollium, brevium et in apice divisorum.

\* Corpus extremum quasi abscissum apparet.

Longitudo descripti duo unciarum, vij linearum. Latitudo maxima viij linearum circiter.

Seba, *Thesaurus* III, p. 60, Tabula 24, Num. 1.

*Ostracion tetraodon, subrotundus; dorso lineis nigris vario; aculeis brevissimis undique.*

Capite gaudet obtuso, crasso corpore, quod in ambitu subrotundum est. Os angustum labiis pollet crassis, duosque dentes maximos, sibi contiguos, utraque in maxilla monstrat. Nares amplum patulæ sunt; oculi elliptici; aperturæ branchiarum exiguæ. Cutis tenax aculeis creberrimis, caudam versus pressulis, undique contegitur, capite excepto, quippe quod aculeis

<sup>233</sup> inferiore: inferiora *ms.*

<sup>234</sup> variis *scripsi* Sebam *secutus*: varicis *ms.*

<sup>235</sup> *verbum haud legitur, alta ut credo.*

caret. Venter & tota pars inferior albescit; dum dorsum obscure fuscum lineis quinque nigris, latis, transversis, variegatur. Pinna dorsalis XI constat ossiculis; pectorales duæ singulæ ossiculis XVII; ani denique pinna ossiculis X. Cauda in extremo æqualis est, vel parumper convexa.

## II. Genus Cyclopteri.

I. CYCLOPTERUS. *Lumpus Anglorum*<sup>236</sup> Gesneri *Paralipomena* p. 1284, ed. Francof. — — Aldrovandi l 3, c:68, p:479. — — Willoughbij<sup>237</sup> p: 208. — — Raji p: 77.

*Lepus marinus nostras, orbis species* Schoneveldii p. 41.

*Snottolf et Son-visch* Belgis, *The Lump-Fish* Angl.

[p. 4]

### *Descriptio.*

C. X. a. Corpus breve, crassum, quodammodo subrotundum et heptagonum.

b. Dorsum acutum, gibbosum. Venter latus, planus et sessilis.

c. Os seu rictus mediocris.

d. Aperturæ branchiarum exiguæ.

e. Denticulorum plures ordines in utraque maxilla ad fauces.

f. Color in recens captis ex rubescente et nigrescente mixtus.

g. Squamæ nullæ, sed cutis tenax tuberculis asperis et nigrescentibus undique obsita est;<sup>238</sup> ex tuberculis majoribus vero primo in utroque latere ternæ ordines<sup>239</sup> longitudinaliter extenduntur, et quarta<sup>240</sup> in ipso dorso eminent, ita ut piscis septangularis quodammodo efficitur. Ordo dorsalis continet 12 tubercula majora lateralium, supremus 30 circiter, medius 20 etc, infimus 9 majora. Sed hæcce tubercula secundum numerum in diversis individuis admodum variant.

h. Prominentia vel appendix cutacea ante pinnam dorsalem.

<sup>236</sup> cf. *Ichthyologia*, Part III *Genera*, p. 62; Part IV *Synonymia*, p. 87.

<sup>237</sup> *sic ms.* The spelling of Willoughby's name (just as that of Artedi's) is very erratic in this manuscript.

<sup>238</sup> *obsita est scripsi Sebam secutus: obsitæ ms.*

<sup>239</sup> *ternæ ordines scripsi Sebam secutus, om. ms.*

<sup>240</sup> *et quarta scripsi Sebam secutus: ex 4<sup>to</sup> ms.*

[p. 5]

- i. Pinna unica in extremo dorso versus caudam ossiculorum x. Pinnæ pectorales latæ ossiculorum xx.
- k. Pinna ventralis singularis in ipso pectore fimbriæ subrotundæ instar, horizontaliter pectori affixa, et in medio protuberantias quasdam exiguas xv circiter numero continens, unde vulgo dicunt hunc pisces signo solis insignitum esse.
- l. Pinna ani e regione dorsalis, ossiculorum ix aut x.
- m. Cauda quadrata ossiculorum xij.
- n. Oceanus Britannicus, Germanicus, mare Balthicum etc.

Seba, *Thesaurus* III, p. 59, Tab. 23.

Num. 7. *Orbis, Piscis Solaris dictus.*

Est hic *Lumpus Anglorum* juxta *Gesner. Paral. pag. 1284*, Ed. Francf. *Aldrovand. Lib III, cap. 68, pag. 179*; *Willughby pag. 208*; *Raj. pag. 77. Lepus marinus nostras, Orbis species, vocatur Schoneveldio pag. 41. Snottolf & Zonne-visch Belgis; Anglis the Lump-fish.*

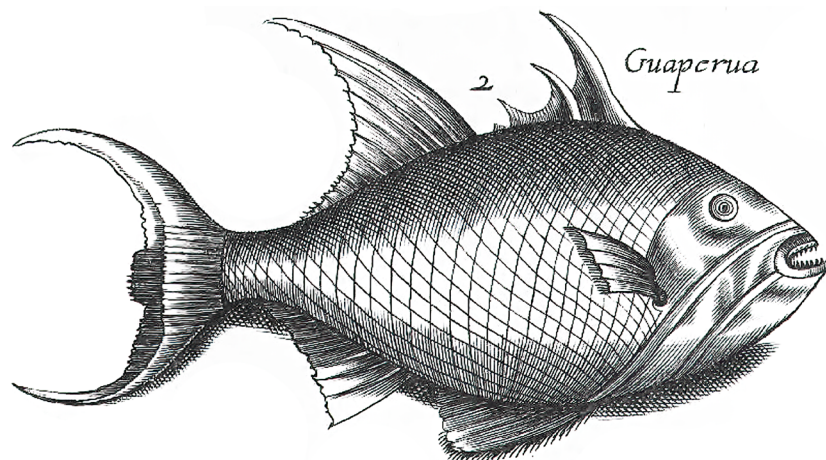
Corpus ejus breve, crassum, quodammodo subrotundum et heptagonum est. Dorsum acutum, gibbosum. Venter latus, planus & sessilis. Rictu gaudet mediocri. Aperturæ branchiarum exiguæ sunt. In utraque maxilla & ad fauces permulti denticulorum ordines extant. Color in recens capto est ex rubescente & nigricante mixtus. Squamis caret; sed cutis tenax asperis undique & nigrescentibus obsita est tuberculis, quorum majora per septem series supra dorsum, juxta longitudinem, extenduntur ita, ut in utroque latere ternæ emineant series, quarta vero impar in ipso dorsi medio: unde Piscis quodammodo heptagonus efficitur. Ordo dorsalis tubercula continet XII majora; lateralium supremus circiter XXX; medius XX; infimus vero IX. Interim horumce tuberculorum numerus haud in omnibus idem est. Ante pinnam dorsalem appendix quædam cutacea prominet. In extremo dorsi, versus caudam, pinna hæret unica, X ossiculis constans: pinnæ vero pectorales, latæ, ossiculis constant XX. Pinna ventralis, singularis, fimbriæ subrotundæ instar, horizontaliter pectori adfixa, in medio exiguas quasdam porrigit appendices, XV circiter numero, radiati quidpiam æmulantes: unde hunc Pisces signo Solis decoratum vulgo perhibent. E regione pinnæ dorsalis alia ani pinna eminet, ossiculis IX ad X prædita. Cauda quadrata XII constat ossiculis.

Reperitur hæc Piscium species in *Oceano Britannico, Germanico, & Mari Balthico*. A Piscatoribus sæpe ejusmodi Orbes inter Asellos reti capiuntur;

qua occasione iis quandoque etiamnum viventibus potitus sum. Quin & in Mari nostro Meridionali dicto dantur ad V ad VI libras pendentes. Ossicula eorum omnia cartilaginea sunt, & caro adeo mollis, ut gelatinam quasi referat: unde vel bidui spatio mortui penitus concidunt, & in tabum glutinosum, valde foetidum, computrescunt: spiritu autem fermentato conditi sensim durescunt, sicque conservari possunt.

[p. 6]

Ordo Piscium Centropterygiorum, seu quorum Ossicula in Pinna Dorsali imprimis Simplicia sunt et plerumque aculeata.<sup>241</sup>



**Figure 12.** ‘Balistes’, a triggerfish, after Hendrik Ruysch (1663–1727), *Theatrum universale omnium animalium piscium, avium, quadrupedum, exanguium, aquaticorum, insectorum, et angium*, 1718 (vol. I, pl. 34, fig. 2). License: Public Domain.

III. Genus Balistes, cujus vi species novi.

[p. 7]

Species I. BALISTES *aculeis dorsi tribus, cauda admodum bifurca*.<sup>242</sup>

*Gicaperica Brasiliensibus, Peixe Porco Lusitanis* Marcgravii l. IV c. XII. Jonstonii p. CXXXI tab. XXXIV fig. II.

*Gicaperica maxima caudata* Willoughb. *Ichthyo.* gr. tab I. f: XXIII.

<sup>241</sup> Comments in German occupy the rest of this page, three lines by the same hand. Instructions to typesetter on typeface?

<sup>242</sup> cf. *Ichthyologia*, Part III *Genera*, p. 53; Part IV *Synonymia*, p. 82. NB: for this species Artedi retains the Latin description, *aculeis dorsi tribus*, from *Ichthyologia*, which he replaces with the synonymous *dorso triacantho* in the other species of *Balistes*.



- a. Caput et corpus perpendiculariter lata.
- b. Os angustum, dentes magni, contigui, quorum viij in utraque maxilla præ reliquis conspicui sunt.
- c. Squamæ satis amplæ, durissimæ, quadratæ. Color corporis canescens, sed lineæ duæ, latæ, cæruleæ et transversæ ab rostro ad pinnas pectorales conductæ.
- d. Pinna dorsi prior aculeis iij constat, quorum 1 admodum robustus<sup>243</sup> et crassus.

Sulcus dorsi insculptus pone hanc pinnam.

Pinna dorsi secunda    ossiculorum xx.

Pinna pectoralis        ossiculorum xv.

Pinna ani                ossiculorum xxvij.

- e. Aculeus vel os magnum retrorsum protensum in ventre ante anum.

Seba, *Thesaurus*, p. 62f, Tab. 24, Num. 14.

*Balistes, tribus in dorso aculeis, & cauda admodum bifurca conspicuus.*

*Guaperua* vocatur Brasiliensibus; *Peixe Porco* Lusitanis, juxta *Marggrav. Lib. IV, c. 12*, & *Johnston: p. 131, Tab. XXXIV, Fig. 2.*

Caput & corpus perpendiculariter lata sunt: os angustum: dentes magni, contigui, quorum octo in utraque maxilla præ reliquis conspicui sunt. Squamæ satis magnæ, quadratæ, durissimæ, superficiem tegunt, cujus color canescens lineis duabus, latis, cæruleis, transversim a rostro ad pinnas pectorales productis, distinguitur. Binæ in dorso pinnæ sunt, quarum prior tribus constat aculeis, inter quos primus admodum crassus & robustus est. Pone hanc pinnam sulcus dorso insculptus cernitur. Altera dorsi pinna 30 constat ossiculis; pectorales pinnæ ossiculis 15; ani pinna 27. Aculeus osseus, magnus, in ventre, ante anum, retrorsum protenditur.

[p. 8]

Species 2. BALISTES *dorso triacantho et tribus ordinibus numero 14 aculeorum utrimque versus caudam.*

- a. In plurimis cum præcedente convenit, sed:
- b. Corpus in medio nigrescens et sæpe lineæ aliquot obliquæ, albæ, ab interiore laterum parte ad pinnam ani descendunt, quæ tamen non in omnibus adsunt.

<sup>243</sup> robusti *ut vid. ms.*

c. Tres ordines aculeorum nigrantium et brevium in linea recta longitudinaliter dispositorum utrinque versus caudam.<sup>244</sup>

d. Pinna dorsi prima aculeos tres continet, quorum primus maximus et ab antica parte tuberculis exasperatus.

Pinna dorsi secunda                      ossiculorum xxiv.

Pinna ani                                      ossiculorum xxi ad xxij.

Pinnæ pectorales breves              ossiculorum xiv.

e. Cauda quadrata, in extremo æqualis et non bifurca ut in prima specie. Os magnum obtusum articulo donatum et tuberculis exasperatum in ventre ante anum.

Seba, *Thesaurus*, p. 63, Tab. 24, Num. 15.

*Balistes, dorso triacantho, & tribus ordinibus aculeorum utrinque versus caudam.*

In plurimis equidem cum priore hic convenit; at corpus, in medio nigrescens, haud raro lineis aliquot obliquis, albis, ab inferiore laterum parte ad ani pinnam descendentes, distinguitur, quæ tamen in omnibus haud adsunt. Tres ordines aculeorum nigricantium, brevium, in linea recta juxta longitudinem digestorum, utrinque versus caudam exporriguntur. Pinna dorsi prior tribus gaudet aculeis, quorum primus, itidem maximus, ab antica parte tuberculis exasperatur. Altera dorsi pinna ossiculis constat 24; ani pinna ossiculis 21 vel 22; pinnæ pectorales, breves, ossiculis 14. Cauda quadrata, in extremo æqualis, minime, ut in præcedente, bifurcatur. Os quoddam magnum, obtusum, articulo donatum, & tuberculis asperum, in ventre, ante anum, conspicitur.

Species 3. BALISTES dorso triacantho, squamis speciei undique aculeatis.

a. In multis cum secunda specie convenit, sed:

[p. 9]

b. ad dorsum nigrescit et squamæ in medio aculeum exiguum et brevissimum obtinent, unde totus asper evadit.

c. Pinna dorsi secunda ossiculorum xvj. Pinna ani ossiculorum xxij.

d. Cauda in extrema alba et æqualis, ossiculorum xij, duas uncias fere longa<sup>245</sup> est.

<sup>244</sup> caudam scripsi *Sebam secutus*: eandem *ms.*

<sup>245</sup> longa: longus *ms.*

Seba, *Thesaurus* III, p. 63, Tab. 24, Num. 16.

*Balistes, dorso triacantho, squamis undique aculeatis.*

Multa sunt, quibus cum priore Num. 14 congruit; sed dorsum nigrescit, & squama quælibet aculeum exiguum, & brevissimum, in medio gerit: unde superficies tota aspera evadit. Pinnam dorsi secundam 26 constituunt ossicula; ani pinnam ossicula 24. Cauda in extremo alba, & æqualis, ossiculis gaudet 12. Longitudo piscis fere biuncialis est.

Species 4. BALISTES *dorso diacantho, unicolor, microlepidotus, asper.*

- a. In multis cum præcedentibus convenit, sed
- b. Squamæ admodum exiles et aculeis exilissimis undique subasperæ, color corporis albescens.
- c. Os crassum, tuberculis exasperatum, in ventre ante anum.
- d. Pinna dorsi prima duobus aculeis constat, quorum primus longus et robustus, secundus vero adeo brevis ut vix in conspectum veniat.

Pinna dorsi secunda    ossiculorum xxxiv.

Pinna pectoralis        ossiculorum xiiij.

Pinna ani                ossiculorum xxx.

- e. Cauda in extremo æqualis fere ossiculorum xij.

Seba, *Thesaurus* III, p. 63, Tab. 24, Num. 17.

*Balistes, dorso diacantho, unicolor, microlepidotus, asper.*

In multis iterum cum præcedentibus convenit: discrepat autem ratione squamarum, quæ admodum exiles sunt, & aculeis exilissimis undique subasperæ. Corpus ubique albescit. Os crassum, tuberculatum, in ventre, ante anum extat. Pinna dorsi prima duobus gaudet aculeis, quorum prior longus & robustus est, alter vero adeo brevis, ut vix in conspectum veniat. Secunda dorsi pinna ossiculis constat 34; pinnæ pectorales singulæ ossiculis 13; ani pinna ossiculis 30. Cauda, in extremo fere æqualis, ossicula habet 12.

[p. 10]

Species 5. BALISTES *unicolor æqualis fere*,<sup>246</sup> *ossiculorum xij, asper, aculeo dorsi postice uncinulis serrato.*

- a. In pluribus cum specie quarto convenit sed:

<sup>246</sup> æqualis fere *om. Seba.*

b. Pinna dorsi prima ex duobus aculeis constat, quorum prior longus, robustus et a postica parte uncinulis seu aculeis minoribus utrinque serratus quasi. Aculeus posterior admodum brevis et parum aspicuus est.

Pinna dorsi secunda    ossiculorum xxviiij ad xxviiiij.

Pinna ani                    ossiculorum xxvij.

c. Versus caudam in utroque latere aculei vel prominentiæ quædam, piliformes et flexiles utrinque adsunt, ita ut ibidem hirsutus quasi evadat.<sup>247</sup> In quibusdam individuis tamen hæ prominentiæ<sup>248</sup> admodum breves et inconspicuæ<sup>249</sup> sunt.

Seba, *Thesaurus* III, p. 63f., Tab. 24, Num. 18.

*Balistes unicolor, asper, aculeo dorsi, postica parte uncinulis serrato.*

Magnam partem priori Num. 16 similis est: sed prima dorsi pinna duos gerit aculeos, quorum prior longus, robustus, postica parte uncinulis seu aculeis minoribus utrinque veluti serratus est; posterior aculeus, admodum brevis, perparum conspectui patet. Altera dorsi pinna ossiculis gaudet 28 ad 29; ani pinna ossiculis 27. Versus caudam in utroque latere aculei vel processus quidam piliformes, flexiles, prominent: unde hirsuta ibi loci superficies evadit. Interim in aliis hujus speciei adeo breves sunt hi villi, ut vix queant conspici.

[p. 11]

Species 6. BALISTES *rostro oblongo, acuto, macula nigra punctis albis varia ad ventrem.*<sup>250</sup>

a. Caput et rostrum multo longiora et angustiora sunt quam in precedentibus speciebus.

b. Os admodum exiguum et angustum.

c. Squamæ exiles, subasperæ et splendentes, versus caudam vero utrimque hirsutæ quasi evadunt, minus tamen quam in quinta specie. Color albescens sed maculis subrotundis fuscentibus et pallidis varius.

<sup>247</sup> evadat *scripsi*: evadit *ms.*

<sup>248</sup> hæ prominentiæ: hos prominentias *ms.*

<sup>249</sup> inconspicuæ: conspiciuæ *ms.*

<sup>250</sup> Note by the same hand, difficult to read: *Ican Awawa* of *Awawa Visch* Valentini [two words illegible] p. 377.

d. Pinna dorsi prima aculeis duobus constat, quorum<sup>251</sup> anterior longus et rectus ac undique tuberculis exilibus exasperatus. Posterior adeo brevis est ut non in conspectum veniat. Sulcus in dorso pone hanc pinnam.

Pinna dorsi secunda ossiculorum xxx.

Pinna ani ossiculorum xxviiij ad xxix.

Longitudo piscis descripti 3 unciarum circiter.

Seba, *Thesaurus* III, p. 64, Tab. 24, Num. 19.

*Balistes, rostro oblongo, acuto; macula nigra, punctis albis varia, ad os ventrale distinctus.*

Caput & rostrum multo, quam in prioribus speciebus, sunt longiora & tenuiora. Os admodum exiguum est & angustum. Squamæ exiles, subasperæ, splendentes, superficiem tegunt, quæ ad utrumque caudæ latus quodammodo hirsutæ evadunt, minus tamen, quam in specie prægressa. Color albidus maculis subrotundis, subfuscis & pallidis, variegatur. Pinna dorsi prima duobus constat aculeis, quorum anterior longus, rectus, minimis ubique tuberculis exasperatur; posterior vero brevissimus vix in conspectum prodit. Pone hanc pinnam sulcus dorso insculptus est. Alteram dorsi pinnam ossicula 30 firmant; pinnam ani ossicula 28 vel 29. Longitudo totius circiter tres uncias æquat.

[p. 12]

IV. Genus Chætodontis, cujus xxxiij species exhibens.

Genus *Chætodontis*.

1<sup>o</sup>. *Chætodontes aculeo utrinque laterali ad caudam.*

Species 1. CHÆTODON *lineis longitudinalibus variis, cauda bifurca et aculeo laterali utrinque.*

1. Caput ab oculis ad rostrum admodum declive.

2. Dentium unus ordo in utraque maxilla.

3. Squamæ subasperæ.

4. Lineæ ix angustæ, cæruleo-albescentes, longitudinales in utroque latere et in lateribus harum, linea utrinque fusca ita ut numerus linearum fuscarum sit<sup>252</sup> circiter — xviiij; partes intermediæ seu lineæ alteræ aut vj vel vij.

<sup>251</sup> quorum: quas *ms.*

<sup>252</sup> *sit* scripsi: est *ms.*

5. Pinna dorsi ossiculorum xxxvj quorum ix aculeata, pinnæ pectorales ossiculorum xvi, ventrales ossiculorum vj. Pinna ani ossiculorum 29, quorum iij aculeata.

6. Cauda magna, bifurca, ossiculorum xvj longioribus.<sup>253</sup>

7. Aculeus acutus in utroque latere versus caudam, antrorsum protensus.

Seba, *Thesaurus* III, p. 64, Tab. 25, Num. 1.

*Chætodon lineis longitudinalibus varius; cauda bifurca et utrinque aculeata.*

Caput ab oculis versus rostrum admodum declive est. Unicus duntaxat ordo dentium utraque in maxilla cernitur. Squamæ subasperæ corpus tegunt, quod lineis novem angustis, ex cæruleo albescentibus, longitudinalibus, utroque in latere, distinguitur; quin et quælibet harum linearum alia quadam linea fusca utrinque stipatur. Pinnam dorsi ossicula 36 constituunt, quorum 9 aculeata sunt. Pectorales pinnæ ossiculis singulæ constant 16; ventrales ossiculis 6; ani pinna 29, quorum denuo 3 aculeata sunt. Cauda magna, bifurca, ossiculis 16 longioribus gaudet. Tandem in utroque latere, caudam versus, aculeus acuminatus antrorsum protenditur.

[p. 13]

Species 2. CHÆTODON *nigrescens, cauda albescente æquali et aculeo laterali utrinque.*

1. Caput, corpus, os, dentes et squamæ ut in præcedente specie No. 1.

2. Pinnæ pectorales ossibus xvj, ventrales ossibus vj. Pinna dorsi ossibus xxxviii quorum ix aculeata. Pinna ani ossibus xxix quorum iij aculeata.

3. Cauda in extremo æqualis ossiculorum xvi, longioribus.<sup>254</sup>

4. Aculeus ad caudam ut in præcedente specie No. 1.

Seba, *Thesaurus*, Vol. III, p. 64, Tab. 25, Num. 2.

*Chætodon nigrescens; cauda albescente, æquali, et utrinque aculeata.*

Caput, corpus, os, dentes, squamæ, eadem ratione, ac in præcedente, comparata sunt. Pinnæ pectorales ossiculis itidem 16 constant; ventrales 6; dorsi pinna ossiculis 38, quorum 9 aculeata sunt; ani pinna 29, inter quæ 3 aculeo gaudent. Cauda, in extremo æqualis, ossicula gerit 16 longiora. Quin et ad caudam ejusmodi datur utrinque aculeus, ac in priore.

<sup>253</sup> longioribus *scripsi Sebam secutus*: longior *ms.*

<sup>254</sup> longioribus *scripsi Sebam secutus*: longior *ms.*

Species 3. CHÆTODON *nigrescens, cauda parum bifurca et aculeo laterali utrinque.*

1. Os et dentes ut in No. 2.
2. Squamæ admodum exiles, subasperæ.
3. Pinna dorsi ossiculorum xxxiiij ad xxxiv quorum ix aculeata. Pinnæ pectorales ossiculorum xv ad xvj. Ventrals vj. Pinna ani ossiculorum xxvij circiter quorum iij aculeata.
4. Aculeus lateralis ad caudam ut in præcedente.

Seba, *Thesaurus* Vol. III, p. 65, Tab. 25, Num. 3.

*Chætodon nigrescens, cauda parum bifurca et utrinque aculeata.*

Os & dentes ita, ut in prioribus, sese habent. Squamæ admodum exiles, subasperæ, corpus tegunt. Pinna dorsi ossiculis gaudet 33 ad 34, quorum 9 aculeata sunt; Pectorales pinnæ 15 ad 16 constant ossiculis, ventrales 6; ani pinna circiter 27, quorum tria denuo aculeata sunt. Aculeus quoque lateralis utrinque ad caudam adest.

Species 4. CHÆTODON *albescens, lineis quinque transversis, nigricantibus, aculeo laterali utrinque.*

[p. 14]

1. Caput, corpus, dentes etc, ut in No. 3 sed lineæ transversæ nigricantes in utroque latere.
2. Pinna dorsi ossibus xxx quorum ix aculeata. Pinna pectoralis ossibus xv ad xvj, ventrales ossibus vj. Pinna ani ossibus xxij quorum iij aculeata.
3. Cauda in extremo æqualis ossiculorum 16 longiorum.
4. Aculeus brevis utrinque versus caudam ut in præcedente No. 3.

Seba, *Thesaurus*, Vol. 3, p. 65, Tab. 25, Num. 4.

*Chætodon albescens, lineis quinque transversis, nigricantibus; et aculeo laterali utrinque.*

Caput, corpus, dentes et reliqua ejusmodi fere sunt ac in præcedente Num. 3. Sed lineæ 5 transversæ, nigricantes, utroque in latere decurrunt. Pinnam dorsi 30 firmant ossicula, inter quæ 9 aculeo gaudent; pectorales pinnæ ossiculis constant 15 ad 16; ventrales ossiculis 6; ani pinna 22, quorum tria aculeata sunt. Cauda, in extremo æqualis, ossicula 16 longis gerit. Aculeus brevis utrinque, versus caudam, ut in præcedente, datur.

Species 5. CHÆTODON *niger, capite diacantho, lineis utrinque quatuor, transversis, curvis.*<sup>255</sup>

*Acarauna exigua, nigra, zonis aliquot luteis eleganter depicta* Listeri in *Appendice* ad Willughby, p. xxiiij, Raji *Synops.* ciij.

1. Maxilla inferior superiore paulo longior.
2. Denticulorum plures ordines in utraque maxilla.
3. Lamina operculorum media ad inferiorem partem in aculeum magnum et robustum desinit.
4. Pinna dorsi ossiculorum xlii quorum x aculeata. Pinna pectoralis ossiculorum xix; ventrales ossiculorum vii. Pinna ani ossiculorum xxvii quorum iij aculeata.
5. Cauda in extremo subrotunda ossiculorum xvii longiorum.

Seba, *Thesaurus*, Vol. III, p. 65, Tab. 25, Num. 5.

Sequuntur proxime Chætodontes ad caput aculeati.

*Chætodon niger, capite diacantho, & lineis utrinque quatuor, transversis, curvis.*

Listero in *Append. ad Willoughb.* p. 23, J. Rajo in *Syn.* p. 103, vocatur *Acarauna exigua, nigra, zonis aliquot luteis eleganter depicta.*

Maxilla ejus inferior paulo longior est superiore; in utraque autem plures eminent ordines denticulorum. Lamina media operculorum, quæ branchias defendunt, ad partem inferiorem in aculeum magnum et robustum desinit. Pinna dorsi ossiculis constat 41, quorum 10 aculeata sunt; pectorales pinnæ ossiculis 19; ventrales 6; ani pinna 27, quorum tria aculeo gaudent. Cauda, in extremo subrotunda, ossicula 17 longiora gerit.

[p. 15]

Species 6. CHÆTODON *aculeis duobus brevibus supra oculos et ossiculo tertio pinnæ dorsalis longissimo.*

1. Rostrum longum et admodum productum.
2. Dentium longiorum plures ordines in maxillis.
3. Ossiculum serratum et aculeus brevis utrinque supra oculos.
4. Squamæ admodum exiguæ, duræ et asperæ.

<sup>255</sup> cf. *Ichthyologia*, Part III *Genera*, p. 52; Part IV *Synonymia*, p. 79; Part V *Descriptiones* p. 91.



5. Color ex lineis aliquot nigris et albis latis ac transversis constat.
6. Pinna dorsi ossiculorum xlvj quorum vij aculeata et iij longissima in setam quasi producta.

Pinnæ pectorales ossiculorum xviii; ventrales ossiculorum vj; Pinna ani ossiculorum xxxvj quorum iij prima aculeata.

7. Cauda parum bifurca ossiculorum xvj longiorum.

Seba, *Thesaurus*, Vol. III, p. 65, Tab. 25, Num. 6.

*Chætodon duobus aculeis brevibus supra oculos, & ossiculo tertio pinnæ dorsalis longissimo præditus.*

Rostrum ejus admodum productum est. In maxillis plures extant dentium longorum ordines. Supra oculos ossiculum serratum, brevisque aculeus, utroque in latere conspiciuntur. Squamis perpusillis, duris & asperis, corpus tegitur. Lineæ aliquot nigræ & albæ, latæ, transversæ, superficiem variegant. Pinna dorsi ossiculis constat 46, quorum septem aculeata sunt, et tertium ordine longissimum in setam quasi producitur. Pinnæ pectorales ossicula gerunt 18; ventrales 6; ani pinna 36, quorum tria priora aculeo gaudent. Cauda, parum bifurcata, ossiculis 16 longioribus pollet.

Species 7. CHÆTODON *canescens*, *aculeo utrinque ad os et ossiculo tertio pinnæ dorsalis setiformi*<sup>256</sup> *longissimo.*

1. Aculeus retrorsum versum utrinque ad angulos oris, quo præcedens (6) caret.
2. Color corporis albo-canescens, splendidus,<sup>257</sup> squamæ admodum exiguæ.

[p. 16]

3. Pinna dorsi ossiculorum xlvj; ani ossiculorum xxxvj; pectorales xvij ad xviiij; ventrales ossiculorum vj ut in No. 6.

Seba, *Thesaurus*, Vol. III, p. 66, Tab. 25, Num. 7.

*Chætodon canescens; ore aculeato & ossiculo tertio pinnæ dorsalis setiformi, longissimo.*

Ad oris angulos utrinque aculeus quidam, retrorsum spectans, eminent, quo adparatu præcedentes carent. Color corporis ex albo canescens et splendidus

<sup>256</sup> setiformi e Ceti formi *corr. ms.*, setiformi Seba; *cf.* 7 Chætodon.

<sup>257</sup> splendidus: splendoris *ms.*

est. Squamæ admodum exiguæ sunt. Pinna dorsi ossiculis constat 46; ani pinna 36; pectorales 17 ad 18; ventrales, ut in priore Num. 6, ossicula gerunt 6.

Species 8. CHÆTODON *macrolepidotus, lineis utrinque duabus nigris, ossiculo quarto pinnæ dorsalis longissimo, setiformi.*

*De Tafelvisch* H. Ruyschii in *Theatro animalium* Tab. 1, fig 1, pag 1. Secundum figuram huic quodammodo similis est, sed descriptio ejus imperfecta est, nec quæ habet pisci rostro omnino quadrante, nec figura in omnibus ad amussim respondet.

1. Denticulorum plures ordines in utraque maxilla.
2. Squamæ amplæ imbricatim sitæ, subasperæ.
3. Pinna dorsi ossiculorum xxxvij quorum xj aculeata. Pinnæ pectorales ossiculorum xvij; ventrales ossiculorum vj; Pinna ani ossiculorum xxij ad xxijj.
4. Cauda in extremo æqualis fere.

Seba, *Thesaurus*, Vol. III, p. 66, Tab. 25, Num. 8.

Chætodontes aculeis ad caput & caudam carentes.

*Chætodon macrolepidotus; lineis utrinque duabus, magnis, nigris; ossiculo quarto pinnæ dorsalis setiformi, longissimo.*

H. Ruyschio in *Theat. Anim.*, Tab. I, fig. 1, p. 1, vocatur Belgice *de Tafelvisch*. Figura sane, quam Author hic ibi exhibet, omnino nostrum hunc Piscem videtur exprimere; quamvis adjuncta descriptio admodum imperfecta sit, nec in omnibus ad amussim figuræ respondeat. Denticulorum plures ordines in utraque maxilla dantur. Squamæ amplæ, imbricatim sitæ, subasperæ, corpus obsident. Pinna dorsi ossiculis constat 37, quorum 11 aculeata sunt. Pectorales pinnæ ossiculis gaudent 18; ventrales 6; ani pinna 22 ad 23. Cauda in extremum fere æquale terminatur.

Species 9. CHÆTODON *macrolepidotus, lineis utrinque tribus nigris, latis, et quarta in ipsa cauda.*

1. Denticulorum ordines et squamæ magnæ, asperæ ut in præcedente specie (8).

[p. 17]

2. Color corporis albescens, lineis quatuor transversis, nigris et latis, in utroque latere.

3. Pinna dorsi ossiculorum xxxiiij quorum xij aculeata. Pinnæ pectorales ossiculorum xvj; ventrales ossiculorum vj. Pinna ani ossiculorum xxj quorum iij aculeata.

4. Cauda in extremo convexa.

Seba, *Thesaurus*, Vol. III, p. 66, Tab. 25, Num. 9.

*Chætodon macrolepidotus, lineis utrinque tribus, nigris, latis, & quarta in ipsa cauda.*

Ordines denticulorum, & squamæ magnæ, asperæ, similiter ut in præcedenti specie Num. 8 sese habent. Color corporis albescens lineis quatuor transversis, nigris, latis, utroque in latere distinguitur. Pinna dorsi ossicula gerit 33, quorum 12 aculeo gaudent. Pectorales pinnæ ossicula habent 16; ventrales 6; ani pinna 21, quorum tria iterum aculeata sunt. Cauda in extremo convexa est.

Species 10. CHÆTODON *macrolepidotus, nigrescens, lineis utrinque duabus albis ad caput.*

1. Dentium ordines et squamæ ut in No. 8 et 9.

2. Color totius fere corporis nigrescens præter lineas illas albescentes transversales ad caput.

3. Pinna dorsi ossiculorum xl quorum xij aculeata. Pinnæ pectorales ossiculorum xvj; ventrales vj. Pinna ani ossiculorum xxiv quorum iij aculeata.

4. Cauda in extremo convexa.

Seba, *Thesaurus*, Vol. III, p. 66, Tab. 25, Num. 10.

*Chætodon macrolepidotus, nigrescens, lineis utrinque duabus, albis, ad caput.*

Dentium atque squamarum eadem est, ac in prioribus Num. 8 et 9 ratio. Totum fere corpus nigrescit, nisi quod binæ albescentes lineæ, transversæ, utrinque ad caput exporrigantur.

Pinna dorsi ossiculis constat 40, quorum 12 aculeata sunt. Pectorales pinnæ ossicula gerunt 16; ventrales 6; ani pinna 24, inter quæ tria aculeata sunt. Cauda in extremo convexum desinit.

Species 11. CHÆTODON, *macrolepidotus, albescens, linea nigra ad oculos & macula rotunda in pinna dorsali.*

1. Denticulorum ordines et squamæ ut in præcedentibus.

2. Rostrum oblongum et productum.

[p. 18]

3. Color totius corporis albescens sed macula rotunda, nigra, superius ad finem pinnæ dorsalis.
  4. Pinna dorsi ossiculorum xxxvij quorum xiiij aculeata. Pinna ani ossiculorum xxiiij quorum iij prima aculeata.
  5. Cauda extrema convexa.
- Longitudo 1 unciæ et viij linearum circiter.

Seba, *Thesaurus*, Vol. III, p. 67, Tab. 25, Num. 11.

*Chætodon macrolepidotus, albescens, linea nigra ad oculo, & macula rotunda in pinna dorsali.*

Dentes iterum & squamæ ita, ut in præcedentibus, sese habent. Rostrum oblongum est & productum. Totum corpus albescit, excepta macula quædam rotunda, nigra, quæ superius ad finem pinnæ dorsalis datur. Quin & linea nigra ad oculos cernitur. Pinna dorsi ossiculis constat 37, quorum 13 aculeata sunt. Ani pinna ossicula gerit 23, quorum tria prima aculeo gaudent. Cauda in extremo convexa est. Longitudo totius piscis circiter est unciæ unius et 8 linearum.

Species 12. CHÆTODON, *macrolepidotus, albescens, lineis utrinque octo, transversis, nigris.*

1. Denticulorum ordines et squamæ ut in præcedentibus No. 9, 10, et 11.
2. Rostrum breve et minime productum.
3. Pinna dorsi ossiculorum xxix ad xxx quorum xj aculeata. Pinna ani ossiculorum xx quorum iij aculeata.
4. Longitudo 1 unciæ et viij linearum. Latitudo in medio corpore 1 unciæ et 1 lineæ.

Seba, *Thesaurus*, Vol. III, p. 67, Tab. 25, Num. 12.

*Chætodon macrolepidotus, albescens, lineis utrinque octo transversis, nigris.*

Et hic ratione dentium et squamarum nihil a præcedentibus discrepat. Rostrum breve est & minime productum. Pinna dorsi ossicula gerit 29 ad 30, quorum 11 aculeata sunt. Ani pinna ossiculis gaudet 20, quorum 3 aculeata sunt. Longitudo est unciæ unius et 8 linearum: latitudo maxima unciæ unius et unius lineæ.

Species 13. CHÆTODON *argentei coloris, pinnis ventralibus ob brevitate parum conspicuis.*

1. Denticuli ut in No. 12.

2. Squamæ albescentes, exiguæ.

3. Pinna dorsi ossiculorum xxxviiij quorum viij aculeata. Pinnæ pectorales ossiculorum xvj ad xvij; ventrales ossiculorum vj. Pinna ani ossiculorum xxxiiij quorum iij aculeata.

4. Cauda in extremo parum bifurca ossiculorum xvij longiorum.

[p. 19]

5. Longitudo corporis 2 unciarum<sup>258</sup> fere. Latitudo in medio corpore 1 unciæ 2 linearum.

Seba, *Thesaurus*, Vol. III, p. 67, Tab. 25, Num. 13.

*Chætodon totus argentei coloris; pinnis ventralibus ob brevitatem parum conspicuis.*

Denticuli sunt ut in Num. 12. Squamæ exiguæ albore argenteo splendent. Pinna dorsi ossiculis constat 38, quorum 8 aculeata sunt. Pectorales pinnæ ossicula gerunt 16 ad 17; ventrales 6; ani pinna 33, quorum tria aculeo gaudent. Cauda, in extremo parum bifida, ossiculis firmatur 17 longioribus. Longitudo fere est biuncialis; latitudo maxima duarum linearum supra unciam.

Species 14. CHÆTODON *ex cano, parum maculosus, ossiculo secundo pinnarum ventralium [et]<sup>259</sup> setiformi.*

1. Denticulorum ordines ut in præcedente.

2. Squamæ exiguæ et subasperæ.

3. Color corporis obscure canus, maculis aliquot irregularibus et parum conspicuis in utroque latere.

4. Pinna dorsi ossiculorum xxxj quorum ix prima aculeata. Pinnæ pectorales ossiculorum xvij ad xvij; ventrales ossiculorum vj. Pinna ani ossiculorum xxij quorum iij aculeata.

5. Cauda in extremo subrotunda.

6. Longitudo 1 unciæ ix linearum.

Seba, *Thesaurus*, Vol. III, p. 67, Tab. 25, Num. 14.

*Chætodon obscure canus, maculis aliquot irregularibus, & ossiculo secundo pinnarum ventralium in setam quasi producto.*

<sup>258</sup> unciarum: unciæ *ms.*

<sup>259</sup> *et exclusi.*

Ordines denticulorum ut in priore, se habent. Squamæ exiguæ sunt et subasperæ. Color corporis obscure canus maculis aliquot irregularibus & parum conspicuis utroque in latere distinguitur. Pinna dorsi ossiculis constat 31, quorum 9 prima aculeata sunt. Pectorales pinnæ ossicula habent 17 ad 18; ventrales 6; ani pinna 22, inter quæ tria aculeata sunt. Cauda in extremo subrotunda est. Longitudo corporis totius est uncia 1 & 9 linearum; latitudo maxima uncia 1 et 2 linearum.

Species 15. CHÆTODON *quadratus, nigrescens, medio*<sup>260</sup> *pinnarum dorsi ac ani* <in><sup>261</sup> *prominentiam producto.*

*T'Zeebotje* H. Ruyschii *Theat.*, p. 18, cujus figura exhibitur Tab. X, f. vij, huic ad partem concinnit, sed pinnas ventrales non adeo duras et osseas habet, ut de suo scribit Ruyschius.

1. Denticulorum ordines ut in No. 14.

[p. 20]

2. Squamæ non magnæ. Color nigrescens et obscurus in toto corpore.

3. Corpus quadratum vel potius romboideum, si pinnas aufers.<sup>262</sup>

4. Pinna dorsi ossiculorum xlii quorum v aculeata. Pinnæ pectorales ossiculorum xvij; ventrales nigræ et longæ ossiculorum vj. Pinna ani ossiculorum xxx quorum iij aculeata.

5. Longitudo corporis iij unciarum. Latitudo inter initium pinnarum dorsi et ani iii unciarum itidem.

Seba, *Thesaurus*, Vol. III, p. 67, Tab. 25, Num. 15.

*Chætodon quadratus, nigrescens, pinnis dorsi ac ani in medio longum productis.*

H. Ruyschio, in *Th. An.*, p. 18, vocatur Belgicè *t' Zeebotje*, cujus icon ibidem, Tab. X, fig. 7, exhibitur, huic pro parte conveniens; quamvis pinnas ventrales non adeo duras et & osseas reperiam, ac Ruyschii descriptio docet.

Dentes, uti in Num. 14 comparati sunt. Squamæ itidem non magnæ. Color nigrescens vel obscurus per totum corpus regnat, quod quadratum vel potius rhomboideum est, si pinna aufers. Dorsi pinna ossiculis constat 41, quorum 5 aculeata sunt; pectorales pinnæ ossiculis 17; ventrales nigræ et longæ

<sup>260</sup> medio: extremo *exspectes*, vide *Sebæ iconem*, Tab. XXV No. 17, inter pp. 64 et 65 positam.

<sup>261</sup> in *addidi Sebam secutus*.

<sup>262</sup> *aufers scripsi Sebam secutus: aufert ms.*

ossiculis 6; ani pinna 30, quorum 3 aculeo gaudent. Longitudo totius est 3 unciarum; latitudo inter initium pinnarum dorsi et ani itidem 3 unciarum.

No. 23. Vide infra 22.

Species 23. CHÆTODON *albescens macrolepidotus, cauda bifurca, laminis operculorum parum serratis.*

a. Denticulorum brevium duo ordines in utraque maxilla et præterea ossicula denticulis aspera ad fauces.

b. Laminæ operculorum singulæ in ambitu denticulis quasi serratæ, imprimis infima.

c. Squamæ maximæ, oblongo-quadratæ asperæ et albæ.

d. Lineæ duæ obscuriores et transversæ in ipso corpore. Color vero ipsius corporis argenteo albus est.

[p. 21]

e. Pinna dorsi ossiculorum xxiv quorum xij aculeata, reliqua mollia.

f. Pinnæ pectorales albæ ossiculorum xvij. Pinnæ ventrales nigrescentes ossiculorum vj. Pinna ani alba ossiculorum xiv, quorum duo prima aculeata, reliqua mollia.

g. Cauda alba in extremo bifurca.

Seba, *Thesaurus*, Vol. III, p. 70, Tab. 26, Num. 23.

*Chætodon albescens, macrolepidotus; cauda bifurca, & operculis branchiarum parum serratis.*

Denticuli breves duobus ordinibus utraque in maxilla dispositi sunt. Præterea in faucibus ossicula hærent denticulis aspera. Laminæ operculorum singulæ in ambitu quasi denticulis serratæ sunt, præsertim vero infima. Squamæ maximæ, oblongo-quadratæ, asperæ, albescunt. Color corporis aregenteo-albus lineis duabus obscurioribus, transversis, varius est. Pinna dorsi ossicula habet 24, quorum 12 aculeata sunt, reliqua mollia. Pinnæ pectorales albæ ossiculis constant 18; ventrales nigrescentes ossiculis 6; ani pinna albescens 14, quorum duo prima aculeata sunt, reliqua mollia. Cauda alba et in extremo bifurca est.

*Ad Genus Chætodontis supra:*

Species 16. CHÆTODON *macrolepidotus, albescens, linea nigra ad oculos et macula rotunda ad caudam.*

1. Maxilla inferior ore aperto longior est.

2. Color corporis albescens sed 1<sup>o</sup> linea nigrescens transversalis ad regionem oculorum et 2<sup>o</sup> macula nigra rotunda, circulo albo cincta, in extremo corpore versus caudam.<sup>263</sup>

3. Pinna dorsi ossiculorum xxxij ad xxxiiij, xiiij<sup>264</sup> aculeata, reliqua mollia. Pinnæ pectorales ossiculorum xv; ventrales ossiculorum vj quorum primum aculeatum et satis longum. Pinna ani ossiculorum xx quorum tres robusta et aculeata, reliqua mollia.

4. Cauda in extremo æqualis ferme.

Seba, *Thesaurus*, Vol. III, p. 68, Tab. 25, Num. 16.

*Chætodon macrolepidotus, albescens, linea nigra ad oculos & macula rotunda ad caudam.*

Ore aperto maxilla inferior superiore longior est. Corpus albescit; sed linea nigrescens, transversalis ad regionem oculorum & macula nigra rotunda, circulo albo inscripta, in extremo corpore versus caudam datur. Pinna dorsi ossiculis constat 32 ad 33, quorum 13 aculeata sunt, reliqua mollia. Pinnæ pectorales ossicula gerunt 15; ventrales 6, quorum primum, satis longum, aculeo gaudet. Ani pinna ossiculis firmatur 20, quorum 3 robusta & aculeata sunt, reliqua mollia. Cauda in extremum fere æquale desinit.

[p. 22]

Species 17. CHÆTODON *macrolepidotus, albo flavescens, rostro longissimo osseo, macula nigra ad pinnam*<sup>265</sup> *dorsalem.*

1. In multis cum præcedente convenit sed rostrum admodum longum, osseum et subacutum. Os tamen satis exiguum.

2. Color corporis albo-flavescens, sed lineis quatuor transversis et obscurioribus in utroque latere, quarum

1<sup>a</sup> oculos secat

2<sup>a</sup> et<sup>266</sup> 3<sup>a</sup> in medio corpore

4<sup>a</sup> reliquis latior versus caudam et præter has 1<sup>o</sup> ad initium caudæ linea nigra transversa et 2<sup>o</sup> ad basin pinnæ dorsalis in penultimo ejus loco,<sup>267</sup> macula nigra, rotunda, satis ampla.

<sup>263</sup> caudam scripsi *Sebam secutus*: eandem *ms.*

<sup>264</sup> xiiij scripsi *Sebam secutus, om. ms.*

<sup>265</sup> pinnam: primam *ms. fortasse recte, id est primam (lineam transversalem): vide translationem.*

<sup>266</sup> et *Seba Thesaurus*: et ut *ms.*

<sup>267</sup> in penultimo ejus loco *om. Seba.*



3. Pinna dorsi flavescens ossiculorum xxxix quorum ix aculeata, brevia et robusta, reliqua mollia. Pinnæ pectorales ossiculorum xv; ventrales ossiculorum vj quorum primum aculeatum, reliqua mollia, ramosa.

4. Pinna ani ossiculorum xxiiij ad xxiv quorum tres aculeata.  
Cauda in extremo æqualis.

Seba, *Thesaurus*, Vol. III, p. 68, Tab. 25, Num. 17.

*Chætodon macrolepidotus, albo flavescens, rostro longissimo, osseo, & macula nigra ad basin pinnæ dorsalis.*

In multis hic cum præcedente convenit; sed rostro gaudet admodum longo, osseo et subacuto, ore interim satis minuto. Corpus, ex albo flavescens, lineis quatuor transversis, obscurioribus, in utroque latere distinguitur, sic ut linearum prima oculos secet, altera & tertia medium per os decurrat, quarta, reliquis latior, versus caudam. Quin & præterea ad caudæ initium linea nigra, transversalis & ad basin pinnæ dorsalis macula nigra, rotunda, satis ampla datur. Pinna dorsi flavescens ossiculis gaudet 39, quorum 9 aculeata, brevia & robusta sunt, reliqua mollia. Pinnæ pectorales ossiculis constant 15; ventrales 6, quorum primum itidem aculeatum est, reliqua vero ramosa. Ani pinna ossicula gerit 23 ad 24, quorum 3 aculeata sunt. Cauda in extremo æqualis est.

[p. 23]

Species 18. CHÆTODON *macrolepidotus albescens, linea nigricante ad oculos, caudam, pinnam ani ac dorsi.*

1. Admodum similis speciei N. 16 descriptæ [, sed linea]<sup>268</sup>

2. Linea nigrescens longitudinalis in pinna ani et dorsi ad extremum.

3. Pinna dorsi ossiculorum xxxv quorum xiiij aculeata, reliqua mollia. Pinnæ pectorales ossiculorum xv; ventrales ossiculorum vj quorum primum aculeatum.

4. Pinna ani ossiculorum xxiiij quorum iij prima aculeata, reliqua mollia.

5. Cauda in extremo æqualis vel parum convexa.

Seba, *Thesaurus*, Vol. III, p. 68, Tab. 25, Num. 18.

*Chætodon macrolepidotus, albescens, linea nigricante ad oculos, caudam, ani ac dorsi pinnam.*

Admodum is adfinis est speciei Num. 16 descriptæ, sed linea nigrescens, longitudinalis, ad extremum pinnæ ani & dorsi datur. Dorsi pinnam ossicula

<sup>268</sup> sed linea *exclusi*.

constituunt 35, quorum 13 aculeata, reliqua mollia sunt. Pinnæ pectorales ossiculis constant 15; ventrales 6, quorum primum aculeatum est; ani pinna ossiculis 23, quorum 3 aculeata sunt, reliqua mollia. Cauda in extremum æquale, vel parum convexum,<sup>269</sup> abit.

Species 19. CHÆTODON *fusco-rubescens*, *aculeis utrinque duobus infra oculos*.

1. Corpus magis oblongum quam<sup>270</sup> in præcedentibus.

2. Laminæ mediæ et infimæ operculorum branchiarum in ambitu aculeis<sup>271</sup> aliquot brevibus serratæ sunt, sed suprema ad oculos inferne in duas magnas spinas, quarum posterior anteriore triplo longior est, desinit.

[p. 24]

3. Pinna dorsi in medio humilior ossiculorum xxviiij ad xxix, quorum x vel xj aculeata sunt, reliqua mollia. Pinnæ pectorales ossiculorum xvij; ventrales ossiculorum vj quorum primum aculeatum. Pinna ani ossiculorum xvij quorum ij aculeata, reliqua mollia.

4. Cauda lata,<sup>272</sup> in extremo rotunda.

Seba, *Thesaurus*, Vol. III, p. 69, Tab. 26, Num. 19.

*Chætodon fusco-rubescens*, *aculeis utrinque duobus infra oculos*.

Corpus huic magis oblongum est, quam prioribus. Lamina media & infima<sup>273</sup> operculorum branchiarum in ambitu aculeis aliquot brevibus quasi serratæ sunt; suprema vero lamina inferne ad oculos in binas abit spinas, magnas, quarum posterior anteriore triplo longior est. Pinna dorsi, in medio humilior, ossiculis constat 28 ad 29, quorum 10 vel 11 aculeata sunt, reliqua mollia. Pinnæ pectorales ossiculis constant 17; ventrales 6, quorum pimum aculeo gaudet. Ani pinna ossicula gerit 17, quorum duo aculeata sunt, reliqua mollia. Cauda, lata, in extremo rotunda est.

Species 20. CHÆTODON *lineis utrinque tribus albis, laminis operculorum admodum serratis*.

1. Præcedenti N. 19 in multis similis est, sed

<sup>269</sup> æquale, vel parum convexum *Seba*: æqualis, vel parum convexa *expectes*.

<sup>270</sup> quam: quale *ms*.

<sup>271</sup> aculeis: aculei *ms*.

<sup>272</sup> lata *Seba*: tota *ms*.

<sup>273</sup> Lamina media & infima *Seba*: Laminæ mediæ & infimæ *expectes*.

2. Color corporis obscure canus lineis vel zonis tribus latis, transversis et albescentibus varius, quarum 1<sup>a</sup> ad opercula branchiarum, 2<sup>a</sup> latissima in medio corpore, 3<sup>a</sup> ad initium caudæ.

3. Lamina suprema et infima operculorum branchiarum in ambitu aculeis plurimis admodum serratæ sunt, media vero iisdem caret.

4. Pinna dorsi, in medio humilior, ossiculorum xxvj quorum ij aculeata, reliqua mollia.

Pinnæ pectorales ossiculorum xvij; ventrales ossiculorum vj quorum primum aculeatum.

[p. 25]

5. Pinna ani ossiculorum xij quorum ij aculeata, reliqua mollia.

6. Cauda in extremo subrotunda.

7. Longitudo corporis ij unciarum<sup>274</sup> circiter.

Seba, *Thesaurus*, Vol. III, p. 69, Tab. 26, Num. 20.

*Chætodon, lineis utrinque tribus, albis; & laminis operculorum in ambitu admodum serratis.*

Præcedenti Num. 19 in multis similis est sed corpus obscure canum lineis vel zonis tribus, latis, transversis, albescentibus variegatur, quarum prima est circa opercula branchiarum, altera, latissima in medio corpore, tertia ad caudæ initium. Lamina suprema et infima operculorum branchiarum in ambitu aculeis plurimis admodum dentatæ sunt: media vero iis caret. Dorsi pinna, in medio humilior, ossiculis constat 26, quorum 11 aculeata, reliqua mollia sunt. Pinnæ pectorales ossicula gerunt 17; ventrales 6, quorum primum aculeo gaudet. Ani pinna ossicula habet 13, quorum duo aculeata, reliqua mollia sunt. Cauda in extremo subrotunda est. Longitudo corporis circiter 2 uncias æquat.

Species 21. CHÆTODON *quadratus, argentei coloris, aculeis dubus brevibus loco pinnarum ventralium.*

a. Corpus quadratum<sup>275</sup> et, quod rotundum, latitudine longitudinem superante.

b. Maxilla inferior superiore paulo longior.

c. Denticulorum plures ordines in maxillis, palato et faucibus. Oculi magni, sphærici.

<sup>274</sup> unciarum *scripsi*: uncias *ms.*

<sup>275</sup> quadratus *ms.*

d. Color totius corporis et pinnarum argenteus. Squamæ amplæ, quadrato-subrotundæ, albæ.

e. Pinnæ pectorales ossiculorum xvij. Pinna dorsi ossiculorum xliij quorum viij aculeata. Pinna ani ossiculorum xxxix maxima et admodum lata, quorum iij prima aculeata et admodum robusta. Cauda lata et in extremo fere æqualis.

f. Aculei duo admodum breves sed robusti retrorsum flexi in ventre proxime supra anum, qui loco pinnæ ventralium sunt.

Seba, *Thesaurus*, Vol. III, p. 69, Tab. 26, Num. 21.

*Chætodon quadratus, argentei coloris; aculeis duobus, brevibus, loco pinnarum ventralium præditus.*

Corpus fere quadratum est & latius, quam longum. Maxilla inferior superiorem longitudine parum superat. Denticulorum plures dantur ordines in maxillis, palato, & faucibus. Oculi magni, sphærici sunt. Corpus, una cum pinnis, argentei est coloris. Squamæ amplæ, quadrato-subrotundæ, albæ, corpus tegunt. Pinnæ pectorales ossicula habent 17; dorsi pinna 43, quorum 8 aculeata sunt; ani pinna maxima, valde lata, ossiculis gaudet 39, quorum tria prima aculeata & admodum robusta sunt. Cauda, lata, in extremo fere æqualis est. Aculei duo, admodum curti, sed robusti, retrorum flexi, in ventre proxime supra anum prominent, qui locum pinnarum ventralium supplere videntur.

[p. 26 *textus omnis erasus est descriptione unius piscis partim amissa*].

[p. 27]

Species 23: *descriptio mutilata*.

[I. ad 4. *desunt*]

5. Squamæ adeo exiles ut vix in conspectum remaneant.<sup>276</sup> Color corporis obscure fuscus vel nigrescens.

6. Pinna unica in postica dorsi parte ossiculorum xxiv numeratu<sup>277</sup> difficilium ob membranam crassam. Pinnæ pectorales breves ossiculorum xxv ad xxvj. Pinnæ ventrales sub pectoralibus sitæ ossiculorum vj mollium.

7. Pinna ani a diametro dorsalis ossiculorum xxiiij.

<sup>276</sup> remaneant *scripsi*: *reminat ms.*

<sup>277</sup> numeratu: *numeratur ms.*

8. Cauda in extremo parum bifurca ossiculorum xvij longiorum. Longitudo vij uncias, latitudo in medio corpore i uncia, ij linearum.

Seba, *Thesaurus*, Vol. III. *Descriptionem non inveni. Species No. 23 secundum Sebam multum differt.*

Ad genus Chætodontis:

Species 24. CHÆTODON *lineis utrinque duabus candidis, laminis operculorum serratis, cauda æquali.*

In <multis><sup>278</sup> cum No. 22 convenit sed lamina operculorum media et suprema aculeis fere carent. Unicus dentium ordo in maxillis. Color corporis fusco-nigrescens sed linæ duæ latae, transversæ, candidæ, seu<sup>279</sup> lacteæ, in utroque latere, quarum prior ad opercula branchiarum, posterior in medio corpore. Extremum corporis et tota cauda quoque alba sunt. Pinnæ pectorales ossiculorum xvij vel xix; ventrales ossiculorum vj. Pinna dorsi in medio ad basin fere incisa, ossiculorum xxv quorum xj aculeata, reliqua mollia. Pinna ani ossiculorum xv ad xvj quorum prima aculeata.

[p. 28]

Cauda in extremo æqualis, squamæ asperæ. Longitudo iij vel iv unciarum.<sup>280</sup>

Seba, *Thesaurus*, Vol. III, p. 70, Tab. 26, Num. 24.

*Chætodon lineis utrinque duabus candidis; laminis operculorum serratis & cauda alba, æquali.*

Convenit quidem in multis cum priore Num. 22 sed laminæ operculorum media & suprema aculeis fere carent. Ordo dentium unicus duntaxat in maxillis datur. Corpus ex fusco nigrescens lineis duabus, latis, transversis, candidis, seu lacteis in utroque latere distinguitur, quarum prior ad opercula branchiarum, posterior in medio est corpore. Extremum corporis & tota cauda pariter alba sunt. Pinnæ pectorales ossiculis constant 18 ad 19; ventrales 6; dorsi pinna, in medio ad basin usque fere incisa, ossicula gerit 25, quorum 11 aculeata, reliqua mollia sunt. Ani pinna ossiculis gaudet 15 ad 16, quorum priora duo aculeata sunt. Cauda in extremo æqualis est. Squamæ asperæ. Longitudo est 3 ad 4 unciarum.

[*Post Speciem 24, Species 25, 26, 27 desunt Manuscripto ichthyologico, habentur in Sebæ Thesaurus.*]

<sup>278</sup> multis *deest ms, addidi Sebam secutus.*

<sup>279</sup> seu *scripsi Sebam secutus: sed ms.*

<sup>280</sup> unciarum *scripsi Sebam secutus: uncias ms.*

Species 28. CHÆTODON *canus, macrolepidotus, lamina operculorum media tantum serrata.*

In omnibus fere cum præcedentibus convenit sed lamina operculorum suprema denticulos nullos in ambitu habet, infima quoque glabra est, media vero tantillum serrata. Dentium unus ordo in maxillis. Pinna dorsi ossiculorum xxvij ad xxviiij quorum xij aculeata, reliqua mollia; ventrales in extremo nigrescentes ossiculorum vj. Pinna ani ossiculorum xv quorum ij aculeata. Cauda in extremo<sup>281</sup> parum bifurca.

Seba, *Thesaurus*, Vol. III, p. 71, Tab. 26, Num. 28.

*Chætodon canus, macrolepidotus, lamina operculorum media tantum serrata.*

Iterum hic priori adfinis est maxime: sed laminæ operculorum suprema & infima nullis in ambitu denticulis asperæ sunt; media duntaxat est serrata. Unus in maxillis dentium datur ordo. Dorsi pinna dorsalis ossiculis constat 27 ad 28, quorum 12 aculeata, reliqua mollia sunt. Ventrales, in extremo nigrescentes, ossicula habent 6; ani pinna 15, quorum 2 aculeo gaudent. Cauda in extremo parum bifurca est.

Species 29. CHÆTODON *macrolepidotus, obscure canus, lineis tribus albis utrinque, cauda bifurca.*

Omnes tres laminæ operculorum in ambitu æquales sunt et non serratae. Lineæ 3 albæ, transversæ, in utroque latere quarum prima ad extrema operculorum, secunda in medio corpore, tertia in extremo corpore ad caudam.

[p. 29]

Pinnæ ventrales, ani et basis caudæ<sup>282</sup> nigrescunt. Pinna dorsi ossiculorum xxv quorum xiiij aculeata. Pinna ani ossiculorum xiv quorum ij prima aculeata. Cauda in extremo parum bifurca.

Seba, *Thesaurus*, Vol. III, p. 71, Tab. 26, Num. 29.

*Chætodon macrolepidotus, obscure canus, lineis tribus albis utrinque; cauda bifurca.*

Omnes tres operculorum laminæ æquales sunt, nec in ambitu serratae. Lineæ tres, albæ, transversæ, in utroque latere dantur, quarum prima ad extrema operculorum, altera per medium corpus, tertia in extremo corpore ad caudam decurrit. Pinnæ ventrales & ani, tum caudæ basis nigrescunt.

<sup>281</sup> extremo *scripsi Sebam secutus: extremum ms.*

<sup>282</sup> basis caudæ *scripsi Sebam secutus: basi onudæ ut vid. ms.*

Dorsi pinna ossiculis constat 25, quorum 13 aculeata sunt. Ani pinna ossicula habet 14, quorum 2 priora aculeo gaudent. Cauda in extremo tantillum bifurca est.

Species 30. CHÆTODON *albus ex fusco, maculosus, aculeis quatuor ad pinnam ani.*

Dorsum a capite assurgit. Squamæ admodum exiguæ. Color corporis albus sed lituris vel maculis fusco-nigrescentibus variis. Pinna dorsi ossiculorum xxvij vel xxviii quorum xj aculeata. Pinna ani ossiculorum xvij vel xviii quorum iv aculeata et brevia. Cauda in extremo æqualis ossiculorum xv ad xvj. Longitudo 1 uncia circiter.

Seba, *Thesaurus*, Vol. III, p. 71, Tab. 26, Num. 30.

*Chætodon albus, ex fusco maculosus; aculeis 4 ad ani pinnam.*

Dorsum a capite tumidius assurgit. Squamæ admodum exiguæ corpus tegunt, quod album est sed lituris vel maculis fusco-nigrescentibus varium. Dorsi pinna ossiculis constat 27 ad 28, quorum 11 aculeata sunt; ani pinna 17 ad 18, quorum 4 aculeata sunt & brevia. Cauda, in extremo æqualis, ossicula habet 15 ad 16. Longitudo est circiter uncia unius.

Species 31. CHÆTODON, *oblongus, maculis aliquot magnis, albis, varius.*

Corpus exiguum, oblongum, caput obtusum. Lamina operculorum media in ambitu leviter serrata. Squamæ exiles. Color corporis fuscus, maculis vj circiter albis et magnis variis. Pinna dorsi ossiculorum xxxj quorum xiiij maculata. Pinnæ ventrales albæ ossiculorum vj.

[p. 30]

Pinna ani ossiculorum x quorum iij prima aculeata. Cauda oblonga, in extremo subacuta. Sescunciam longus est.

Seba, *Thesaurus*, Vol. III, p. 72, Tab. 26, Num. 31.

*Chætodon oblongus, maculis aliquot magnis, albis, varius.*

Corpus exiguum est & oblongum. Caput obtusum. Lamina operculorum media in ambitu leviter serrata. Squamæ exiles. Corpus fuscum maculis sex circiter, albis, magnis, variegatur. Pinna dorsi ossiculis constat 31, quorum 13 aculeata sunt; ventrales albæ ossiculis 6; ani pinna 10, quorum priora tria aculeo gaudent. Cauda oblonga est & in extremo subacuta.

Species 32.<sup>283</sup> CHÆTODON *lineis fuscis, longitudinalibus, varius, pinna dorsi anteriùs alta.*

Caput obtusum; dorsum a capite assurgens; maxilla superior paulo longior inferiore; denticulorum plures ordines in maxillis. Squamæ mediocres, subasperæ. Color corporis albescens sed lineis longitudinalibus varius.

Pinna dorsi longa ossiculorum xlix ad l quorum xj aculeata. Pinnæ ventrales nigræ ossiculorum vj. Pinna ani exigua ossiculorum ix vel x quorum ij aculeata.

Seba, *Thesaurus*, Vol. III, p. 72, Tab. 26, Num. 33.

*Chætodon lineis fuscis, longitudinalibus, varius; pinna dorsi anteriùs in eminentiam producta.*

Caput obtusum est. Dorsum a capite assurgit. Maxilla superior longitudine parum superat inferiorem; in utraque autem plures denticulorum ordines dantur. Squamæ mediocres sunt & subasperæ. Corpus albescens lineis fuscis, longitudinalibus, variegatur. Pinna dorsi longa ossiculis constat 49 ad 50, quorum 11 aculeata sunt; ventrales nigræ ossiculis 6; ani pinna exigua 9 ad 10, quorum duo aculeata sunt.

No. 1

Genus *Holocentri*. Tab. xxvij

Species 1. *Holocentrus* derivatur ex ὅλος *totus* et κέντρος<sup>284</sup> *aculeus*, omnes enim partes externæ in hoc pisce: caput, pinnæ, squamæ et ipsa cauda aculeata sunt. Cujusmodi piscis<sup>285</sup> meusque<sup>286</sup> ignotus fuit.

*Descriptio.*

Caput et corpus a lateribus compressa; dorsum convexum, venter latiusculus. Os mediocre; maxillæ æquales, nares utrinque<sup>287</sup> duplices. Oculi amplissimi, rotundi, cute obducti.

<sup>283</sup> 32: *numerum om. ms.*

<sup>284</sup> *sic ms.*: κέντρον *expectes.*

<sup>285</sup> piscis: *pisces ms.*

<sup>286</sup> meusque: *hactenus Seba.*

<sup>287</sup> utrinque *scripsi Sebam secutus*: *utriusque ms.*



[p. 31]

Aperturæ branchiarum satis amplæ. Laminæ capitis omnes in aculeos plurimos desinunt; media vero in unicum, præ ceteris admodum robustum, et ultimæ duos utrinque magnos. Denticuli, vel potius tubercula scabra, in maxillis, palato, et faucibus. Color corporis ex argenteo albus, cui tamen aliquod aurei in adultioribus imprimis admixtum est, et præterea in utroque latere vj vel vij lineæ lucidiores et albidiores longitudinaliter extensæ. Squamæ amplissimæ, durissimæ, splendentes et pulcræ, postica parte aculeis exiguis plurimis serratæ. Pinnæ pectorales albescentes ossiculorum xiv. Pinnæ ventrales paulo inferius sitæ, sibi admodum vicinæ,<sup>288</sup> albæ, ossiculorum viij quorum primum aculeatum, reliqua mollia.

Nota: Numerus octonarius ossiculorum inprimis ventralibus admodum rarus<sup>289</sup> est in piscibus acanthopterygiis, plerumque<sup>290</sup> enim omnes sex tantum ossicula continent.

Pinna dorsi magna, postica parte in basin fere incisa, ossiculorum xxiv ad xxv, quorum priora aculeata, reliqua mollia et ramosa. Pinna hæc in sulco quasi emergit. Pinna ani albescens ossiculorum xij, quorum iv prima aculeata, reliqua mollia et ramosa. Aculeus tertius robustissimus et admodum crassus est, postica parte sulco exaratus. Cauda albescens, multum bifurca, ossiculorum xix [p. 32] longiorum; ad latera caudæ utrinque aculei iv vel v adsunt, quod admodum rarum est et paucissimis commune. Longitudo in descripto vj unciarum; latitudo maxima i unciæ, ix linearum.

Partes intestinæ.

Hepar in duos lobos divisum, quorum sinister multo major. Ventriculus non magnus. Intestinum semel reflexum. Appendices aliquot crassiusculæ ad pylorum. Vesica ærea maxima<sup>291</sup> spina dorsi affixa.<sup>292</sup> Costæ utrinque<sup>293</sup> ix.<sup>294</sup>

<sup>288</sup> vicinæ: (...)niæ *ms.*

<sup>289</sup> rarus: variis *ms.*, perrarus *Seba.*

<sup>290</sup> plerumque *scripsi*: plerique *ms. Seba.*

<sup>291</sup> adj. *maxima* may apply to *vesica aerea* or *spina*; Artedi's Latin is not clear on this point.

<sup>292</sup> affixa *ms.*

<sup>293</sup> utrinque *scripsi Sebam secutus*: utriusque *ms.*

<sup>294</sup> Instruction to the printer, in German, at the bottom of the page: NB: Die Schuppen dieses Fisches, weil sie so schön und sonderlich sind, können auch in Kupfer gestochen werden.

Seba, *Thesaurus*, Vol. III, p. 73, Tab. 27, Num. 1.

Sequitur aliud piscium genus, hactenus, quantum novi, minime descriptum; cui novum hinc impertiri nomen licebit a quadam ejus peculiari dote petitum. *Holocentrum* scilicet hunc piscem vocabo, a Græco ὅλος, *totus*, et κέντρον, *aculeus*; siquidem omnes ejus partes externæ, caput, pinnæ, squamæ & ipsa cauda aculeata sint. Eum igitur nunc ea, qua potero, accuratione describam, ut, quæ deinceps forte ad hoc genus pertinentes species innotescant, tanto commodius internosci queant.

Num. 1. *Holocentri descriptio.*

Caput & corpus utroque a latere compressa sunt. Dorsum convexum est. Venter latiusculus. Os mediocre. Maxillæ inter se æquales. Nares utrinque geminæ hiant. Oculi amplissimi, sphaerici, cute obducuntur. Aperturæ branchiarum satis ample patent. Laminæ capitis omnes in aculeos abeunt plurimos: media tamen earum in unicum, præ reliquis valde robustum aculeum extenditur; ultima vero in duos utrinque majusculos. Denticuli, vel potius tubercula scabra in maxillis, palato & faucibus prominent. Corpus argentea splendet albedine, cui tamen, in adultioribus præsertim, aurei quidquam intermistum est: præterea in utroque latere sex vel septem lineæ, albedine lucidiore coruscantes, secundum longitudinem exporriguntur. Squamæ amplissimæ, durissimæ, splendentes, admodum venustæ, postica parte aculeis exiguis, plurimis, horridæ, corpus muniunt. Pinnæ pectorales, albescentes, ossiculis constant 14, ventrales paulo inferius sitæ, sibi mutuo admodum vicinæ, albæ, ossicula gerunt 8, quorum primum aculeatum reliqua mollia sunt. Peculiaris autem est huic pisci numerus octonarius ossiculorum in pinnis ventralibus; siquidem is perrarus sit in Piscibus Acanthopterygiis, quippe qui plerique omnes sex tantum ibidem ossicula gerunt. Pinna dorsi magna, postica parte ad basin fere usque incisa, ossiculis gaudet 24 ad 25, quorum 11 priora aculeata, reliqua mollia & ramosa sunt: aculeus tertius heic robustissimus est, admodum crassus, & postica parte sulco exaratus. Cauda albescens, multum bifurca, ossiculis constat 19 longioribus. Ad caudæ latus utrumque 4 ad 5 aculei extant, phænomeno perquam raro, paucissimisque communi. Longitudo nostri speciminis est unciarum 6, latitudo maxima novem linearum supra unciam.

Quantum ad partes ejus interaneas: Hepar in duos lobos, quorum sinister multo major est, dividitur. Ventriculus non admodum capax est. Intestinum unico duntaxat flexu crispatur. Ad pylorum crassiusculæ aliquot appendices cernuntur. Vesica aërea maxima est, & spinæ dorsi affixa. Costæ utrinque 9 corpus firmant.

VI. Genus *Pentanemi*.<sup>295</sup>

No. 2

Species 1. PENTANEMUS<sup>296</sup> derivatur ex πεντάς *quinque*, et νῆμα<sup>297</sup> *filus*, ab inferiore enim pinnarum parte pectoralium quinque utrinque<sup>298</sup> ossicula filiformia et longissima continet, quod in aliis piscibus insolitum<sup>299</sup> est.

*Descriptio:*

Caput et corpus perpendiculariter lata. Dorsum convexum. Rictus mediocris. Maxillæ æquales. Nares magnæ utrinque duplices. Oculi mediocres, rotundi, cute capitis tecti,<sup>300</sup> iris argentei coloris. Ductus<sup>301</sup> aliquot in capite sub cute. Rostrum obtusum, rotundum. Aperturæ branchiarum satis magnæ. Denticuli vel tubercula supra modum exilia in maxillis, palato et faucibus. Lingua glabra. Color totius corporis argenteus, pinnæ omnes albescentes. Squamæ mediocres, albæ, molles, postica parte leviter serratæ, unde subasperæ sentiuntur.

[p. 34]

Linea lateralis curva, dorso quam ventri propior. Pinnæ in dorso duæ, quarum prima exigua est ossiculorum vij parum aculeatorum et brevium; secunda major et altior, ossiculorum xvj quorum primum aculeatum, reliqua mollia. Pinnæ pectorales longæ et angustæ ossiculorum xvj quorum singula in apice indivisa sunt. Pinnæ ventrales albæ, breves, sibi vicinæ, ossiculorum vj quorum primum aculeatum, reliqua mollia. Pinna ani magna ossiculorum xxx vel xxxj quorum ij prima aculeata et brevia, reliqua mollia et ramosa. Cauda alba, magna, multum bifurca, ossiculorum xvij longiorum. Ex ossiculis filiformis in pectore utrinque infimum breve est, duo media longissima et corpore ipso duplo fere longiora, duo suprema mediis paulo breviora.

Piscis admodum curiosus et rarus est.

Longitudo in descripto viij unciarum. Latitudo maxima i uncia viij vel ix linearum. Longitudo ossiculi filiformis longissimi 14 unciarum 7 vel 8 linearum.

---

<sup>295</sup> Pentameni *ms.*

<sup>296</sup> Pentamenus *ms.*

<sup>297</sup> νῆμα *ut videtur.*

<sup>298</sup> utriusque *ms.*

<sup>299</sup> ii solutum *ms.*

<sup>300</sup> cute capitis tecti *scripsi Sebam secutus: case capitis secti ms.*

<sup>301</sup> ductus *scripsi Sebam secutus: dentes ms.*

Seba, *Thesaurus*, Vol. III, p. 73, Tab. 27, Num. 2.

Transimus ad novum aliud Piscium genus, innominatum, quod Pentanemum liceat adpellare, nomine ex πέντα, quinque, & νῆμα, filum, derivato; quum piscis ab inferiore parte pinnarum pectoralium quinque utrinque ossicula filiformia & longissima ostendat: id, quod in aliis piscibus prorsum insolitum est. En Pentanemi descriptionem.

Num. 2. *Pentanemus*.

Caput & corpus perpendiculariter lata sunt. Dorsum convexum. Rictus mediocris. Maxillæ æquales. Nares magnæ, utrinque duplices. Oculi mediocres, rotundi, cute capitis obteguntur, iride donati coloris argentei. Ductus aliquot in capite sub cute conspiciuntur. Rostrum obtusum est & rotundum. Aperturæ branchiarum satis late diductæ sunt. In maxillis, palato, & faucibus denticuli supra modum exiles, tuberculis similes, extant. Lingua glabra est. Corpus universum argenteo colore splendet. Pinnæ omnes albescunt. Squamis mediocribus, albis, mollibus, postica parte leviter serratis, hinc subasperis, vestitur corpus. A latere linea decurrit curva, dorso quam ventri propior. Pinnæ e dorso duæ eminent, quarum prima exigua ossiculis constat 7 parum aculeatis & brevibus; altera major & altior ossicula gerit 16, quorum primum aculeatum, reliqua mollia sunt. Pinnæ pectorales, longæ, angustæ, ossiculis gaudent 16, quorum singula in apice indivisa sunt. Ventræ pinnæ, albæ, breves sibi vicinæ, ossicula gerunt 6, quorum primum aculeatum, reliqua mollia sunt. Pinna ani magna ossiculis constat 30 ad 31, quorum 2 prima aculeata et brevia, reliqua mollia & ramosa sunt. Cauda alba, magna, multum bifurca, ossiculis firmatur 17 longioribus. Ex ossiculis quinque filiformibus in pectore infimum utrinque brevius est, media duo longissima, ut vel ipsum corpus duplo fere superent longitudine; duo suprema tandem mediis paulo sunt breviora. Piscis sane admodum rarus est & attentione dignissimus. Longitudo ejus octo æquat uncias; latitudo maxima est uncia unius & octo aut novem linearum. Ossiculum filiforme longissimum ad 14 uncias & 7 vel 8 lineas se extendit.

## VII. De genere *Scombri*

No. 3

SCOMBER *linea laterali aculeata, pinna ani ossiculorum viginti.*<sup>302</sup>

[p. 35]

*Guara Tereba Brasiliensis* Marcgrav., l. IV, c. XVII, Jonsonii CXXXVI, T. XXXV, F. 4; Willughby *Species* T. XVIII, F. 1.

<sup>302</sup> cf. *Ichthyologia*, Part III *Genera*, p. 31; Part IV *Synonymia*, p. 50.

Dorsum inter pinnam et caput acutum et parum assurgens. Os mediocre, maxillæ ejusdem fere longitudinis sed aperto inferior longior apparet. Oculi mediocres, rotundi, iris flava. Aperturæ branchiarum satis amplæ. Denticuli in maxillis, palato et faucibus. Squamæ exiguæ et molles. Color corporis argenteus cum auro admixto. Linea lateralis antè arcus instar curva est et ad dorsum flexa ac glabra, a medio vero corpore ad caudam recta tendit et aculeis latis ac retrorsis aculeata est. Numerus harum eminentiarum aculeatarum est circiter xxx utrinque. Pinnæ in dorso duæ sibi fere contiguæ, quarum prior aculeos viij continet, qui omnes e<sup>303</sup> sulco quasi emergunt. Posterior ossiculorum xxij, quorum<sup>304</sup> primum rigidum est, reliqua mollia et ramosa. Pinnæ pectorales longæ ossiculorum xxj, præter duo prima, in apice ramosorum. Pinnæ ventrales albæ, exiguæ, ossiculorum vj præter primum multum ramosorum. Pinna ani longa ossiculorum xix ad xx, quorum iij prima aculeata, reliqua mollia et ramosa.

[p. 36]

Cauda multum bifurca. Longitudo iv unciarum, vj vel vij linearum. Latitudo maxima i uncia, vj linearum.

Seba, *Thesaurus*, Vol. III, p. 74, Tab. 27, Num. 3.

Proxime nunc Pisces aliquot exhibemus, ad *Scombri* genus qui pertinent.

Num. 3. *Scomber*, *linea laterali aculeata*,; *pinna ani ossiculorum viginti*. *Guara Tereba* vocatur Brasiliensibus, juxta Marggrav, *Lib. IV, c. 17*; Johnston *p. 136, Tab. XXXV, fig. 4*; Willoughb. *p. 291, Tab. S. XVIII, Fig. 1*.

Dorsum ejus inter pinnam et caput acutum est & parumper assurgit. Os mediocre est. Maxillæ ejusdem fere sunt longitudinis, sed ore aperto inferior superiore longior apparet. Oculi mediocres, rotundi, flava gaudent iride. Aperturæ branchiarum satis amplæ sunt. In maxillis, palato, & faucibus denticuli prominent. Squamæ exiguæ & molles superficiem tegunt. Corpus argentei est coloris, qui aurei quid admixtum est. Linea lateralis, antè arcus instar curva, ad dorsum flexa ac glabra, a medio dein corpore ad caudam usque recta tendit, aculeisque tunc latis, retroversis, circiter triginta utrinque, horret. Pinnæ in dorso duæ, sibi mutuo fere contiguæ, sunt, quarum prior aculeos monstrat octo, omnes e sulco quasi emergentes; posterior ossiculis gaudet 22, quorum primum rigidum, reliqua mollia et ramosa sunt. Pinnæ pectorales, albæ, exiguæ, ossicula habent 6, quæ itidem, præter

<sup>303</sup> e *scripsi* *Sebam secutus*: in *ms*.

<sup>304</sup> quorum *scripsi* *Sebam secutus*: quam *ms*.

primum, valde ramosa sunt. Ani pinna, longa, ossiculis constat 19 ad 20, quorum tria prima aculeata, reliqua mollia sunt & ramosa. Cauda multum bifurca est. Longitudo 4 unciarum & 6 vel 7 linearum. Latitudo maxima est unciæ unius cum 6 lineis.

No. 4

Species 2. SCOMBER *flavescens*, latitudine ad longitudinem dimidia, denticulis piliformibus.<sup>305</sup>

Caput, dorsum, venter, oculi, squamæ et color ut in præcedente specie, sed corpus latius est et dorsum a capite magis assurgit. Os seu rictus angustus. Maxillæ ejusdem fere longitudinis vel superior tantillum productior. Aculei duo exiles et brevissimi supra utrumque oculum. Oculi satis ampli. Aperturæ branchiarum mediocres.<sup>306</sup> Denticuli exiles et piliformes in maxillis et ossicula aspera ad fauces. Linea lateralis curva, dorso vicina.<sup>307</sup> Pinna in dorso unica, longa, ossiculorum xxiiij vel xxiv, quorum viij anteriora aculeata, longiora, reliqua brevia et mollia. Pinnæ pectorales ossiculorum xix; ventrales exiguæ ossiculorum vj, quorum primum aculeatum. Pinna ani magna ossiculorum xvj vel xvij, quorum iij prima aculeata et longiora, reliqua humilia, mollia et ramosa. Cauda multum bifurca, forcicis deductæ instar. Os durum sub cute inter<sup>308</sup> anum et pinnam ani. Longitudo iij unciarum, viij vel ix linearum. Latitudo maxima i unciæ, viij linearum.

Seba, *Thesaurus*, Vol. III, p. 75, Tab. 26, Num. 4.

*Scomber flavescens*; latitudine ad longitudinem dimidia; denticulis piliformibus.

Caput, dorsum, venter, oculi, squamæ, & color sese habent, uti in specie prægressa. At corpus latius est, dorsumque a capite magis assurgit. Os seu rictus angustus est. Maxillæ longitudine fere inter se æquales sunt, aut superior tantillum productior. Aculei duo exiles & brevissimi supra utrumque oculum extant. Oculi satis ampli sunt. Aperturæ branchiarum mediocres. Denticuli exiles, piliformes, in maxillis, & ossicula aspera ad fauces hærent. Datur & linea lateralis, curva, dorso vicina. Pinna in dorso unica est, longa, ossiculis constans 23 ad 24, quorum 8 anteriora aculeata & longiora, reliqua brevia & mollia sunt. Pinnæ pectorales ossicula habent

<sup>305</sup> piliformis *adj.* not in *L&S*; cf. *OED s.v.* piliform.

<sup>306</sup> mediocres *scripsi* *Sebam secutus*: mediocræ *ms.*

<sup>307</sup> vicina: vicinia *ms.*

<sup>308</sup> os durum sub cute inter *scripsi* *Sebam secutus*: os tamen sub cute instar *ms.*

19, ventrales exiguæ ossicula 6, quorum primum aculeatum est. Ani pinna, magna, ossiculis constat 16 ad 17, quorum tria priora aculeata & longiora, reliqua humilia, mollia & ramosa sunt. Cauda, diductæ instar forficis, multum bifurcata est. Os durum sub cute inter anum et ani pinnam datur. Longitudo est 3 unciarum & 8 vel 9 linearum. Latitudo maxima uncia 1 & linearum 8.

[p. 37]

Species 3. ABUCATUAIA.

Brasiliensibus *Peixe*. *Galle Lucitanis* G. Marcgravii Liber V, Cap. 11; Willoughby p. ccicv; Ray p. icix. *Gallus Marinus seu faber Indicus* in appendice ad Ichthyologiam Willoughby p. iii. *Ican Kapelle* H. Ruyschii *Theatrum* p. xvj, T. ix, p. vij.

Caput et corpus tenuia et perpendiculariter lata. Dorsum et venter admodum acuta. Maxilla inferior superiore paulo longior. Denticuli vix conspicui in utraque maxilla. Color corporis argenteus et splendens. Linea lateralis curva ad<sup>309</sup> dorsum flexa. Pinna in dorso unica ossiculorum xxxj, quorum ix anteriora aculeata, reliqua mollia; mollium primum admodum longum est et in setam quasi producitur, reliqua multum breviora. Pinnæ pectorales longæ ossiculorum xx. Pinnæ ventrales admodum longæ et nigrescentes ossiculorum vj. Pinna ani ossiculorum xx, quorum primum tantummodo aculeatum, reliqua mollia. Mollium primum longissimum est et in setam quasi productum. Cauda lata admodum bifurca ossiculorum xvij longiorum. [p. 38] Venter inter pinnas ventrales et pinnam ani ex mero osse tenui et acuto constat.

Seba, *Thesaurus* vol. III, p. 72, Tab. 26, Num. 34.

*Piscis* Abucatuia *Brasiliensibus*, *Peixe Gallo Lusitanis vocatus, juxta* Marggrav. Lib. IV, C. II; Willoughb. p. 295; Raj. p. 99. In Appendice ad *Ichthyol. Willoughbb.* p. 3, vocatur *Gallus marinus*, seu *Faber Indicus*. H. Ruyschio autem, *Theat. p. 16, Tab. IX, fig. 7. Ican Kapelle* audit.

Caput ejus et corpus tenuia sunt & perpendiculariter lata: dorsum et venter admodum acuta. Maxilla inferior superiore paulo longior est. Denticulis vix conspicuis utraque maxilla pollet. Corpus argenteo splendens colore, laterali linea curva, ad dorsum flexa, distinguitur. Pinna in dorso unica ossiculis constat 31, quorum 9 anteriora aculeata sunt, reliqua mollia: horumque mollium primum valde longum est, & veluti in setam productum, cum cætera multo sint breviora. Pinnæ pectorales longæ ossiculis

<sup>309</sup> ad *scripsi Sebam secutus*, et *ms.*

20 constant; ventrales vero longæ admodum & nigrescentes, ossiculis 6; ani pinna ossiculis 20, quorum primum duntaxat aculeatum est, reliqua mollia; itidemque mollium primum longissimum est, & quasi in setam exprorectum. Cauda lata, profunde bifurcata, ossiculis 17 longioribus gaudet. Ventris illa pars, quæ pinnas inter ventrales & pinnam ani est, ex mero osse tenui & acuto constat.

VIII. *Grammistes* a γραμμῆ *linea*, quia lineas utrinque albas, longitudinales habet.

No. 6

Species I. GRAMMISTES *caput, corpus perpendiculariter lata*.<sup>310</sup>

Os seu rictus satis amplus. Maxilla inferior superiore paulo longior. Oculi mediocres, subrotundi. Lamina operculorum media in ambitu aculeis aliquot serrata, ultima vero in tres aculeos acutiores desinit. Denticuli plurimi in maxillis, palato et faucibus. Squamæ admodum exiguæ, molles et leves. Color corporis rubescens sed lineis longitudinalibus albis et parallelis utrinque varius; lineæ hæ numero plerumque sunt vij vel viij. Pinnæ omnes albæ. Pinna in dorso unica ad basin usque in medio incisa, vel, si mavis, duæ, quarum anterior vij vel viij aculeos continet, posterior ossiculorum xij et xiv ramosorum. Pinnæ pectorales subrotundæ ossiculorum xvj vel xvij. Pinnæ ventrales breves ossiculorum vj, quorum primum aculeatum. Pinna ani exigua ossiculorum x vel xj, quorum primum aculeatum et admodum breve, reliqua mollia et ramosa. Cauda lata in extremo subrotunda. Longitudo iij unciarum, ix linearum circiter.

Seba, *Thesaurus* vol. III, p. 75, Tab. 26, Num. 5.

Præterea & piscem nostro in Museo asservamus, haud, quantum scio, ante nominatum descriptumve, neque & ad quoddam determinatum piscium genus referendum. Audiet is nobis *Grammistes* a γραμμῆ, *linea*, quoniam utrinque lineis albis, longitudinabilibus distinctus est. Hæc vero ejus sit descriptio.

Num. 5. *Grammistes*.

*Grammistes* capite gaudet & corpore perpendiculariter latis; ore sive rictu satis amplo, cujus inferior maxilla superiore paulo longior est. Oculi ejus

<sup>310</sup> This diagnosis, offered in the nominative case, is an exception to Artedi's normal practice which would have required *Grammistes, capite, corpore perpendiculariter latis*.



mediocres sunt & subrotundi. Media operculorum lamina in ambitu aculeis aliquot serrata est; postrema vero in tres aculeos magis acuminatos terminantur. Denticuli plurimi maxillas, palatum, & fauces obsident. Squamæ admodum exiguæ sunt, molles & læves. Corpus rubescens lineis albis longitudinalibus, & parallelis, utrinque variegatur, sunt autem lineæ hæ numero 7 vel 8 plerumque. Pinnæ omnes albæ sunt. Unica in dorso pinna, ad<sup>311</sup> basin usque in medio incisa, vel, si mavis, duæ adsunt, quarum anterior 7 ad 8 aculeos porrigit, posterior ossiculis constat 13 vel 14 ramosis. Pinnæ pectorales, subrotundæ, ossicula habent 16 vel 17: ventrales breves ossiculis constant 6, quorum primum aculeatum est. Ani pinna exigua ossiculis gaudet 10 ad 11, quorum primum aculeatum & admodum breve est, reliqua mollia & ramosa. Cauda, lata, in extremo subrotunda est. Longitudo est trium unciarum & novem linearum circiter.

[p. 39]

No. 7

Species 1. PERCA *maculosa, maxilla inferiore longiore, pinna dorsi aculeorum novem.*

*Descriptio.*

1. Maxilla inferior superiore longior.
2. Dentes quatuor, magni, in apice maxillarum, nempe ij utrimque.
3. Pinna dorsi ossiculorum xxv, quorum novem aculeata. Pectorales ossiculorum xvij; ventrales ossiculorum vj. Ani ossiculorum xij, quorum tres aculeata.
- Cauda ossiculorum xvij longiorum.
4. Maculæ fuscæ vel nigrescentes, creberrimæ in toto corpore, capite, et pinnis.

Seba, *Thesaurus* vol. III, p. 75, Tab. 27, Num. 6.

Jam Percarum species quasdam exhibebimus rariores atque exoticas, neque prius, quantum novimus descriptas. Initium faciet

Num. 6. *Perca maculosa; maxilla inferiore longiore: pinna dorsi aculearum novem.*

Maxilla inferior longitudine vincit superiorem. In apice vero maxillarum dentes utrinque duo, magni, prominent. Dorsi pinna ossiculis gaudet 25,

<sup>311</sup> ad scripsi Artedi secutus: ab Seba.

quorum 9 aculeata sunt. Pinnæ pectorales ossicula gerunt 18; ventrales 6; ani pinna 13, quorum 3 aculeata sunt. Cauda ossiculis 17 longioribus constat. Corpus universum, caput, & pinnæ maculis fuscis vel nigrescentibus, creberrimis, variegantur.

IX. Genus *Perca*, cujus xiiij species novi.

Species 1. *PERCA maculosa, maxilla longiore, species, pinna dorsi aculeorum novem.*

Vide descriptionem superius datam.

No. 8

Species 2. *PERCA tota maculis fuscis et punctis albis varia; pinna dorsi aculeorum undecim.*

In plurimis cum præcedente specie convenit, sed maxillæ longitudine fere æquales sunt. Aculeus medius in lamina operculorum ultima reliquis duobus multo longior est, in priore vero specie æquales fere sunt. Maculæ<sup>312</sup> ipsius corporis pauciores et majores, cum punctis albis ad limbum ita dispositis, ut maculæ illæ fuscae pentagone quasi appareant. Pinna dorsi ossiculorum xxvij vel xxviii, quorum xj aculeata, reliqua mollia. Cauda maculosa, in extremo subrotunda, ossiculorum xvij longiorum. Reliquæ pinnæ ut in prima specie sese habent.

Seba, *Thesaurus* vol. III, p. 76, Tab. 27, Num. 7.

*Perca tota maculis fuscis & punctis albis varia; pinna dorsi aculeorum undecim.*

In plurimis quidem cum præcedente convenit hic piscis; sed maxillæ ejus tantum non ejusdem sunt longitudinis. Quin & aculeus medius in ultima operculorum lamina duobus reliquis multo est longior; cum contra in specie priore omnes fere inter se æquales sint. Maculæ itidem, quæ corporis pingunt superficiem, pauciores sunt, at majores, punctisque albis, limbo earum circumpositis, ita distinguuntur, ut quasi pentagonæ appareant. Pinna dorsi ossiculis constat 27 ad 28, quorum 11 aculeata, reliqua mollia sunt. Cauda, maculosa, in extremo subrotunda, ossiculis firmatur 17 longioribus. Pinnæ reliquæ uti in specie priore se habent.

[p. 40]

<sup>312</sup> Maculæ scripsi *Sebam secutus*: Maxillæ *ms.*

## No. 9

Species 3. PERCA *maxilla inferiore longiore, lineis longitudinalibus varia. Pinna dorsi aculeorum xj.*

In multis cum No. 2 convenit, sed oculi magis flavescunt. Lineæ longitudinales, non rectæ sed parum flexuosæ, coloris obscurioris quam ipsum corpus. In pinnis nullæ maculæ observantur, contra ac<sup>313</sup> in secunda specie. Pinna dorsi ossiculorum xxix, quorum xj aculeata. Pinnæ ventrales ossiculorum vj, quorum primum aculeatum. Pinna ani ossiculorum xvj, quorum iij prima aculeata. Cauda in extremo subrotunda.

Seba, *Thesaurus* vol. III, p. 76, Tab. 27, Num. 8.

*Perca maxilla inferiore longiore; lineis longitudinalibus varia; pinna dorsi aculeorum undecim.* Cum priore Num. 7 in multis convenit: sed oculi magis flavescunt. Lineæ longitudinales, non recto, sed flexuoso tramite decurrentes, coloris, quam ipsum corpus, obscurioris, superficiem variegant. Pinnæ tamen contra, ac in priore specie, maculis prorsus carent. Dorsi pinna ossiculis constat 29, quorum 11 aculeata sunt. Pinnæ ventrales ossicula gerunt 6, quorum primum aculeo gaudet. Ani pinna 16 constituunt ossicula, quorum 3 prima aculeata sunt. Cauda in extremo subrotunda est.

## No. 10

Species 4. PERCA *maxilla inferiore longiore, transversim lineata, macula nigerrima ad caudam.*

In multis cum præcedentibus convenit sed maculæ exiguæ, nigræ, in marginibus orbitæ oculorum. Squamæ exiguæ, asperæ. Color corporis albescens cum lineis transversis, latis, et fuscis, quinque nempe in utroque latere; inter pinnam dorsi vero et oculos duæ utrinque lineæ longitudinales sunt. [p. 41] Macula nigerrima oblonga superne ad initium caudæ. Pinnæ ventrales ossiculorum vj. Pinna dorsi in medio paulo humilior ossiculorum xxix quorum undecim aculeata. Pinna ani ossiculorum xij<sup>314</sup> quorum iij aculeata. Cauda in extremo fere æqualis.

Seba, *Thesaurus* vol. III, p. 76, Tab. 27, Num. 9.

*Perca maxilla inferiore longiore, transversim lineata; macula nigerrima ad caudam.*

<sup>313</sup> contra ac *scripsi Sebam secutus*: contraque *ms.*

<sup>314</sup> xij *scripsi Sebam secutus*: ij *ms.*

In multis iterum cum præcedentibus convenit: sed margines orbitæ oculorum exiguis maculis, nigris, obsessæ sunt. Squamæ minutæ, asperæ, corpus tegunt. Color corporis albescens lineis transversis, latis, fuscis, utrinque quinis, distinguitur: quin & ab oculis ad pinnam dorsi usque duæ utrinque lineæ longitudinales protenduntur; & caudæ initio superne nigerrima insidet macula, oblonga. Pinnæ ventrales ossiculis gaudent 6; dorsi pinna, in medio humilior paulo, ossiculis 29, quorum 11 aculeata sunt; ani pinna ossiculis 12, quorum 3 aculeata sunt. Cauda extremo fere æquali terminatur.

Species 5. PERCA *unicolor, maxilla inferiore longiore, macula nigra ad basin caudæ.*

Cum præcedentibus in quibusdam convenit, sed lamina operculorum media admodum serrata est, ultima quoque in tres aculeos desinit. Dorsum subacutum est et corpus latius respectu<sup>315</sup> quam in præcedentibus speciebus. Macula exigua, nigricans vel fusca, inter nares et rostrum. Color [tertius]<sup>316</sup> corporis fusco canescens, macula nigerrima superne ad initium caudæ. Pinnæ pectorales longæ ossiculorum xiiij vel xiv. Ventrales ossiculorum vj. Dorsi ossiculorum xxv quorum x aculeata. Ani ossiculorum xj quorum iij aculeata. Cauda in extremo paululum bifurca.

Seba, *Thesaurus* vol. III, p. 76, Tab. 27, Num. 10.

*Perca unicolor, maxilla inferiore longiore; macula nigra ad basin caudæ.*

Quoad nonnulla præcedentibus affinis est, sed lamina operculorum media admodum est serrata; ultima vero in tres aculeos desinit. Dorsum subacutum est, & corpus, ratione longitudinis, latius, quam in prioribus. Macula nigricans, vel fusca, exigua, nares inter atque rostrum datur; itidemque ad caudæ initium superne alia macula nigerrima: cum corpus reliquum ex fusco canescat. Pinnæ pectorales, longæ, ossiculis constat 13 ad 14; ventrales ossiculis 6; dorsi ossiculis 25, quorum 10 aculeata sunt; pinna ani ossiculis 11, quorum tria aculeo gaudent. Cauda in extremo tantillum bifurcatur.

No. 12

Species 6. PERCA *maxillis æqualibus, lineis utrinque duabus transversis, nigricantibus.*

In multis cum<sup>317</sup> præcedente (5) convenit, sed dorsum a capite [p. 42] magis assurgit et antè subacutum est. Lamina operculorum media in

<sup>315</sup> respectu: respectu longitudinis *Seba*.

<sup>316</sup> tertius *ms.*, *deest Seba, delendum credidi*.

<sup>317</sup> cum *add. Sebam secutus, om. ms.*

ambitu leviter serrata est. Squamæ subasperæ mediocres. Color corporis albo-flavescens sed utrinque lineæ duæ latæ, transversæ et nigrescentes, corpus cingunt sed parum conspicuæ sunt. Pinnæ pectorales oblongæ et albescentes. Ventrals nigrescentes ossiculorum vj, quorum sextum aculeatum. Pinna dorsi in medio paulo humilior ossiculorum xxvij ad xxviii, quorum xj aculeata, reliqua mollia. Pinna ani ossiculorum xiiij ad xiv, quorum tres aculeata. Cauda in extremo parum bifurca.

Seba, *Thesaurus* vol. III, p. 77, Tab. 27, Num. 11.

*Perca maxillis æqualibus, lineis utrinque duabus, transversis, nigricantibus.*

In multis iterum cum priore Num. 10 convenit: sed dorsum a capite magis assurgit & antica parte subacutum est. Lamina operculorum media in ambitu leviter est serrata. Squamæ mediocres sunt & subasperæ. Corpus ex albo flavescens lineis utrinque duabus, latis, transversis, nigrescentibus, parum tamen conspicuis, cingitur. Pinnæ pectorales, oblongæ, albescunt. Ventrals nigrescentes ossiculis constant 6, quorum primum aculeatum est. Dorsi pinna, in medio paulo humilior, ossicula gerit 27 ad 28, quorum 11 aculeo gaudent; reliqua mollia sunt. Ani pinna ossiculis constat 13 ad 14, quorum 3 aculeata sunt. Cauda in fine parum bifurcatur.

No. 13

Species 7. PERCA *maxillis æqualibus, capite maculoso, cauda æquali.*

Multa cum præcedentibus communia habet, sed lamina operculorum media in ambitu levissime serrata est, et ultima vix aculeata. Dorsum antè subacutum est. Denticuli in maxillis, palato et faucibus. Color corporis obscure albescens cum maculis aliquot magnis, parum distinctis, nigricantibus, ab utroque latere dorsi supra lineam lateralem. Caput totum maculis plurimis, exiguis, nigricantibus vel fuscis varius. Pinna dorsi ossiculorum xxij quorum x aculeata, quæ ex sulco quasi prove-niunt. Pinnæ pectorales ossiculorum 14. Ventrals albescentes ossiculorum vj. Pinna ani x ossiculorum quorum iij prima aculeata. Cauda in extremo æqualis fere ossiculorum xvj ad xvij.

Seba, *Thesaurus* vol. III, p. 77, Tab. 27, Num. 12.

*Perca maxillis æqualibus; capite maculoso; cauda æquali.*

Multa quidem cum præcedentibus habet communia: at lamina operculorum media in ambitu levissime serrata est, ultima vero vix aculeata. Dorsum antica parte subacutum est. In maxillis, palato & faucibus denticuli hærent. Corpus obscure albescens maculis aliquot magnis, parum distinctis,

nigricantibus, ab utroque dorsi latere, supra lineam lateralem, variegatur. Caput vero totum maculis plurimis, exiguis, nigricantibus, vel fuscis, varium est. Pinna dorsi ossicula gerit 22, quorum 10 aculeata sunt, & quasi e fulco proveniunt. Pectorales pinnæ ossiculis constant 14; ventrales albescentes ossiculis 6; ani pinna ossiculis 10, quorum 3 prima aculeata sunt. Cauda, in extremo fere æqualis, ossicula gerit 16 ad 17.

No. 14

Species 8. PERCA *coloris argentei, lineis utrinque duabus* [p. 43] *longitudinalibus, cauda bifurca.*

Dorsum convexum. Maxillæ longitudine proxime æquales. Iris alba. Squamæ exiles, argenteæ, arcte adhærentes, vix asperæ. Color totius corporis argenteus sed ad dorsum utrinque duæ lineæ pallide rubescentes longitudinaliter extenduntur, quæ tamen [in]<sup>318</sup> parum in conspectum veniunt. Lamina operculorum media, ultima et prima sub oculis singulæ serratæ sunt. Pinna dorsi in medio ad basin fere incisa ossiculorum xxj ad xxij quorum xj aculeata. Pinnæ pectorales albæ et oblongæ. Ventrales ossiculorum vj quorum primum aculeatum. Pinna ani ossiculorum xj vel xij quorum tria prima aculeata. Cauda alba in extremo bifurca. Longitudo 2 unciarum 1 lineæ. Latitudo vj linearum circiter.

Seba, *Thesaurus* vol. III, p. 77, Tab. 27, Num. 13.

*Perca coloris argentei; lineis utrinque duabus longitudinalibus: cauda bifurca.*

Dorsum convexum est. Maxillæ longitudine proxime inter se sunt æquales. Oculi iride alba gaudent. Squamæ exiles, argenteæ, vix asperæ, corpori arcte adhærent. Color corporis totius argenteus est, sed utrinque ad dorsum, juxta longitudinem, duæ extenduntur lineæ, pallide rubescentes, quæ parum tamen in conspectum veniunt. Lamina operculorum media, ultima, & prima sub oculis, singulæ serratæ sunt. Pinna dorsi, in medio ad basin fere incisa, ossiculis constat 21 ad 22, quorum 11 aculeata sunt. Pectorales pinnæ albæ sunt & oblongæ. Ventrales ossiculis 6 constant, quorum primum aculeatum est. Ani pinna ossiculis 11 vel 12, quorum 3 priora aculeata sunt. Cauda, alba, in extremo bifurcatur. Longitudo est unciarum 2, & lineæ unius: latitudo 6 linearum circiter.

<sup>318</sup> in *ut supervacaneum delevi Sebam secutus.*

No. 15

Species 9. PERCA *maxilla inferiore longiore, albescens, cum lineis transversis obscurioribus.*

Cum præcedente (8) in multis convenit sed lamina operculorum media unicum aculeum<sup>319</sup> magnum continet, duæ reliquæ glabræ sunt. Squamæ mediocres limbo subaspero<sup>320</sup> præditæ. Color corporis ex argenteo albescit sed lineæ vij vel viij obscuriores et parum conspicuæ corpus utrinque transversaliter secant. Pinna dorsi in medio ad basin fere incisa ossiculorum xxvj, quorum xij aculeata, reliqua mollia. [p. 44] Pinnæ pectorales albescentes ossiculorum xvj. Ventrals albæ ossiculorum vj. Pinna ani albescens ossiculorum xj quorum iij aculeata, reliqua mollia. Cauda in extremo paululum bifurca.

Seba, *Thesaurus* vol. III, p. 78, Tab. 27, Num. 14.

*Perca maxilla inferiore longiore; albescens cum lineis transversis, obscurioribus.*

Cum præcedente Num. 13 in multis convenit: sed lamina operculorum media unicum gerit, magnum, aculeum; binæ autem reliquæ læves sunt. Squamæ mediocres, limbo subaspero præditæ, corpus vestiunt, quod, ex argenteo albescens, lineis 7 vel 8 obscurioribus, & parum conspicuis utrinque transversaliter secatur. Pinna dorsi, in medio fere ad basin incisa, ossiculis constat 26, quorum 12 aculeata sunt, reliqua mollia. Pinnæ pectorales, albescentes, ossicula gerunt 16; ventrals albæ ossicula 6; ani pinna, albescens, ossicula 11, quorum 3 aculeata, reliqua mollia sunt. Cauda in extremo tantillum bifurcatur.

No. 16

Species 10. PERCA *maxilla inferiore longiore, tota maculis et lineis transversis varia.*

Caput angustum est, subacutum. Corpus oblongius quam in præcedentibus. Denticuli in maxillis, palato et faucibus. Lamina operculorum media et ultima aculeatæ<sup>321</sup> sunt. Color corporis albescens, sed maculis fusco-nigrantibus et inæqualibus in toto corpore et pinnis quibusdam varius et præterea inter pinnas pectorales et caudam lineæ vij vel viij transversæ et fuscæ ventrem secant. Pinna dorsi maculata, ossiculorum xxij quorum x aculeata. Pectorales albæ ossiculorum xij ad xiv. Ventrals albæ

<sup>319</sup> aculeum *scripsi Sebam secutus: aculeatum ms.*

<sup>320</sup> subaspero *scripsi Sebam secutus: subasperæ ms.*

<sup>321</sup> aculeatæ *scripsi Sebam secutus: aculeata ms.*

ossiculorum vj quorum primum aculeatum. Pinna ani ossiculorum xj quorum tria prima aculeata. Cauda in extremo æqualis fere.

Seba, *Thesaurus* vol. III, p. 78, Tab. 27, Num. 15.

*Perca maxilla inferiore longiore; tota maculis et lineis transversis varia.*

Caput angustum est & subacutum. Corpus magis oblongum, quam in præsentibus. Denticuli in maxillis, palato, & faucibus hærent. Lamina operculorum media & ultima aculeatæ sunt. Color corporis albescens maculis ex fusco nigricantibus, inæqualibus, per totum corpus & nonnullas pinnas dispersis, variegatur: præterea & pinnas inter pectorales atque caudam lineæ 7 vel 8 transversæ, fuscæ, ventrem secant. Pinna dorsi maculosa ossiculis constat 23, quorum 10 aculeata sunt; pectorales albæ ossiculis 13 ad 14; ventrales albæ ossiculis 11, quorum 3 prima aculeo gaudent. Cauda in extremo fere æqualis est.

No. 17

Species 11. PERCA *oblonga, teres, lineis utrinque octo transversis, fuscis.*

Caput oblongum, subacutum et parum plagioplateum seu depressum. Corpus oblongum et anterius omnino teres. Maxilla inferior superiore paulo longior apparet. [p. 45] Oculi ampli et sibi satis vicini. Lamina operculorum media in ambitu glabra est, ultima vero in aculeos duos desinit. Color corporis albescens, sed lineis fuscis, irregularibus, viij vel ix, transversis, utrinque varius. Pinnæ maculosæ. Pinna dorsi ossiculorum xxvj quorum v tantum anteriora aculeata sunt, reliqua mollia. Pinnæ pectorales albescentes ossiculorum xvj vel xvij. Ventrales ossiculorum vj quorum primum aculeatum. Pinna ani longa ossiculorum xvij quorum primum admodum exiguum et aculeatum, reliqua mollia. Cauda in extremo æqualis, ossiculorum xvij longiorum.

Seba, *Thesaurus* vol. III, p. 78, Tab. 27, Num. 16.

*Perca oblonga, teres; lineis utrinque octo transversis, fuscis.*

Caput oblongum est, subacutum, & nonnihil plagioplateum sive depressum. Corpus itidem oblongum, & antica parte omnino teres est. Maxilla inferior superiore paulo apparet longior. Oculi ampli & satis inter se vicini sunt. Lamina operculorum media in ambitu lævis est; ultima vero duos in aculeos terminatur. Color corporis albescens lineis fuscis, irregularibus, 8 ad 9, transversis, utroque in latere variegatur. Pinnæ maculosæ sunt. Dorsi pinna ossiculis constat 26, quorum 5 tantum anteriora aculeata sunt, reliqua mollia. Pectorales pinnæ, albescentes, ossiculis constant 16 vel 17; ventrales



ossiculis 6, quorum primum aculeatum est; ani pinna longa ossiculis 18, quorum primum valde exiguum & aculeatum est, reliqua mollia. Cauda, in extremo æqualis, ossicula gerit 17 longiora.

No. 18

Species 12. PERCA *maxilla superiore longiore, lineis longitudinalibus varia, aculeis dorsi tredecim.*

Caput obtusum, ab oculis ad rostrum admodum declive. Anus notabili distantia a pinna ani distat. Maxilla superior inferiore multo productior. Foramina vj satis magna in apice maxillæ inferioris et duo in superiore. Oculi magni, ovals. Aperturæ branchiarum satis amplæ. Lamina operculorum media aculeis plurimis in ambitu serrata est, duæ reliquæ glabræ. Squamæ mediocres, asperæ. Color albescens sed lineis vj longitudinalibus et increscentibus varius. Lineæ transversæ in vertice. [p. 46] Pinna dorsi ossiculorum xxxiiij quorum xiiij aculeata, quæ ex sulco quasi dorso insculpto perveniunt. Pinnæ pectorales albescentes ossiculorum xviiij; ventrales albæ ossiculorum vj. Pinna ani ossiculorum xj quorum iij prima aculeata. Cauda in extremo<sup>322</sup> æqualis fere ossiculorum xvij.

Seba, *Thesaurus* vol. III, p. 79, Tab. 27, Num. 17.

*Perca maxilla superiore longiore, lineis longitudinalibus varia; aculeis dorsi tredecim.*

Caput obtusum, ab oculis ad rostrum valde declive est. Anus notabili intervallo a pinna ani distat. Maxilla superior inferiorem longitudine multum superat. Foramina 6 satis magna in apice maxillæ inferioris & bina in superiore hiant. Oculi magni sunt & elliptici. Aperturæ branchiarum satis ample patent. Lamina operculorum media aculeis plurimis in ambitu serrata est; binæ autem reliquæ læves sunt. Squamis mediocribus, asperis, vestitur corpus, quod albescens lineis sex longitudinalibus, nigrescentibus, distinguitur. In vertice itidem lineæ transversæ decurrunt. Dorsi pinna ossiculis constat 33, quorum 13 aculeata e sulco veluti, dorso, insculpto propullulant. Pinnæ pectorales, albescentes, ossiculis constant 18; ventrales albæ ossiculis 6; ani pinna ossiculis 11, quorum 3 prima aculeata sunt. Cauda, in extremo fere æqualis, ossicula gerit 17.

No. 19

Species 13. PERCA *maxilla superiore longiore, lineis longitudinalibus varia, aculeis dorsi decem.*

<sup>322</sup> extremo *scripsi Sebam secutus: extremæ ms.*

In plurimis cum præcedente (12) convenit, sed corpus respectu<sup>323</sup> latius est et dorsum ab oculis magis assurgit et subacutum est. Color corporis albus, lineis quinque vel pluribus fusco-rubentibus utrinque longitudinaliter varius. Lineæ aliquot<sup>324</sup> longitudinales in vertice. Pinna dorsi ossiculorum xxxij quorum x anteriora aculeata, quæ e<sup>325</sup> sulco quasi emergunt. Pinna ani ossiculorum xj. Reliqua ut in No. 12 omnino sese habent.

Seba, *Thesaurus* vol. III, p. 79, Tab. 27, Num. 18.

*Perca maxilla superiore longiore; lineis longitudinalibus varia; aculeis dorsi decem.*

In plurimis cum præcedente Num. 17 convenit, sed corpus ejus latius est dorsumque ab oculis magis assurgit et subacutum est. Color corporis albus lineis 5 vel pluribus, fusco rubentibus, longitudinalibus, utrinque variegatur. In vertice pariter lineæ aliquot longitudinales observantur. Pinna dorsi ossiculis constat 32, quorum 10 anteriora aculeata e sulco quasi emergunt. Ani pinna ossiculis constat 11. Reliqua simili modo ac in priore Num. 17 comparata sunt.

Species 1. COTTUS *squamosus, rostro bifido, pinnis pectoralibus ad caudam extensis.*

*Descriptio.*

N. 1

1. Caput admodum aculeatum.

2. Pinna dorsi ossiculorum xxiv quorum xiiij aculeata. Pectorales ossiculorum xiv longissimorum in apice non divisorum. Ventrals ossiculorum vj. Ani ossiculorum x quorum iiij prima aculeata. [p. 47] Cauda oblonga ossiculorum xiv longiorum.

3. Maculæ nigræ in singulis pinnis et cauda.

Seba, *Thesaurus* vol. III, p. 79, Tab. 28, Num. 1.

Sequitur *Cotti* genus, cujus septem species meo in Museo asservo, ordine nunc describendas.

<sup>323</sup> respectu: ejus *Seba*.

<sup>324</sup> aliquot: aliquod *ms*.

<sup>325</sup> e *scripsi Sebam secutus*: in *ms*.

Num. 1. *Cottus squamosus, rostro bifido; pinnis pectoralibus ad caudam extensis.*

Caput ejus valde aculeatum est. Pinna dorsi ossiculis constat 24, quorum 13 aculeata sunt; pectorales ossiculis gaudent 14 longissimis, in apice non divis; ventrales ossiculis 6; ani pinna ossiculis 10, quorum 3 prima aculeo gaudent. Cauda oblonga ossiculis constat 14 longioribus. In pinnis singulis & cauda nigræ maculæ observantur.

X Genus Cotti cujus vij species novi.

Species 1. COTTUS *squamosus, rostro bifido, pinnis pectoralibus ad caudam extensis.*

Vide descriptionem supra.

Species 2. COTTUS *squamosus, varius, appendiculis ad maxillas, nares, et lineam lateralem. Scorpilus* Salviani fol. 197 ad iconem. *Scorpilus major* Gesneri fol. 44 editione Germana. — Willoughby p. 331. — Raji p. 142.

Caput totum aculeis plurimis scatet, exstantiores vero aculei sunt numero 44 circiter. Anus longe a pinna distat. Rictus magnus. Denticuli in maxillis, palato, et faucibus. Cavitas magna inter oculos et alia in medio pone oculos. Cirri, seu appendiculæ, plurimæ, breves, in maxilla inferiore, in superiore pauciores. Ad narium anterius foramen unica utrinque appendicula et præterea plurimæ exiguæ ad lineam lateralem. Ad oculos vero nulla observatur. [p. 46]<sup>326</sup> Squamæ mediocres, duræ, arcte adhærentes, oblongo-rotundæ, non tamen asperæ. Color ex nigro, rubescente, et albescente varius, sordidus et aspectu ingratus. Linea lateralis dorso vicina. Pinna dorsi maculosa, in medio humilior, ossiculorum 22 vel 23, quorum 12 aculeata et robusta, reliqua mollia. Pinnæ pectorales latæ et maculis variæ, ossiculorum 20 quorum 8 vel 9 in apice bifida sunt, reliqua indivisa. Pinnæ ventrales variæ sunt ossiculorum 6, quorum primum aculeatum, reliqua mollia. Cauda in extremo æqualis fere ossiculorum 15 longiorum. Longitudo corporis 8 unciarum et ultra.

Seba, *Thesaurus* vol. III, p. 79, Tab. 28, Num. 2.

<sup>326</sup> This page erroneously given no. 46 (for 48), this faulty numbering continuing to the end of the manuscript.

*Cottus squamosus, varius; appendiculis ad maxillas, nares & lineam lateralem.*

Ex iconis similitudine videtur *Scorpius* esse *Salviani* p. 197. *Gesnero* p. 44 edit. Germ. *Willoughby* p. 331, *Rajo* p. 142 vocatur *Scorpius major*.

Caput totum aculeis plurimis scatet, quorum 44 circiter præ reliquis magis extant. Anus a pinna longe distat. Rictus magnus denticulos in maxillis, palato & faucibus monstrat. Cavitas magna inter oculos, aliaque in medio, pone oculos, conspicitur. Cirri seu appendiculæ plurimæ, breves, in maxilla inferiore, pauciores in superiore dantur. Ad narium quoque foramen anterius unica utrinque hæret appendicula; & plurimæ exiguæ ad lineam lateralem. Nulla vero ad oculos observatur. Squamæ mediocres, duræ, arcte adhærentes, oblongo rotundæ, haud tamen asperæ, corpus tegunt. Color ex nigro, rubescente & albescente varius, sordidus & adspectu ingratus est. Linea lateralis dorso vicina. Pinna dorsi maculosa, in medio humilior, ossiculis gaudet 22 vel 23, quorum 12 aculeata & robusta, reliqua mollia sunt. Pinnæ pectorales latæ & maculis variæ ossiculis constant 20, quorum 8 vel 9 in apice bifida, reliqua indivisa sunt. Ventrals pinnæ ossicula gerunt 6, quorum primum aculeatum est, reliqua mollia & ramosa. Pinna ani varia ossiculis firmatur 9, quorum 3 prima aculeata sunt, reliqua mollia. Cauda in extremo fere æqualis ossiculis constat 15 longioribus. Longitudo corporis est 8 unciarum et ultra.

Species 3. *COTTUS maxilla inferiore longiore, cirrata, pinnis ventralibus ventri adnatis.*

Caput oblongius quam in præcedente (2) et admodum inæquale. Prominentias enim aculeatas 16 vel 17, præter orbitas oculorum admodum prominentes, utrinque continet. Corpus perpendiculariter latum, alepidotum. Os amplum. Maxilla inferior paulo longior et sursum porrecta, superior namque in apice admodum repanda est. Cirri duo majores et aliquot minores in maxilla inferiore; [p. 47] in maxilla superiore, in<sup>327</sup> lamini operculorum et linea laterali,<sup>328</sup> alii plures inveniuntur. Oculi longe<sup>329</sup> a rostro remoti et pinnæ dorsali admodum vicini, exigui, orbita magna, ossea, disjuncti. Cavitas maxima inter oculos. Denticuli in maxillis, palato, et faucibus. Color ex fusco-nigrescente varius et foedus aspectu. In dorso paulo supra lineam lateralem ductus vel foramina circiter quinque<sup>330</sup> in linea recta disposita utrinque

<sup>327</sup> in *om. ms.*, addidi *Sebam secutus*.

<sup>328</sup> et linea laterali *scripsi Sebam secutus*: in lineam lateralem *ms*.

<sup>329</sup> longe *scripsi Sebam secutus*: longi *ms*.

<sup>330</sup> quinque *om. ms*: addidi *Sebam secutus*.

conspiciuntur. Pinna dorsi longa et alta ossiculorum 24, quorum 17 aculeata et longa, reliqua mollia. Pinnæ<sup>331</sup> pectorales magnæ et variæ ossiculorum 10, ad inferiorem vero partem utrinque duo ossicula a reliquis paululum remota<sup>332</sup> et in extremo unci instar flexæ obtinent, ita ut verus<sup>333</sup> numerus ossiculorum in pinnis pectoralibus 12 sit.<sup>334</sup> Pinnæ ventrales oblongæ, interiore parte per membranam ipsi ventri adnatæ, ossiculorum 6 quorum primum breve et aculeatum, reliqua mollia. Pinna ani longa ossiculorum 13, quorum 2 prima parum aculeata et brevia, reliqua mollia et longiora. Cauda oblonga, in<sup>335</sup> extremo subrotunda, lineis duabus nigrescentibus notata ossiculorum 13 vel 14. Longitudo corporis 4 unciarum fere.

Seba, *Thesaurus* vol. III, p. 80, Tab. 28, Num. 3.

*Cottus maxilla inferiore longiore, cirrata, pinnis ventralibus ventri adnatis.*

Caput oblongius est, quam in præcedente Num. 2, & admodum inæquale; siquidem processus quidam aculeati 16 ad 17 admodum prominentes, juxta orbitas oculorum, utrinque, extent. Corpus perpendiculariter latum squamis caret. Os amplum maxillam inferiorem paulo longiorem & sursum porrectam monstrat; cum superior in extremum admodum repandum terminetur. Cirri duo majusculi, & aliquot minores, in inferiore maxilla; in superiore autem, atque in laminis operculorum & linea laterali plures alii conspiciuntur. Oculi, longe a rostro remoti, pinnæ dorsali admodum vicini, exigui, magnis in orbitis osseis hærent, & intermedia cavitate maxima a se mutuo disjunguntur. In maxillis, palato, & faucibus denticuli dantur. Color ex fusco, nigrescente & albescente varius adspectuque foedus est. In dorso, paulo supra lineam lateralem, ductus, vel foramina quinque circiter utrinque, secundum lineam rectam disposita, cernuntur. Pinna dorsi longa, alba, ossiculis constat 24, quorum 17 aculeata & longa sunt, reliqua mollia. Pinnæ pectorales magnæ & variæ ossiculis 10 constant: ad inferiorem vero earum partem præterea duo utrinque ossicula, a reliquis paululum remota, & in extremo unci instar flexa, obtinent; ut adeo verus ossiculorum in his pinnis numerus sit 12. Pinnæ ventrales, oblongæ, parte interna ope membranæ ipsi ventri adnatæ, ossicula gerunt 6, quorum primum breve & aculeatum, reliqua mollia sunt. Pinna ani longa ossiculis 13 constat, quorum 2 priora parum aculeata & brevia, reliqua mollia & longiora sunt. Cauda oblonga,

<sup>331</sup> pinnæ scripsi *Sebam secutus*: lineæ ms.

<sup>332</sup> remota scripsi *Sebam secutus*: ramosa ms.

<sup>333</sup> verus scripsi *Sebam secutus*: veri ms.

<sup>334</sup> sit scripsi *Sebam secutus*: est ms.

<sup>335</sup> in scripsi *Sebam secutus*: et ms.

in extremo subrotunda, lineis duabus nigrescentibus notata, ossiculis constat 13 ad 14. Longitudo corporis 4 fere est unciarum.

[p. 48]

Species 4. COTTUS *alepidotus, varius, maxilla inferiore longiore, multum cirrata.*

Caput plagioplateum, cute molli tectum, latius quam ipsum corpus. Corpus ipsum subteres fere est, dorsum convexum; venter latus. Os seu rictus amplissimus. Maxilla inferior paulo longior superiore et sursum nonnihil producta. Cirri plurimi, crassiusculi, in maxilla inferiore et præterea aliquot majores et minores [in]<sup>336</sup> ad angulos oris, in operculis branchiarum et ipso capite superius. Supra utrumque oculorum duo majores sunt ductus ac foramicula varia in maxillis et ipso capite. Oculi subrotundi, rostro vicini, sursum vero spectantes, [ante]<sup>337</sup> capitis cute<sup>338</sup> communi obducti. Aperturæ branchiarum angustæ; dentes crassi et breves in maxillis, palato et faucibus. Squamæ nullæ sed totum corpus cute glabra tectum.<sup>339</sup> Color ex fusco rubescente et albescente varius et sordidus. Linea lateralis ex meris foraminulis constat. Pinna dorsi longa ossiculorum 25, quorum tria prima aculeata et brevia, reliqua mollia et ramosa. Pinnæ pectorales variæ ossiculorum 23. Pinnæ ventrales antè sitæ quam pectorales, albescentes, ossiculorum 3<sup>340</sup> quorum duo prima indivisa, tertium vero admodum ra-[p. 49] -mosum. Pinna ani longa ossiculorum 19 mollium et ramosorum. Cauda varia in extremo subrotunda fere, ossiculorum 15 circiter longiorum. Totum caput supreme glabrum, sed lamina operculorum ultima in tres aculeos obtusiores et membrana vestitos desinit. Longitudo 6 ad 7 unciarum.

Seba, *Thesaurus* vol. III, pp. 80–81, Tab. 28, Num. 4,

*Cottus alepidotus, varius; maxilla inferiore longiore, cirrata.*

Caput plagioplateum, corpore ipso latius, molli cute tegitur. Corpus fere subteres est. Dorsum convexum. Venter latus. Os amplissimum. Maxilla inferior superiore paulo longior est & sursum nonnihil producta. Cirri plurimi crassiusculi in maxilla inferiore, & aliquot præterea majores minoresque ad angulos oris, in operculis branchiarum, & in ipso capitis vertice,

<sup>336</sup> in ante ad *delevi Sebam secutus.*

<sup>337</sup> ante *delevi Sebam secutus.*

<sup>338</sup> cute *addidi Sebam secutus, om. ms.*

<sup>339</sup> tectum *scripsi Sebam secutus: sectum ms.*

<sup>340</sup> 3 *scripsi Sebam secutus, legi nequit ms.*

dantur: supra utrumque tamen oculus duo sunt majores. In maxillis & ipso capite varii ductus & foramina hiant. Oculi subrotundi, rostro vicini, cute capitis communi obducti, sursum fere spectant. Aperturæ branchiarum angustæ sunt. Dentes crassi & breves in maxillis, palato, et faucibus obtinent. Corpus totum, cute glabra tectum, squamis caret. Color ex fusco, rubescente & albescente varius ac sordidus est. Linea lateralis ex meris constat foraminulis. Pinna dorsi longa ossiculis gaudet 25, quorum 3 prima aculeata & brevia, reliqua mollia & ramosa sunt. Pinnæ pectorales variæ ossicula gerunt 23. Ventræ pinnæ, magis antrorsum sitæ quam pectorales, albescunt, ossiculis constantes 3, quorum duo prima indivisa sunt, tertium vero admodum est ramosum. Pinna ani longa ossiculis 19 mollibus & ramosis gaudet. Cauda varia, in extremo fere subrotunda, ossiculis 15 circiter, longioribus, firmatur. Totum caput est superne glabrum; sed lamina operculorum ultima in tres aculeos obtusiores, & membrana vestitos, desinit. Longitudo est 6 vel 7 unciarum.

Species 5. *COTTUS alepidotus, capite polyacantho, maxilla superiore paulo longiore.*<sup>341</sup>

*Scorpæna Bellonii* p. 201 edit. Gallicæ. *Scorpæna Bellonii similis* Willughby p. 138. — Ray p. 145.

*Posthooft* et *Posthoeft* Belgis et Flandris. *Rötsimpa* et *Skrabba* Suecis. *Ulk* et *Ulka* incolis ad Fretum Danicum. *Father Lasher* quibusdam ad Cornubiam Angliæ.

Caput magnum, latum, aculeatum. Sunt autem<sup>342</sup> aculei capitis no. 16 ad 17 circiter. Cavitas inter oculos. Venter latus<sup>343</sup> et prominulus. Corpus a capite ad caudam usque gracilescit. Maxilla<sup>344</sup> superior paulo longior, rictus amplus; denticuli ut in præcedentibus. Linea lateralis in adultioribus subaspera, reliqua cutis glabra et alepidota. [p. 50] Oculi magni, cute capitis communi obducti; iris obscure rubescens. Caput supremum,<sup>345</sup> dorsum, latera, et pinnæ maculis et lituris nigrescentibus et flavicantibus varia, interdum vero rubescunt et interdum eadem partes magis albent. Venter et mandibula inferior albicantia.<sup>346</sup> Pinnæ pectorales ossiculorum 17. Ventræ ossiculorum 4 sed primum secundo adeo arcte<sup>347</sup> adhæret, ut tria tantum negligentius inspicientibus

<sup>341</sup> *Genera, Synonymia, Descriptiones*: 3. Cottus.

<sup>342</sup> autem *scripsi*: aut *ms.*

<sup>343</sup> latus *scripsi* *Sebam secutus*: latius *ms.*

<sup>344</sup> maxilla *scripsi* *Sebam secutus*: maxima *ms.*

<sup>345</sup> caput supremum *scripsi*: caput supremo *ms.*, capitis superiora *Seba.*

<sup>346</sup> albicantia: albicantiæ *ms.*, albescunt *Seba.*

<sup>347</sup> arcte *scripsi* *Sebam secutus*: ante *ms.*

conspicua sint. Pinna dorsi in medio ad basin usque incisa, ossiculorum 24, 25 vel 26 quorum 9 vel 10 anteriora simplicia et rigida, reliqua mollia, sed in apice<sup>348</sup> indivisa tamen. Pinna ani ossiculorum 11 vel 12 mollium et in apice indivisorum. Cauda in extremo æqualis fere ossiculorum 12 longiorum. Longitudo 7 unciarum major et minor.

Locus: In mari Balthico ad litora Sueciam alluentia piscis hic satis frequens est imprimis autumno. In mari Germanico, Bataviam et Flandriam alluente haud infrequens, ad Cornubiam Angliæ quoque invenitur, sed rarius.

Hic piscis omnium primo a nobilissimo Willoughbyo descriptus est, ex quo sua transcripsit clarus Rajus, sed licet bene et secundum artem a Willoughbyo describitur, eum tamen denuo descripsimus et [p. 51] ad suum genus rettulimus.

[NB. 6 lines in German—not quoted by Seba or Merriman 1941].

Seba, *Thesaurus* vol. III, p. 81, Tab. 28, Num. 5.

*Cottus alepidotus; capite polyacantho: maxilla superiore paulo longiore.*

*Scorpænæ* Bellonii p. 207, edit. Gallicæ, similis vocatur a Willoughby p. 238, et Rajo p. 145. Belgis & Flandris *Posthoofdt* & *Potshoofdt*: Suecis *Rötsimpa* & *Skrabba*: *Ulk* & *Ulka* incolis ad Fretum Danicum: *Father Lasher* quibusdam ad Cornubiam Angliæ habitantibus.

Hic piscis omnium primo a Nobilissimo Willoughby descriptus est, ex quo suum dein transcripsit clarus Rajus: at quamvis nitide & ex arte concinnata sint illa descriptio, eum tamen denuo describemus cum icone adjuncta, quam nemo hactenus Authorum dedit, ut tanto melius ad suum referri genus queat. Caput magnum est, latum, & aculeis circiter 16 vel 17 horridum. Cavitas inter oculos datur. Venter latus est & prominulus. Corpus a capite ad caudam usque gracilescit. Maxilla superior paulo longior est. Rictus amplus. Denticuli ut in præcedentibus se habent. Linea lateralis in adultioribus subaspera est; dum cutis reliqua glabra squamis caret. Oculi magni, cute capitis communi obducti, iride gaudent obscure rubescente. Capitis superiora, dorsum, latera & pinnæ maculis & lituris nigrescentibus & flavescentibus varia sunt; interdum tamen rubescunt; alias etiam magis albicant. Venter & mandibula inferior albescunt. Pinnæ pectorales ossiculis constant 17; ventrales ossiculis 4, quorum primum secundo tam arcte adhæret, ut tria tantum videantur obiter insipienti. Pinna dorsi, in medio ad basin usque incisa, ossiculis constat 24, 25 vel 26, quorum 9 vel 10

<sup>348</sup> apice scripsi *Sebam secutus*: Capite *ms.*



anteriora simplicia sint & rigida, reliqua vero mollia & in apice tamen indivisa. Ani pinna ossiculis constat 11 vel 12 mollibus & in apice non divisis. Cauda, in extremo fere æqualis, ossiculis 12 longioribus constat. Longitudo est 7 unciarum, plus vel minus. Locus natalis est in mari Balthico ad litora Sueciam alluentia, ubi autumnno præprimis satis frequens est. In mari Germanico, Bataviam et Flandriam lambente, quoque crebro reperitur; quin & ad Cornubiam Angliæ; sed rarius.

Species 6. CATAPHRACTUS *Schooneveldii*

[3 lines in German]

*Cataphractus* Schooneveldii p. 30. 31. — Jonstonii p. 77, T. 46, f. 5. 6. — Willughby p. 211. — Ray *Synopsis* p. p. 77.

[*Haec species ipsius Artedi descriptione carere videtur; Editor Thesauri Sebani tamen hanc descriptionem donavit, quam Artedi speciei 7 adscripsit*].

Num. 6. *Cataphratus* Schoneveldii p. 30, 31; *Johnstoni* p. 77, Tab XLVI, fig. 5, 6; *Willoughb.* p. 211; *Raji Synop.* p. 77.

Videmur jure Piscem hunc ad Cottorum genus referre.

Corpus ejus, ex tereti angulosum ab ano ad caudam valde gracilescit. Os non magnum, subtus situm, figuræ est semicircularis, vel lunatæ. Maxilla superior inferiore multo longior est. In inferiore autem maxilla & ad os plurimi dantur cirri. Numerosi denticuli in utraque maxilla & faucibus hærent. Caput osseum, durum, inæquale, 8 præprimis horret aculeis, quorum 4 in apice rostri, & duo utrinque ad latus capitis constituti sunt. Corpus a capite ad finem pinnæ dorsalis octogonum est, inde vero ad caudam usque sexangulare, & laminis osseis, duris, tegitur, quæ in medio prominentiam emittunt: unde corpus angulosum evadit. Pinna in dorso unica, ad basin fere usque in medio incisa, ossiculis constat 12, quorum 5 anteriora simplicia sunt & parum aculeata, reliqua mollia. Pinnæ pectorales ossiculis constant 15. Ventrals ossiculis tantum duobus. Ani pinna ossiculis sex. Cauda in extremo subrotunda ossiculis gaudet 11 vel 12. Longitudo Piscis est 4 unciarum circiter.

Species 7. MILVUS *Rondeletii*. [Two lines in German]

Corpus ex<sup>349</sup> tereti angulosum et ab ano ad caudam valde gracilescens. Os non magnum, subtus situm, figura semicirculari vel lunata.<sup>350</sup> Maxilla superior inferiore multo longior. Cirri plurimi in maxilla inferiore et ad

<sup>349</sup> ex addidi *Sebam secutus*: om. ms.

<sup>350</sup> lunata scripsi *Sebam secutus*: liniata ut vid. ms.

os. Denticuli plurimi in utraque maxilla et ad fauces. Caput osseum, durum et inæquale, 8 aculeos imprimis continet, quorum 4 in apice rostri conspiciuntur et duo utrinque ad la- [p. 52] -tera capitis. Corpus a capite ad finem pinnæ dorsalis secundæ octogonum est, inde vero ad caudam usque sexangulare laminis osseis duris contegitur, quæ in medio in prominentiam desinunt, unde corpus angulosum evadit. Pinna in dorso unica ad basin fere in medio incisa, ossiculorum 12 quorum quinque anteriora simplicia et parum aculeata sunt, reliqua 7 mollia. Pinnæ pectorales ossiculorum 15. Ventrals ex duobus ossiculis tantum constant. Pinna ani ossiculorum 6. Cauda in extremo subrotunda ossiculorum 11 ad 12. Longitudo piscis 4 unciarum circiter.

Seba, *Thesaurus* vol. III, p. 81, Tab. 28, Num. 7.

*Milvus* Ovidii Nas. *Halieut.* Poëm. versu 95.

Eodem nomine venit et *Salviano* p. 187, *Willoughb.* p. 283 & *Rajo* p. 89. *Rondeletio* autem Lib. X, cap. 1, p. 284. *Hirundo* audit. Siciliae & Melitæ incolis vocatur Falcone. Descriptionem ejus qui videre amat, eam plurimos apud Authores, præsertim vero apud Nobilissimum *Willoughbejum* inveniet.

Species 3. PLEURONECTES *glaber, macrolepidotus, oculis a sinistra capitis.*<sup>351</sup>

Rictus mediocris, denticuli acutissimi in utraque maxilla. Oculi a sinistra parte capitis, rostro admodum vicini. Squamæ amplæ, subrotundæ, albescentes, molles, et leves. Color totius corporis cano-albescens. Linea lateralis in medio corpore, recta fere. Pinnæ pectorales exiguæ, ossiculorum 10. Pinna dorsi ossiculorum 77. Pinna ani ossiculorum 58. Cauda in extremo subrotunda, ossiculorum 17. Longitudo piscis descripti 3 unciarum, 3 ad 4 linearum.

[*Huius piscis mentionem omisit Seba.*]

Species 4. ORBIS *cauda productiore, dorso lævi, ventre spinoso.*

Willoughbey p. 144. *Orbis Lagocephalus* Grey R.S. *Onus* Rayi p. 43. NB idem supina X 6.

[p. 53]

<sup>351</sup> cf. *Ichthyologia*, Part III, *Genera*: 8. PLEURONECTES; Part IV, *Synonymia*: 5. PLEURONECTES.

N. 3 't Nervolus op Tafereel 24.

OSTRACION *triangulatus figura, hexagonis parum tuberculis et quasi radiatis, aculeis duobus in imo ventre*. A.<sup>352</sup>

*Piscis triangularis, parvus, non nisi in imo ventre cornutus* Lysteri in appendice ad *Ichthyologiam* Willoughby p. 20. — Raji p. 45 N 8.

[*Huius piscis mentionem omisit Seba*].

Species 7. MILVUS *Ovidii*.

Nasonis *Halieutica* Poem. versu 95. — Salviani fol. 187 ad 188. 189. — Willoughb. p. 283. — Raji p. 89. *Hirundo* Rondeletii L. 10, c. 1, p. 284.

*Falcone* in Sicilia et Melitta.

Descriptionem apud plurimos auctores, imprimis Nobilissimi Willoughby, videre licet.

Seba, *Thesaurus* vol. III, p. 82. Num. 7. Milvus Ovidii Nas. Halieut. Poëm. versu 95

Eodem nomine venit & *Salviano* p. 1878, *Willoughb.* p. 283, & *Rajo* p. 89. *Rondeletio* autem Lib. X, cap. 1, p. 284, *Hirundo* audit. Siciliae & Melitae incolis vocatur *Falcone*. Descriptionem ejus qui videre amat, eam plurimos apud Authores, praesertim apud Nobilissimum *Willoughbbejum* inveniet.

XI. Genus *Mysti*, cujus 10 species novi.

Vocabulum *Mystus* huic generi melius quam ulli alio convenit, quum singulae species cirros ad os barbæ instar obtineant.

1<sup>o</sup> Cauda bifurca et appendice cutanea in extremo dorso.

Species 1. MYSTUS *ore subtus, cirris octo, appendice in dorso*.

[p. 54]

Caput oblongum, planiusculum. Corpus cathetoplateum et satis crasum. Venter latus. Anus medio inter pinnam ani et ventrales. Os non in apice capitis sed subtus; rictus apertus quadrato-rotundus est. Maxilla

<sup>352</sup> cf. *Ichthyologia*, Part III, *Genera*, p. 57; Part IV, *Synonymia*, 13, p. 85, 9. OSTRACION *triangulatus, tuberculis hexagonis radiatis, aculeis duobus in imo ventre*. Artedi.

superior longe ultra inferiorem prominens. Cirri octo ad os, quatuor nempe breves in maxilla inferiore et unus utrinque, reliquis longior, ad latera maxillæ superioris est et unus utrinque ad foramina narium posteriora. Nares utrinque duplices. Oculi ovales, cute capitis communi tecti. Aperturæ branchiarum angustæ apparent. Denticulorum plurimi ordines in utraque maxilla. Os denticulis asperum in antica parte palati et ad fauces duo utrinque ossicula denticulis aspera. Squamæ nullæ set totum corpus cute glabra et molli tectum. Color corporis albescens cum fusciscente mixtus. Linea lateralis recta fere. Os claviculæ magnum, durum et longum supra pinnas pectorales lateri adnatum. Pinna unica in anteriore dorsi parte, ossiculorum 8 quorum primum est aculeus robustus et crassus, a postica parte totus leviter serratus, reliqua mollia et in apice ramosa. Appendix magna, cutanea et pinniformis sed ossiculis radiatis carens ad posteriorem dorsi partem. Pinnæ pectorales ad ventrem horizontaliter fere sitæ ossiculorum 9 quorum [p. 55] primum est aculeus admodum crassus et planiusculus, a postica parte multum serratus, reliqua mollia et in apice ramosa. Pinnæ ventrales in infimo ventre longe infra pectorales, ossiculorum 6 mollium. Pinna ani e regione appendicis dorsalis, ossiculorum 15 mollium. Cauda magna, multum bifurca, forcis deductæ instar, ossiculorum 17 longiorum, præter extrema breviora. Longitudo in descripto 5 unciarum, 9 linearum. Latitudo maxima ad pinnam dorsi, unius.

Seba, *Thesaurus* vol. III, p. 82, Tab. 29, Num. 1.

Mysti genus nunc subjungo, qui equidem istud nomen potiori jure, quam ulli alteri convenire putem; quum singulæ ejus species cirros ad os, barbæ instar, obtineant. Decem vero species hujusce generis novi, quas, uti meo in Museo asservantur, nunc describam.

Sunt *Mysti* in genere vel:

I. Cauda bifurca & appendice cutacea in extrema dorso. Ad quam classem sequentes pertinent.

Num 1. *Mystus*, ore *subtus*; *cirris octo*; *appendice in dorso*.

Caput oblongum est & planiusculum. Corpus cathetoplateum & satis crassum. Venter latus. Anus medio inter ani pinnam & ventrales loco hiat. Os non in apice capitis, sed inferna parte, aperitur, apertumque quadrato-rotundum est. Maxilla superior longe ultra inferiorem prominens. Cirri octo ori adsident, quatuor nempe breves ad maxillam inferiorem, tum unus utrinque, reliquis longior, ad latera maxillæ superioris, unusque

tandem utrinque ad foramina narium posteriora. Nares utrinque duplices sunt. Oculi elliptici cute capitis communi teguntur. Aperturæ branchiarum angustæ apparent. In utraque maxilla plurimi denticulorum ordines dispositi sunt: os ipsum in antica palati parte denticulis asperum est; & ad fauces duo utrinque ossicula denticulis serrata hærent. Corpus totum, cute glabra et molli tectum, squamis caret. Color ejus est albescens cum subfusco mixtus. Linea lateralis recta fere protenditur. Os claviculæ magnum, durum, longum, supra pinnas pectorales lateri adnatum est. In anteriore dorsi parte unica datur pinna, ossiculis 8 constans, quorum 1 est aculeus robustus, crassus, a postica parte undique leviter serratus; reliqua vero mollia sunt & in apice ramosa. Appendix magna, cutacea, pinniformis, sed ossiculis radiatis carens, ad posteriorem dorsi partem extat. Pinnæ pectorales, horizontaliter fere ad ventrem collocatæ, ossiculis 9 constant, quorum 1 est aculeus admodum crassus, planiusculus, postica parte multum serratus; reliqua vero mollia sunt, & in apice ramosa. Pinnæ ventrales, in infimo ventre longe infra pectorales sitæ, ossiculis 6 mollibus constant. Ani pinna, e regione appendicis dorsalis posita, ossiculis 15 mollibus constat. Cauda magna, multum bifurca, forcicis diductæ instar, ossiculis 17 constat longioribus, exceptis saltem extremis, quæ breviora sunt. Longitudo descripti est unciarum 5 & 9 linearum: latitudo maxima ad pinnam dorsi est uncia unius.

Species 2. MYSTUS ore in apice capitis, cirris octo.

Quod ad figuram, pinnas, numerumque ossiculorum attinet, in plurimis is cum præcedente convenit, sed caput planum est et corpus respectu longius. Maxillæ fere æquales vel superior paululum longior. Cirri situ et numero ut in priore, sed triplo longiores fere. Pinnæ pectorales ossiculorum 8, aliis ut in priore specie. Cauda longa et admodum bifurca, cujus superior inferiore paulo longior apparet. Longitudo descripti 3 unciarum 5 linearum.

Seba, *Thesaurus* vol. III, p. 83, Tab. 29, Num. 2.

*Mystus ore in apice capitis; cirris octo.*

Quod ad figuram, pinnas & numerum ossiculorum attinet, maximam partem cum præcedente convenit: sed caput planius est, & corpus pro rata longius. Maxillæ fere æquales sunt, nisi quod superior tantillum ultra inferiorem producat. Cirri situ & numero, ut in priore, se habent, sed triplo fere sunt longiores. Pinnæ pectorales ossiculis constant 8, quæ, ut in priore specie, comparata sunt. Cauda longa, admodum bifurca est, ejusque segmentum superius inferiore paulo longius apparet. Longitudo descripti est 3 unciarum & 5 linearum.

Species 3. MYSTUS *argentei coloris*, *cirris sex*, *pinna ani ossiculorum octodecim*.<sup>353</sup>

Caput planissimum et a rostro ad pinnam dorsi usque testa dura et tuberculis minimis scabra munitum. Corpus, venter, oculi, dentes, cutis, pinna dorsi, ventrales, cauda etc. ut in secunda specie sese habent. [p. 56] Maxilla superior ante inferiorem prominens. Cirri, sex longi, quorum duo illi longissimi in maxilla superiore ad finem pinnarum ventralium usque extenduntur, figura autem planiusculi sunt; nares amplæ, rostro vicinæ. Oculi mediocres cute communi tecti. Iris argentei coloris. Color corporis argenteus, ad dorsum vero obscurior. Aculeus pinnæ dorsalis satis robustus et ab utraque parte levissime serratus. Pinnæ pectorales situ ut in præcedentibus, ossiculorum 11 quorum primum est aculeus robustus et crassus, ab utraque parte postica imprimis serratus, reliqua mollia et in apice ramosa. Pinna ani ossiculorum 18 mollium, exilium et numeratu difficillimi. Cauda multum bifurca ossiculorum 15 ad 16 longiorum. Longitudo descripti 4 unciarum, 1 lineæ.

Seba, *Thesaurus* vol. III, p. 83, Tab. 29, Num. 3.

*Mystus argentei coloris; cirris sex; pinna ani ossiculorum octodecim.*

Caput planiusculum est, & a rostro ad pinnam dorsi usque testa dura, tuberculis minimis scabra, munitum. Corpus, venter, oculi, dentes, cutis, dorsalis & ventrales pinnæ, cauda, &c. ut in secunda specie sese habent. Maxilla superior ultra inferiorem prominet. Cirri sex longi adsunt, quorum duo longissimi in maxilla superiore ad finem usque pinnarum ventralium extenduntur & figuræ sunt planiusculæ. Nares amplæ, rostro vicinæ sunt. Oculi mediocres, cute communi tecti, iride gaudent argentei coloris. Color corporis argenteus est, ad dorsum tamen obscurior. Aculeus pinnæ dorsalis sat robustus est, & ab utraque parte levissime serratus. Pinnæ pectorales, uti in præcedentibus sitæ, ossiculis constant 11, quorum 1 est aculeus validus, crassus, ab utraque, præprimis tamen postica, parte serratus; dum reliqua mollia sunt & in apice ramosa. Ani pinna ossiculis constat 18 mollibus, exiguis, difficulter numerandis. Cauda, multum bifurca, ossiculis constat 15 vel 16 longioribus. Longitudo descripti est 4 unciarum & lineæ unius.

<sup>353</sup> octodecim for CL duodeviginti.

Species 4. MYSTUS *cirris sex longissimis, appendice triangulari in extremo dorso.*

*Bagre piscis* Margravii *H. Bras.* l. 4, cap. 16. — Willoughby p. 139. *Bagre prima Jonstonii* p. 143. Cum hac specie in multis<sup>354</sup> convenit quidem, sed descriptio Marcgravii imperfecta et figura admodum rudis est.

In multis cum præcedente convenit sed caput minus planum et convexius est. Anus pinnis ventralibus<sup>355</sup> quam pinnæ ani multo propior. [p. 57] Cirri sex admodum longi, quorum duo longissimi in maxilla superiore ad medium caudæ usque extenduntur et teretes sunt. Nares utrinque duplices longe a se invicem remotæ. Oculi ovales; iris alba. Denticulorum plures ordines in utraque maxilla, ut et ossa denticulata ad fauces. Color inferioris corporis albescens, dorsum vero et caput canescentia. Os claviculæ magnum et longum extensum supra pinna pectorales. Pinna dorsi ossiculorum 7 quorum primum aculeus longus, robustus et acutus, a postica parte serratus denticulis deorsum versis, reliqua ossicula mollia sunt, et<sup>356</sup> in apice ramosa. Appendix cutanea triangularis fere in extremo dorso. Pinnæ pectorales ossiculorum 10 quorum primum est aculeus magnus, acutus, planus, et ab utraque parte denticulis acutis pulcre serratus, reliqua mollia sunt. Pinna ani exigua ossiculorum 13 mollium. Cauda multum bifurca ossiculorum 16 longiorum. Longitudo descripti 3 unciarum 3 linearum.

Seba, *Thesaurus* vol. III, p. 83, Tab. 29, Num. 4.

*Mystus cirris sex longissimis; appendice triangulari in extremo dorso.*

*Bagre Piscis* Marcgrav. *H. Bras. Lib. IV, cap. 16*, Willoughb. p. 139. *Bagre prima* Johnston. p. 143, cum hac quidem specie in multis convenit, sed descriptio Marcgravii imperfecta est et figura admodum rudis. Unde accuratius hunc Piscem describemus.

Multum is convenit cum præcedente num. 3; sed capite est minus plano et convexiore. Anus pinnis ventralibus multo est propior, quam ani pinnæ. Cirri sex admodum longi adsunt, quorum duo longissimi in maxilla superiore, teretes, ad medium usque caudæ extenduntur. Nares, utrinque duplices, longe a se invicem remotæ sunt. Oculi elliptici Iride alba gaudent. Denticulorum plures ordines utraque in maxilla, ad fauces vero ossa denticulata dantur. Color corporis inferioris albescens est, dum dorsum & caput canescunt. Os claviculæ magnum, longe extenditur supra pinna pecto-

<sup>354</sup> multis *scripsi* *Sebam secutus*: multum *ms.*

<sup>355</sup> pinnis ventralibus *scripsi* *Sebam secutus*: pinnæ ventrales *ms.*

<sup>356</sup> et: ut *ms.*

rales. Pinna dorsi ossiculis constat 7, quorum primum est aculeus longus, robustus, acutus, a postica parte serratus denticulis deorsum recurvatis: reliqua ossicula mollia sunt & in apice ramosa. Appendix cutacea in extremo fere dorso extat. Pinnæ pectorales ossiculis 10 constant, quorum 1 est aculeus magnus, acutus, planus, & ab utraque parte acuminatis denticulis pulchre serratus: reliqua mollia sunt. Ani pinna exigua ossiculis gaudet 13 mollibus. Cauda, multum bifurca, ossiculis constat 16 longioribus. Longitudo descripti est 3 unciarum & 3 linearum.

Species 5. MYSTUS *cirris sex longissimis, appendice dorsi a pinna ad caudam extensa.*

Testa capitis ad initium pinnæ dorsalis non pertingit ut in proxime præcedentibus. Corpus, venter, os, pinnæ ventrales etc. ut in tertia specie, sed maxillæ fere æquales vel superior paulo longior. [p. 57] Situs et longitudo cirrorum ut in præcedente (4) fere se habent. Denticuli ut in præcedente. Color corporis flavescens. Pinnæ albescunt. Os claviculæ minus quam in præcedentibus. Pinna dorsi ossiculorum 7 quorum primum est aculeus teres, non serratus et multo minor ac gracilior quam in præcedentibus, reliqua mollia et in apice ramosa. Appendix dorsi longa et satis alta,<sup>357</sup> a pinna dorsali ad caudam fere extenditur. Pinnæ pectorales ossiculorum 10 ut in præcedente (4) comparatorum, sed aculei primi denticuli minores sunt.<sup>358</sup> Pinna ani ossiculorum 12 vel 13 mollium. Cauda bifurca ossiculorum 17 longiorum. Inferior caudæ pars superiore major est. Longitudo descripti 4 unciarum, 9 linearum.

Seba, *Thesaurus* vol. III, p. 84, Tab. 29, Num. 5.

*Mystus cirris sex longissimis; appendice dorsi a pinna ani ad caudam extensa.*

Testa capitis nequaquam, uti in proxime prægressis, ad initium usque pinnæ dorsalis pertingit. Corpus, venter, os, pinnæ ventrales, &c. uti in tertia specie se habent: sed maxillæ fere sunt æquales, vel superior saltem paulo longior inferiore. Cirrorum situs & longitudo eadem est, ac in præcedente num. 4. Ita & denticulis sese habent. Corpus flavescit; pinnæ vero albescunt. Os claviculæ, quam in prioribus, minus est. Pinna dorsi ossiculis constat 7, quorum primum est aculeus teres, non serratus, multoque minor & gracilior, quam in præcedentibus: reliqua mollia sunt & in apice ramosa. Appendix dorsi longa, & satis alta, a pinna dorsali ad caudam fere usque porrigitur. Pinnæ pectorales ossiculis constant 10, ut in præcedente num. 4,

<sup>357</sup> longa et satis alta *scripsi Sebam secutus*; et longa satis alba *ms.*

<sup>358</sup> aculei primi denticuli minores sunt *scripsi*: denticuli aculei primi minores sunt *ms.*, nisi quod aculei primi dentes sint minores *Seba*.



comparatis, nisi quod aculei primi dentes sint minores. Ani pinna ossiculis constat 12 vel 13 mollibus. Cauda bifurca ossiculis 17 longioribus gaudet: inferius autem caudæ segmentum superiore majus est. Longitudo descripti 4 est unciarum, & linearum 9.

Species 6. MYSTUS *maculosus*, *cirris sex longis*, *capite longo*, *plano*.

*Bagre quinta species* Marcgravii lib. 4, cap. 16. — Willoughby p. 148.

Ad hanc speciem quodammodo accedit, sed descriptio Marcgravii omnino imperfecta est.

Caput longum, latum et admodum planum. Testa subdura tegitur. Corpus reliquum subteres est, tunc dorsum et venter multum convexa. Os admodum amplum. Maxilla superior inferiore longior, ambæ in ambitu semicirculum describunt. [p. 59] Cirri sex longi et filiformes, quorum quatuor longiores ad pinnas ventrales pertingunt. Nares utrinque duplices, rostro vicinæ. Oculi exigui, ovales, cute tecti. Aperturæ branchiarum amplæ. Ossa denticulata in maxillis, palato et faucibus. Cutis glabra et alepidota. Inferior pars corporis albescit. Caput supremum, dorsum et superior laterum pars nigricantia sunt. Maculæ aliquot nigræ sed raræ in lateribus supra lineam. Appendix dorsi, pinna ani, cauda etc. maculis nigris varia sunt. Pinna dorsi exigua, ossiculorum 7 quorum primum aculeatum et ferme teres, sed tamen ab utraque parte leviter serratum, reliqua mollia. Appendix cutanea exigua in extremo dorso. Pinnæ pectorales ossiculorum 11, quorum primum est aculeus longus utrinque serratus, inprimis a postica parte. Pinnæ ventrales ossiculorum 6 mollium. Pinna ani ossiculorum 13 mollium. Cauda longa, multum bifurca ossiculorum 17 longiorum. Os claviculæ magnum, supra pinnas pectorales extensum. Longitudo descripti 7 unciarum.

Seba, *Thesaurus* vol. III, p. 84, Tab. 29, Num. 6.

Num. 6. *Mystus maculosus*; *cirris sex longis*: *capite longo*, *plano*.

*Bagre quinta species* Marcgrav. *Lib. IV, cap. 16*, Willoughb. *p. 140*, ad hunc Piscem quodammodo accedit; sed quia Marcgravii descriptio admodum manca est, eum denuo describemus.

Caput longum, latum, admodum planum, testa subdura tegitur. Corpus reliquum subteres est, hincque dorsum cum ventre valde convexum. Os admodum amplum est. Maxilla superior inferiore paulo longior; utraque autem in ambitu simicirculum describit. Cirri 6 longi & filiformes adsunt, quorum quatuor longiores ad pinnas usque ventrales pertingunt. Nares, utrinque duplices, rostro vicinæ sunt. Oculi exigui, elliptici, cute teguntur.

Branchiæ amplum patulæ sunt. Ossa denticulata in maxillis, palato & faucibus dantur. Cutis glabra squamis caret. Pars corporis ima albescit: caput vero supremum, dorsum, & superior laterum pars nigrescunt; maculis præterea aliquot nigris latera supra lineam notata sunt. Appendix dorsi, ani pinna, cauda, &c. maculis nigris varia sunt. Pinna dorsi exigua ossiculis constat 7, quorum primum aculeatum & ferme teres, at utrinque tamen leviter serratum est: reliqua mollia. In extremo dorso exigua datur appendix cutacea. Pinnæ pectorales ossiculis constant 11, quorum primum est aculeus longus, utrinque serratus, inprimis a postica parte. Pinnæ ventrales ossiculis constant 6 mollibus. Ani pinna 13 itidem mollibus. Cauda longa multum bifurca, ossiculis constat 17 longioribus. Os claviculæ, magnum, supra pinnas pectorales extensum est. Longitudo descripti 7 uncias æquat.

2° Mysti cauda in extremo vel æquali vel levissime divisa, quorum quidam appendice dorsali carent, quidam habent.

[p. 60]

Species 7. MYSTUS *cirris sex, cauda in extremo æquali.*

Caput crassum, plagioplateum, superne convexum et testa durissima, ad pinnam dorsi extensa, munitum. Corpus breve et crassum, dorsum convexum, venter latus. Os mediocre,<sup>359</sup> maxillæ fere æquales vel inferior putillum prominentior. Cirri 6 quorum 4 longiores ad finem pinnarum pectoralium pertingent. Oculi exigui, magna distantia inter sese invicem, cute communi tecti. Iris cærulescens. Aperturæ branchiarum admodum angustæ. Ossa denticulata in maxillis et faucibus. Color cinereus cum maculis nigrescentibus. Os claviculæ super pinnas pectorales procurrat, in acutum desinit. Pinna dorsi capiti admodum vicina, ossiculorum 7 quorum primum est aculeus crassus et rectus a postica parte denticulis serratus, ab antica levis, qui elevatus vix ullo modo deprimi potest. Appendix cutacea, exigua, in extremo dorso. Pinnæ pectorales ossiculorum 9 quorum primum maximum, aculeatum, et robustum est ac utraque parte dentibus serratum, reliqua mollia et exigua. Aculeus hic directe a lateribus protenditur et nullo modo deprimi potest. Pinnæ ventrales ossiculorum 6 mollium. Pinna ani oblonga, ossiculorum 23 vel 24, mollium et exilium. Cauda fere quadrata, in extremo æqualis, ossiculorum 19 longiorum. Longitudo descripti 3 unciarum, 3 linearum.

Seba, *Thesaurus* vol. III, p. 85, Tab. 29, Num. 7

<sup>359</sup> mediocre *scripsi*: *mediocris ms.*

Sequuntur II. Mysti cauda in extremo vel æquali, vel levissime bifida, quorum alii appendice dorsali gaudent, alii carent.

Num. 7. *Mystus cirri sex; cauda in extremo æquali.*

Caput crassum, plagioplateum, superne convexum, testa durissima, ad pinnam dorsi usque extensa, munitur. Corpus breve & crassum est: dorsum convexum: venter latus: os mediocre: maxillæ fere æquales sunt, vel inferior superiore paulum prominentior. Cirri 6 adsunt, quorum 4 longiores ad finem pinnarum pectoralium porriguntur. Oculi exigui, longe a se invicem distantes, cute communi tecti, iride gaudent cærulescente. Aperturæ branchiarum admodum angustæ sunt. Ossa denticulata in maxillis & faucibus extant. Corpus cinerei est coloris, nigrescentibus maculis variegatum. Os claviculæ, longe supra pinnas pectorales excurrens, in acumen desinit. Pinna dorsi, capiti valde vicina, ossiculis constat 7, quorum primum est aculeus crassus, rectus, postica parte denticulis serratus, antica lævis, deprimi nescius, dum elevatus est. Appendix in dorso extremo cutacea, exigua, hæret. Pinnæ pectorales ossiculis constant 9, quorum primum maximum, aculeatum, robustum, & utrinque dentibus serratum est, reliqua mollia & exigua: aculeus hic directe a lateribus protenditur, nec ullo modo deprimi potest. Pinnæ ventrales ossiculis 6 mollibus constant. Ani pinna, oblonga, ossiculis gaudet 23 vel 24 mollibus, exilibus. Cauda fere quadrata, in extremo æqualis, ossiculis constat 19 longioribus. Longitudo descripti est 3 unciarum & 3 linearum.

[p. 61]

Species 8. *MYSTUS cirris duobus exilibus, pinnis pectoralibus aculeo destitutis.*

Caput latum et satis planum. Corpus, dorsum, venter, dentes, cutis, color, appendix dorsi etc. ut in præcedente specie sese habent, sed os admodum amplum. Maxilla superior inferiore paulo longior, ambæ in ambitu semicirculares. Cirri duo tantum in toto capite iique ad latera maxillæ superioris, unus nempe utrinque, brevis, seu 2 circiter linearum mathematicarum, gracilis et parum conspicuus, nam a postica parte foveam quasi habet, in qua sese obsconditur; in maxilla inferiore nulli sunt. Oculi longissime a se invicem distantes cute communi tecti. Denticulorum plures ordines in utraque maxilla ut et ossicula denticulata ad fauces. Maculæ nigricantes majores et plures quam in præcedente. Os claviculæ magnum sed non longum. Pinna dorsi capite admodum vicina, ossiculorum 7 quorum primum non aculeatum est, ut in præcedentibus, sed fragile et submolle, reliqua adhuc molliora. Pinnæ pectorales nigrescentes, ossiculorum 14 vel 15 gracilium quorum

primum simplex quidem est sed non aculeatum, a posteriore parte tamen levissime serratum est, quod oculatus inspector vel nudis oculis vel cultri acie observabit, reliqua molliora et gracilia.

[p. 62]

Pinnæ ventrales nigrescentes ossiculorum 7 præter primum in apice divisorum. Pinna ani oblonga ossiculorum 38 vel 39 mollium et gracilium. Cauda in extremo parum bifurca ossiculorum 19 longiorum. Longitudo descripti 4 unciarum fere.

Seba, *Thesaurus* vol. III, p. 85, Tab. 29, Num. 8.

*Mystus cirris duobus exilibus; pinnis pectoralibus aculeo destitutis.*

Caput latum est & satis planum. Corpus, dorsum, venter, dentes, cutis, color, appendix dorsi, &c. ut in præcedente se habent: os tamen admodum amplum est. Maxilla superior inferiore paulo longior: ambæ vero in ambitu semicirculares sunt. Cirri duo tantum in universo capite, iique ad latera maxillæ superioris utrinque siti, breves, circiter 2 lineas æquantes, graciles, adsunt, qui tamen parum conspiciuntur; quum a postica parte fovea sit insculpta, in qua sæpe absconduntur. Maxilla inferior cirris caret. Oculi longissime a se invicem distantes cute communi teguntur. In utraque maxilla plures observantur denticulorum ordines, & ad fauces ossicula denticulata. Maculæ nigricantes hic majores sunt & plures, quam in præcedente. Os claviculæ magnum, at non longum est. Dorsi pinna, capiti admodum vicina, ossiculis constat 7, quorum primum non, ut in prioribus, aculeatum est, sed fragile & submolle; reliqua adhuc molliora. Pinnæ pectorales, nigrescentes, ossiculis constant 14 vel 15 gracilibus, quorum primum simplex est, non aculeatum, a postica tamen parte levissime serratum, quod ab oculatione nudis oculis, cæteroquin cultri acie observari potest: reliqua molliora sunt & gracilia. Pinnæ ventrales nigrescentes ossiculis 7 constant, in apice divisæ, primo excepto. Pinna ani oblonga ossiculis constat 38 vel 39 mollium & gracilibus. Cauda, in extremo parum bifurca, ossiculis 19 longioribus gaudet. Longitudo descripti 4 fere est unciarum.

Species 9. MYSTUS, *cirris sex; appendice dorsi carens.*

Caput magnum, latum et planiusculum, testa dura munitum. Corpus a pinna dorsi sensim gracilescens,<sup>360</sup> longum, gracile et ferme teres. Venter latus, planiusculus. Os respectu capitis non magnum. Maxilla superior inferiore multo longior. Cirri 6, quorum duo superiores in maxilla

<sup>360</sup> gracilescens *scripsi Sebam secutus*: graciliens ms.

superiore reliquis longiores, ad pectorales vix pertingunt. Nares utrinque duplices. Oculi admodum exigui, sursum fere spectantes, cute communi tecti. Iris cærulescens. Aperturæ branchiarum admodum angustæ, ante basin pinnarum pectoralium sitæ. Ossa denticulata in maxillis et faucibus. Cutis levis et alepidota. Color ex cano et nigrescente mixtus. Linea lateralis recta fere. Os claviculæ longe supra pinna pectorales extensum, sed ob cutem, qua tegitur, parum in conspectum venit. Pinna dorsi exigua, triangularis, ossiculorum 5 quorum primum simplex est, sed non aculeatum nec serratum, reliqua mollia et bifurca. [p. 63] Appendix cutanea nulla in extremo dorso sed eminentia, seu carina exigua, humilis, acuta, dura, et fere ossea a pinna dorsi ad caudam extenditur. Pinnæ pectorales ossiculorum 8, quorum primum est os aculeatum, supra omnem modum robustum, crassum, planum, et ab utraque parte dentibus magnis serratum, reliqua mollia et in apice bifida. Pinnæ ventrales ossiculorum 6 mollium. Pinna ani longissima, ad ipsam caudam extensa, ossiculorum 54 vel 55 mollium sed indivisorum. Cauda exigua, oblonga, eo modo bifurca ut<sup>361</sup> ossiculum utrinque extremum in prominentiam longam desinat; ossicula 8 vel 9 continet. Longitudo descripti 9 unciarum, 6 linearum.

[Two lines of comments in German].

Seba, *Thesaurus* vol. III, p. 86, Tab. 29, Num. 9.

*Mystus cirris sex; appendice dorsi carens.*

Caput magnum, latum, planiusculum, testa dura munitur. Corpus a pinna dorsi sensim gracilescens, longum, gracile & ferme teres est. Venter latus, planiusculus. Os ratione capitis non magnum. Maxilla superior inferiore multo longior. Cirri sex adsunt, quorum duo superiores in maxilla superiore, reliquis longiores, ad pinna pectorales fere pertingunt. Nares utrinque duplices sunt. Oculi admodum minuti, sursum fere spectantes, cute communi teguntur, iride cærulescente præditi. Aperturæ branchiarum, admodum angustæ, ante basin pinnarum pectoralium sitæ sunt. Ossa in maxillis & faucibus denticulata hærent. Cutis lævis squamis caret, estque coloris ex cano & nigrescente mixti. Linea lateralis recta fere decurrit. Os claviculæ longe supra pinna pectorales extensum est, sed ob cutem, qua tegitur, parum in conspectum venit. Pinna dorsi exigua, triangularis, ossiculis constat 5, quorum primum simplex est, sed non aculeatum nec serratum; reliqua mollia & bifurca. In dorso extremo nulla datur appendix cutacea, sed eminentia, seu carina exigua, humilis, acuta, dura, ferre ossea, a pinna dorsi ad caudam extenditur.

<sup>361</sup> ut scripsi *Sebam secutus*: et *ms.*

Pinnæ pectorales ossiculis 8 constant, quorum primum est os aculeatum, robustissimum, crassum, planum, magnis utrinque dentibus serratum; reliqua mollia sunt & in apice bifida. Pinnæ ventrales ossiculis 6 mollibus constant. Pinna ani longissima, ad ipsam caudam extensa, ossiculis constat 54 vel 55 mollibus, sed indivisis. Cauda exigua, oblonga, eo modo bifurcata est, ut ossiculum utrinque extremum in longam desinat prominentiam: constat vero ossiculis 9. Longitudo descripti est 9 unciarum & 5 vel 6 linearum.

[p. 63]

Species 10. MYSTUS *cirris octo, appendice dorsi carens*.

In pluribus cum præcedente convenit, sed caput planum apparet et maxilla superior longius ante inferiorem prominet. Os quoque amplius. Cirri octo, nempe quatuor in utraque maxilla, mediis vere illis brevibus prior species caret. Oculi adeo exiles ut parum in conspectum veniant.<sup>362</sup> Color totius corporis cineraceus vel albescens. Cauda ut in præcedente, sed ossiculum utrinque extremum multo brevius est et in prominentiam brevem producitur, hinc minus multo bifurca apparet. Longitudo descripti 7 unciarum, 6 vel 7 linearum.

Seba, *Thesaurus* vol. III, p. 86, Tab. 29, Num. 10.

*Mystus cirris octo; appendice dorsi carens*.

In plurimis cum præcedente convenit; sed caput planius apparet, & maxilla superior longius ultra inferiorem prominet. Os quoque est amplius. Cirri octo adsunt, quatuor nimirum in utraque maxilla; ut adeo binos gerat breviores, medios, qui in priore specie desunt. Oculi adeo exiles sunt, ut parum in conspectum veniant. Color corporis totius cineraceus est vel albescens. Cauda, ut in præcedente, comparata est; sed ossiculum utrinque extremum multo est brevius & in prominentiam brevem producitur: unde multo minor heic apparet bifurcatio. Longitudo descripti est 7 unciarum & 6 vel 7 linearum.

[p. 64]

XII. Genus *Plecostomi* cujus 4 species novi.

N I I

Species 1. PLECOSTOMUS *cirris duobus, cauda bifurca*.

1. Caput anterius plagioplateum et subtus planum. Ambitus corporis subrotundus sed venter planus.

<sup>362</sup> veniant *scripsi Sebam secutus*: veniunt *ms*.

2. Os non in apice capitis sed subtus, ut in Squalis et Acipensere, ad inferiorem partem, plicam seu fimbriam semicircularem habens. Introitus oris angustus.
3. Cirri duo, satis breves, unus scilicet utrinque ad latera oris.
4. Aperturæ branchiarum ad pinnas pectorales, admodum exiguæ et angustæ.
5. Laminæ osseæ, duræ et spinulis exasperatæ, in toto corpore præter ventrem.
6. Pinnæ pectorales ossiculorum septem quorum primum admodum robustum, crassum et aculeatum, reliqua mollia.
7. Pinnæ ventrales in medio ventre, ossiculorum 6 quorum primum simplex et robustum, reliqua ramosa.
8. Pinnæ in dorso duæ quarum prior satis alta, ossiculorum 8 quorum primum simplex, reliqua mollia. Secunda admodum exigua versus caudam, ex unico aculeo brevi, membrana dorso adjuncto, constat.
9. Pinna ani exigua ossiculorum 5.
10. Cauda longa et multum bifurca.
11. Longitudo corporis 3 unciarum, 8 linearum; latitudo maxima [3 unciarum,]<sup>363</sup> 8 linearum.

Seba, *Thesaurus* vol. III, p. 87, Tab. 29, Num. 11.

*Plecostomi* genus sequitur, cujus 4 novi species ordine nunc describendas.

Num. 11. *Plecostomus cirris duobus; cauda bifurca.*

Caput anterius plagioplateum & subtus planum est: ambitus corporis subrotundus; at venter planus. Os non in apice capitis, sed subtus, ut in Squalis & Acipensere, est, habetque plicam seu fimbriam semicircularem in parte inferiore, atque hiatus angustum. Cirri duo satis breves, utrinque unus ad latera oris, dantur. Aperturæ branchiarum ad pinnas pectorales admodum exiguæ sunt & angustæ. Laminæ osseæ, dura, spinulis asperæ, totum corpus, excepto ventre, tegunt. Pinnæ pectorales ossiculis constant 7, quorum primum admodum robustum, crassum & aculeatum est; reliqua mollia. Pinnæ ventrales, in medio ventre sitæ, ossiculis constant 6, quorum primum simplex & robustum est; reliqua ramosa. Pinnæ in dorso duæ sunt, quarum prior, satis alta, ossiculis gaudet 8, inter quæ primum simplex est;

<sup>363</sup> 3 unciarum *delevi Sebam secutus.*

reliqua mollia: posterior, admodum exigua, versus caudam sita, unico constat aculeo brevi, qui ope membranæ dorso adjungitur. Pinna ani exigua ossiculis 5 constat. Cauda longa est, & multum bifurca. Longitudo corporis est 3 unciarum & 8 linearum: latitudo maxima 8 fere linearum.

[p. 65]

N 12

Species 2. PLECOSTOMUS *cirris plurimis, aculeis unguiformibus ad*<sup>364</sup>*aperturas branchiarum.*

1. Corpus, os, aperturæ branchiarum, color, laminæ corporis osseæ, situs et numerus ossiculorum in pinnis etc. ut in prima specie, sed
2. Cirri plurimi, 22 circiter, in maxilla superiore.
3. Aculei plurimi duri et unguiformes utrinque ante aperturas branchiarum, quibus prima species omnino caret.
4. Cauda multo brevior, vix bifurca.
5. Longitudo in descripto 3 unciaum, 9 linearum.

Seba, *Thesaurus* vol. III, p. 87, Tab. 29, Num. 12.

Num. 12. *Plecostomus cirris plurimis; aculeis unguiformibus ad aperturas branchiarum.*

Corpus, os, aperturæ branchiarum, color, laminæ corporis osseæ, situs & numerus ossiculorum in pinnis &c. uti in prima specie comparata sunt; sed cirri plurimi, circiter 22, in maxilla superiore dantur. Quin & aculei plurimi, duri, unguiformes, utrinque ante aperturas branchiarum extant, quibus equidem prior species caret. Cauda multo est brevior, vix bifurca. Longitudo descripti est 3 unciarum 9 linearum.

N 13

Species 3. PLECOSTOMUS *cirris quatuor longis.*

*Tamaota* Marcgravii lib. 4, ch. 5. — Jonstonii p. 126, Tab. 29, Fig. 10.

Caput latum horisontaliter et planum fere. Corpus reliquum cathetoplateum sed magis perpendiculariter latum. Os subtus fere, transversim incisum, angustum, edentulum. Cirri quatuor longi, duo nempe utrinque, ad latera vel angulos oris, uncia longiores in adultis. Oculi supra modum exigui et sphaerici. Aperturæ branchiarum angustæ. Color corporis

<sup>364</sup> ad scripsi *Sebam secutus*: in *ms.*



cano-nigrescens. Squamæ vel potius laminæ osseæ, duræ, oblongæ et transversim sitæ in toto corpore, [p. 66] excepto medio ventre, quadruplici ordine dispositæ sunt et in mediis lateribus<sup>365</sup> coeunt, in dorso et ventre non item. Ordo singulas laminas 27 ad 28 continet. In ambitu hæ laminæ uncinulis quasi asperæ sunt. Pinnæ in dorso duæ, quarum prior non longe a capite, ossiculorum 9. Posterior in extremo versus caudam, ex aculeo unico constat. Pinnæ pectorales ossiculorum 8, ut in præcedentibus. Pinnæ ventrales omnino ut in præcedentibus (12). Pinna ani in extremo corpore, subtus, longissime ab ano dissita, ossiculorum 7. Cauda in extremo subrotunda, ossiculorum 14. Longitudo corporis 5 unciarum, minor et major. Locus: fluvii in Brasilia, et Surinamiæ Americæ.

Seba, *Thesaurus* vol. III, p. 87, Tab. 29, Num. 13.

Est hic *Tamoata* Marcgrav. *Lib. IV, c. 5*; Johnston *p. 126, Tab. XXXII, fig. 10.*

Num. 13. *Plecostomus cirris quatuor longis.*

Caput ejus horizontaliter latum & fere planum est: corpus reliquum cathoplateum, seu magis perpendiculariter latum. Os subtus fere situm, transversim incisum, angustum, edentulum. Cirri quatuor longi, duo nempe utrinque ad angulos vel latera oris, in adultis uncia longiores, conspiciuntur. Oculi supra modum exigui & sphærici sunt. Aperturæ branchiarum angustæ. Color corporis ex cano nigrescit. Totum corpus, excepto medio ventre, squamis, vel potius laminis osseis, duris, oblongis, transversim sitis, tegitur, quæ quidem ordine quadruplici digestæ sunt, & in mediis lateribus coeunt; in dorso tamen & ventre non item. Ordo quilibet laminas continet 27 vel 28; suntque laminæ hæ in ambitu quasi uncinulis asperæ. Pinnæ in dorso duæ sunt, quarum prior non procul a capite sita ossiculis constat 9; posterior, versus caudam collocata, ex aculeo unico constat. Pinnæ pectorales ossiculis constant 8, ut in præcedentibus. Ventrales itidem, ut in prioribus, sese habent. Ani pinna, in extremo corpore subtus sita, longissime ab ano distans, ossiculis constat 7. Cauda, in extremo subrotunda, ossiculis constat 14. Longitudo corporis est 5 unciarum, minor vel major. Locus natalis sunt fluvii in Brasilia, et Surinamo Americæ.

N 14

Species 4. *PLECOSTOMUS corpore aculeato, ore cirrato, dorso monopterygio.*

Caput et totum corpus plagioplatea. Os non in apice capitis sed subtus, cirris undique præditum. Dentes aliquot oblongi et flexiles in antica et

<sup>365</sup> lateribus *scripsi Sebam secutus: latoralibus ms.*

postica oris parte, ut et ossicula aspera ad fauces. Oculi mediocres in suprema capitis parte. Aperturæ branchiarum exiguæ admodum. Color corporis obscure albescens. Laminæ osseæ, durissimæ, in toto corpore, quadruplici vel pluribus ordinibus dispositæ. Ordo dorsalis et ventralis glabri et plani sunt, laterales vero medio in aculeos aliquot retroversos et acutissimos desinunt, unde piscis in antica parte angulosus evadit. Caput laminis duris, fere levibus, tectum.

[\* Pinnæ pectorales latæ ossiculorum 19 vel 20. Ventrals in lineam singularem et quodam]<sup>366</sup>

[p. 67]

Pinna in dorso unica ossiculorum 8: posterior ad caudam in hac specie deest. Pectorales ossiculorum 7. Ventrals ossiculorum 6 quorum primum omnium longissimum. Ani longe ab ano sita ossiculorum 6 quorum primum indivisum. Cauda bifurca, ossiculorum 12 longiorum quorum supremum in filum quasi, 4 fere uncias longum, in adultis extenditur. Longitudo a rostro ad extremitatem ossiculi filiformis in cauda 12 unciarum fere.

Seba, *Thesaurus* vol. III, p. 87, Tab. 29, Num. 14.

Num. 14. *Plecostomus corpore aculeato; ore cirrato: dorso monopterygio.*

Caput & corpus universum plagioplatea sunt. Os non in apice capite, sed subtus situm, cirris plurimis ubique pollet. Oblongi quidam dentes, flexiles in antica & postica oris parte, ut & ossicula aspera ad fauces conspiciuntur. Oculi mediocres in suprema capitis parte collocantur. Aperturæ branchiarum admodum exiguæ sunt. Corpus obscure albescit, laminisque tegitur osseis, durissimis, quadruplices vel plures in ordines dispositis: ita, ut ordo dorsalis & ventralis glabri & plani sint; laterales vero in medio aculeos aliquot retroversos, acutissimos, porrigant: unde piscis in antica parte angulosus evadit. Caput ipsum laminis duris, at fere lævibus, munitur. Pinna in dorso unica ossiculis constat 8: neque datur pinna posterior in hac specie. Pinnæ pectorales ossiculis constat 7. Ventrals ossiculis sex, quorum primum omnium est longissimum. Ani pinna, longe ab ano dissita, ossiculis gaudet 6, quorum primum indivisum est. Cauda bifurca ossiculis constat 12 longioribus, quorum supremum in filum quasi, quatuor fere uncias in adultis longum, extenditur. Longitudo a rostro ad extremum usque ossiculi filiformis in cauda est fere 12 unciarum.

<sup>366</sup> *Hæc verba ad textum paginæ 68 pertinent, quem vide.*

XIII Genus *Gobii* cuius 3 species novi.

N 15

Species 1. GOBIUS *ex*<sup>367</sup> *nigricante varius, pinna dorsi secunda ossiculorum quatuordecim.*<sup>368</sup>

*Synonymia Auctorum.*

Ὁ Χωπιός Aristotelis *H. anim.* l. 2 c. 17 et 6 c. 13, l. 8 c. 2, 13, 19 et l. 9 c. 2. 37. — Athenei *Deipn.* l. 7. p. 309. Oppiani l. 1 p. 7. l. 2 p. 46.

*Gobius* Ovid. Nason. *Hal.* ver. 128. — Martialis *Epigr.* l. 13.88.

*Gobio* Columella l. 8 c. 17. — Juvenalis *Satyr.* 11.4. — Plinii *H. N.* l. 9 c. 57.

*Gobio vel Gobius* p. Jovii *de Rom. pis.* c. 22 p. 90.

*Gobius Marinus* Salviani f. 214. 6.

*Gobio niger* Rondeletii l. 6 c. 17 p. 200 [p. 68] — Gesneri p. 395. 469.

*Gobius niger* Gesneri fol. 6 b edit. Germ. — Aldrovandi l. 1 c. 20 p. 97. — Willoughby p. 206.

*Gobio vel Gobius niger* Schoneveldii p. 36.

*Gobius marinus niger* Raji p. 76.

*Gobius, Gobio, et Cobio marinus* Charletoni p. 135.

*Go vel Gogel* Venetis, *Zolero* Liguribus.

*Rock Fisch* Pensantiæ in Cornubia Angliæ; item *Sea Gudgeon.*

*Descriptio.*

Caput ambitu fere subrotundum, reliquum corpus perpendiculariter latum. Os amplum. Maxillæ æquales labiis donatæ. Ductus aliquot seu foraminula, in capite præter nares. Oculi sibi multi vicini, cuti capitis communi tecti. Dentium plures ordines in utraque maxilla et præterea ossa denticulata ad fauces. Squamæ mediocres, subrotundæ, asperæ. Color nigrescens sed ductibus quibusdam varius. Pinnæ in dorso duæ, prior ossiculorum 6 rigidiusculorum, secunda altior et longior ossiculorum 14 vel 15 mollium et in apice ramosorum.

<sup>367</sup> *ex add. Ichthyologiam et Sebam secutus, om. ms.*

<sup>368</sup> *cf. Ichthyologia, Part III Genera, p. 28; Part IV Synonymia, p. 46.*

Nunc sequitur \*p. 66: Pinnæ pectorales latæ ossiculorum 19 vel 20. Ventrals in unicam singularem quodam

[*textus resumitur p. 68:*] modo infundibiliformem concretæ sunt, ossiculorum 12 quorum duo anteriora brevia, reliqua ordine longiora et admodum ramosa. Pinna ani ossiculorum 13 vel 14 mollium et ramosorum. Cauda maculata, in extremo subrotunda.<sup>369</sup> [p. 69] Longitudo descripti 4 unciarum, 5 vel 6 linearum.

Seba, *Thesaurus* vol. III, p. 88, Tab. 29, Num. 15.<sup>370</sup>

Nunc aliquot species Piscis dicti Gobii exponemus

Num. 15. *Gobius ex nigricante varius; pinna dorsi secunda ossiculorum 14 constante.*

Caput in ambitu fere subrotundum est: reliquum corpus perpendiculariter latum: os amplum: maxillæ æquales labiis gaudent. In capite, præter nares, ductus aliquot seu foraminula hiant. Oculi, inter ossa se multum vicini, cute capitis communi teguntur. Dentium plures ordines utraque in maxilla, & insuper ossa denticulata ad fauces observantur. Squamæ mediocres, subrotundæ, asperæ sunt. Color nigrescens, sed ductibus quibusdam varius est. Pinnæ in dorso duæ sunt, quarum prior ossiculis sex constat rigidiusculis; altera altior & longior ossiculis gaudet 14 vel 15 mollibus & in apice ramosis. Pinnæ pectorales latæ ossiculis constant 19 vel 20. Pinnæ ventrales in unicam, singularem, & quodammodo infundibiliformem concretæ sunt, constantque ossiculis 12, quorum duo anteriora brevia, reliqua ordine longiora & admodum ramosa sunt. Pinna ani ossiculis constat 13 vel 14 mollibus & ramosis. Cauda, maculosa, in extremo subrotunda est. Longitudo descripti est unciarum 4, & 5 vel 6 linearum.

No 16

Species 2. GOBIUS *albescens*, ossiculis pinnæ<sup>371</sup> dorsalis præaltis et setiformibus.

*Gobius tertius*, Jozo Romæ Salviani, forte *Gobius albus Rondeletii* Willoughby p 207 ad hanc speciem videtur pertinere, sed a nullo auctore neque ipso Willoughbyo satis perfecte describitur.

<sup>369</sup> pinnæ pectorales usque ad et quodam: hæc verba in fine p. 66 addita sunt, -modo infundibili usque ad subrotunda: hæc in fine p. 68 post verba nunc sequitur \*p. 66 addita sunt.

<sup>370</sup> For sources, see Latin edition.

<sup>371</sup> pinnis *ms.*

Caput et corpus latitudinem perpendicularem<sup>372</sup> habent. Os mediocre. Oculi, dentes, squamæ etc. ut in præcedente specie sese habent. Color corporis cano albescens, ad ventrem vero inter pinnas pectorales et pinnam ani, lineæ 5 vel 6 transversæ, albidiores et lucidæ utrinque conspiciuntur,<sup>373</sup> sed color forte in diversis variat. Pinna dorsi anterior ossiculorum 6, quorum secundum, tertium et quartum præalta sunt et in setam quasi supra membranam adscendunt. Pinna dorsi secunda ossiculorum 16 mollium et præter morem longiorum. Pinnæ pectorales albescentes ossiculorum 19. Pinnæ ventrales in unam infundibuliformem concretæ ossiculorum 12. Pinna ani ossiculorum 16 mollium et longiorum. Cauda oblonga in extremo subrotunda, ossiculorum 15 longiorum. Longitudo descripti 2 unciarum, 7 vel 8 linearum.

Seba, *Thesaurus* vol. III, p. 88, Tab. 29, num. 16.

Num. 16. *Gobius albescens; ossiculis pinnæ dorsalis primæ præaltis et setiformibus.*

Est hic Salviani *Gobius tertius*, Romæ *Jozo* vocatus: forte *Gobius albus Rondeletii* Willoughb. p. 207 huic speciei affinis est. Verum quia ab authorum nullo, ne ipso quidem Willoughbejo satis perfecte descriptus est, hinc ejus heic dabimus descriptionem accuratiorem.

Caput & corpus latitudinem habent perpendicularem. Os mediocre est. Oculi, dentes, squamæ, & c. ut in præcedente, comparata sunt. Color corporis cano-albescens, forte in variis varius, ad ventrem, inter pinnas pectorales & ani pinnam, lineis 5 vel 6, transversis, albidioribus & lucidis, utrinque distinguitur. Pinna dorsi anterior ossiculis 6 constat, quorum 2, 3 & 4 præalta sunt, & supra membranam instar setæ quasi ascendunt. Pinna dorsi altera ossiculis constat 16 mollibus, & præter morem longioribus. Pinnæ pectorales, albescentes, ossiculis 19 gaudent. Pinnæ ventrales, in unam infundibuliformem concretæ, ossiculis constat 12. Pinna ani ossiculis 16 mollibus & longis. Cauda oblonga, in extremo subrotunda, ossiculis 15 longioribus. Longitudo descripti est unciarum 2 & 7 vel 8 linearum.

No 17

Species 3. *GOBIUS pinnis ventralibus disjunctis.*

Caput fere quadratum et anterius ab oculis ad os per- [p. 70] -pendiculariter declive. Dorsum latiusculum et convexum ut et in ventre. Os satis late diduci potest, sed non profunde incisum est. Labia satis magna.

<sup>372</sup> perpendicularem: perpendiculorum *ms.*

<sup>373</sup> conspiciuntur *scripsi*: conspiciunt *ms.*

Maxilla superior inferiore paulo longior. Oculi protuberantes in suprema capitis parte, sibi admodum vicini. Cavitas magna, seu fossicula<sup>374</sup> utrinque infra oculos. Aperturæ branchiarum angustæ. Unus ordo dentium in utraque maxilla et, secundo, ossicula utrinque duo ad fauces. Lingua et palatum glabra. Squamæ albæ, dense sitæ tam in ipso capite quam corpore, subasperæ sunt. Color totius corporis albescens. Linea lateralis parum conspicua et fere recta. Dorsi pinna prior ossiculorum 8, mollium et simplicium; secunda ossiculorum 18 mollium et in apice indivisorum. Pinna ani ossiculorum 13 itidem mollium et indivisorum. Pinnæ pectorales brachii quid æmulum habent et ad dimidiam partem squamis dense teguntur, continent ossicula 13 ad 14. Pinnæ ventrales breves, albæ, sibi ad basin quidem contiguæ, sed inferiore parte non concretæ ut in præcedentibus, singulæ<sup>375</sup> ossiculorum sex, præter primum, multum ramosorum. Cauda in extremo subrotunda-acuta ossiculorum 18 circiter, quorum quæ in inferiore parte multo breviora sunt respectu quam quæ in superiore. Longitudo piscis descripti 2 unciarum, 9 linearum. Latitudo maxima 3 linearum.

Piscis est curiosus admodum et a nullo auctore hucusque descriptus.

Seba, *Thesaurus* vol. III, p. 89, Tab. 29, Num. 17,

Num. 17. *Gobius pinnis ventralibus disjunctis.*

Caput fere quadratum & anterius ab oculis ad os perpendiculariter declive est: dorsum cum ventre latiusculum & convexum. Os satis late diduci potest, quamvis non profunde incisum sit; labiis autem sat magnis gaudet. Maxilla superior inferiore paulo longior est. Oculi, inter se admodum vicini, in suprema capitis parte protuberant. Infra oculos magna datur utrinque cavitas seu fossula. Aperturæ branchiarum angustæ sunt. Unus est dentium ordo in utraque maxilla, & ad fauces duplex utrinque ossiculum. Lingua & palatum glabra sunt. Squamæ albæ, subasperæ, tam in ipso capite, quam corpore, dense sitæ sunt. Corpus totum albescit. Linea lateralis, parum conspicua, fere recta decurrit. Pinna dorsi prior ossiculis constat 8 mollibus, simplicibus; altera vero ossiculis 13 mollibus itidem & in apice indivisis. Ani pinna ossiculis constat 13 pariter mollibus & indivisis. Pinnæ pectorales brachii quid æmulum habent, & ossiculis firmatæ 13 vel 14, ad dimidiam usque partem squamis dense teguntur. Pinnæ ventrales breves, albæ, sibi mutuo ad basim quidem contiguæ, sed parte inferiore non concretæ, uti in præcedentibus, singulæ ossiculis sex constant multum ramosis, excepto primo. Cauda,

<sup>374</sup> fossicula *scripsi*: ossicula *ms.*, fossula *Seba.*

<sup>375</sup> singulæ *scripsi* *Sebam secutus*: singulos *ms.*

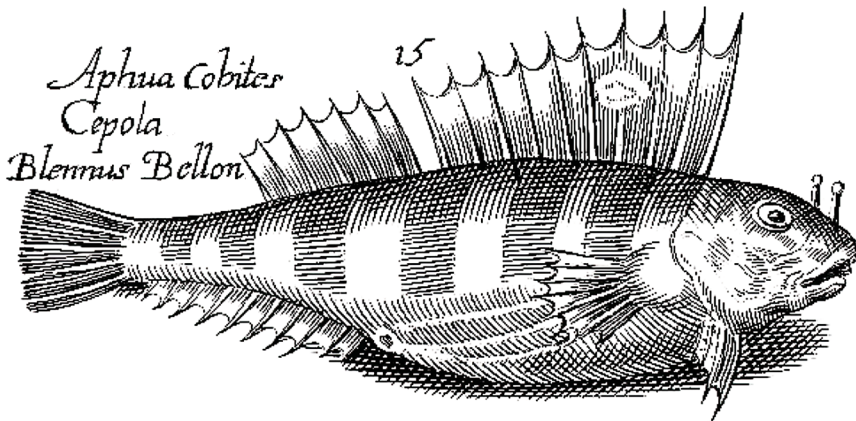
in extremo subrotundo-acuta, ossiculis 18 circiter constat, quorum inferiora multo sunt breviora, quam quæ in superiore parte hærent. Longitudo descripti est 2 unciarum & 9 linearum; latitudo maxima 5 linearum.

Est Piscis hic admodum singularis, & a nullo hactenus Authore descriptus.

[p. 71]

XIV. Genus *Blennii* cujus 6 species exhibitæ.<sup>376</sup>

*Blennius* est vocabulum Plinii l. 32, c. 9 usurpatum reliquis auctoribus: *blennus* scribitur adjective, et minus incongrue;<sup>377</sup> pervenit enim a vocabulo βλέννος, *ignavus* vel *mucosus*, nam hi pisces muco scitent.



**Figure 13.** The butterfly blenny, *Blennius ocellaris*, after Hendrik Ruysch (1663–1727), *Theatrum universale omnium animalium piscium, avium, quadrupedum, exanguium, aquaticorum, insectorum, et angium*, 1718 (vol. 1, pl. 19, fig. 15). License: Public Domain.

Species 1. *BLENNIUS capite subacuto, pinna dorsi tota aculeata.*

Caput et corpus perpendiculariter lata. Caput subacutum. Venter prominulus, os angustum. Maxilla inferior superiore paulo longior, utraque labiis prædita. Foraminula exilia in capite præter nares. Oculi cute capitis tecti cum appendicula exili supra utrumque oculum. Denticuli in utraque maxilla, palato et faucibus. Squamæ adeo exiguæ, ut parum in conspectum veniant. Color corporis canus vel cineraceus. Linea lateralis supra ventrem deorsum flexa et curva. Pinna dorsi a

<sup>376</sup> exhibitæ scripsi: exhibitum ms.

<sup>377</sup> incongrue scripsi: congrue ms. quod verbum om. Seba.

cervice ad caudam extensa aculeorum 45. Pectorales in extremo subrotundæ ossiculorum 12. Ventrals anteriores sitæ ossiculorum 2 tantum. Ani longa, ossiculorum 29 quorum duo prima aculeata, reliqua mollia sed in apice indivisa. Cauda exigua, in extremo subrotunda ossiculorum 13 longiorum. Longitudo<sup>378</sup> descripti 2 unciarum 5 linearum.

Seba, *Thesaurus* vol. III, p. 89, Tab. 30, Num. 1.

De genere *Blennii* piscis, quod nunc sistemus, sex nobis cognitæ sunt species, quas nostro in Museo asservamus. Est *Blennii* vocabulum Plinio *Lib. XXXII, cap. 9* jam usitatum, atque a reliquis Authoribus *Blennus* scribitur: provenit autem a voce Græca βλεννός, ignavus, vel mucosus; quum pisces hi admodum muco scateant.

Num. 1. *Blennius capite subacuto; pinna dorsi tota aculeata.*

Caput & corpus perpendiculariter lata sunt: caput subacutum: venter prominulus: os angustum: maxilla inferior superiore paulo longior est; utraque autem labiis prædita. In capite foraminula exigua, præter nares, hiant. Oculi cute capitis tecti exilem quilibet supra se appendiculam monstrant. In utraque maxilla, palato & faucibus denticuli dantur. Squamæ adeo sunt exiguæ, ut parum in conspectum veniant. Color corporis canus est vel cineraceus. Linea lateralis supra ventrem deorsum flexa est & incurvata. Pinna dorsi, a cervice ad caudam extensa, aculeis constat 45. Pinnæ pectorales, in extremo subrotundæ, ossiculis 12 constant. Ventrals anteriores sitæ ossiculis tantum 2 gaudent. Ani pinna longa ossiculis 29, quorum duo prima aculeata, reliqua mollia & in apice indivisa sunt. Cauda exigua, in extremo subrotunda, ossiculis constat 13 longioribus. Longitudo descripti est unciarum 2 & 5 linearum.

Species 2. *BLENNIUS canescens, ossiculis ultimis pinnæ [p. 72] dorsalis mollibus.*

Cum præcedente in plurimis convenit, sed caput paulo obtusius et crassius est. Pinnæ pectorales et ventrals ut in præcedente. Pinna dorsi in initio altior quam in priore et in extremo mollis, non vero tota aculeata ut in præcedente, ossiculorum 37 quorum 31 parum aculeata sunt, reliqua mollia. Pinna ani ossiculorum 23 in apice indivisum. Cauda in extremo magis æqualis quam in præcedente, ossiculorum 14 longiorum. Longitudo descripti 2 unciarum circiter.

<sup>378</sup> longitudo scripsi *Sebam secutus*: latitudo *ms.*



Seba, *Thesaurus* vol. III, p. 89, Tab. 30, Num. 2.

Num. 2. *Blennius canescens; ossiculis ultimis pinnæ dorsalis mollibus.*

Cum præcedente in plurimis convenit; sed caput paulo obtusius & crassius est. Pinnæ pectorales & ventrales, ut in præcedente, se habent. Pinna dorsi in initio altior, quam in priore, & in extremo mollis, haud vero tota aculeata, uti in præcedente, ossibus constat 37, quorum 31 parum aculeata sunt, reliqua mollia. Ani pinna ossiculis constat 23 in apice indivisis. Cauda in extremo magis æqualis, quam in præcedente, ossiculis constat 14 longioribus. Longitudo descripti est 2 unciarum.

Species 3. *BLENNIUS varius, capite subacuto, ossiculis ultimis pinnæ dorsalis mollibus.*

In plurimis cum præcedentibus duobus convenit sed ossicula 3 prima in pinna dorsali reliquis notabiliter longiora sunt. Corpus brevius et crassius quam in specie prima. Pinna dorsi ossiculorum 44 vel 45 quorum 37 vel 38 anteriora aculeata sunt, reliqua mollia sed in apice non divisa. Pinnæ pectorales in extremo subrotundæ ossiculorum 15 indivisorum. Ventrales ut in præcedentibus sese habent. Pinna ani longa ossiculorum 28, 29 vel 30 quorum duo prima breviora et parum aculeata, reliqua mollia verum indivisa. Cauda ossiculorum 13 longiorum. Color corporis flavescens sed maculis inæqualibus ac rubescentibus in capite, corpore, pinna dorsi et ani plerumque varius. Longitudo descripti 4 unciarum, 1 linæ. Dantur tamen multo majores.

Seba, *Thesaurus* vol. III, p. 89, Tab. 30, Num. 3.

Num. 3. *Blennius varius; capite subacuto; ossiculis ultimis pinnæ dorsalis mollibus.*

Quoad plurima rursus cum 2 prioribus convenit; sed ossicula tria primæ pinnæ dorsalis reliquis notabiliter longiora sunt: quin corpus brevius est & crassius, quam in specie prima. Pinna dorsi ossiculis constat 44 vel 45, quorum 37 vel 38 anteriora aculeata sunt, reliqua mollia, sed in apice non divisa. Pinnæ pectorales, in extremo subrotundæ, ossiculis 15 indivisis constant. Ventrales, uti in prioribus, se habent. Ani pinna longa ossiculis 28, 29 vel 30 constat, quorum duo primo breviora sunt & parum aculeata, reliqua mollia, sed indivisa. Cauda ossiculis 13 longioribus constat. Color corporis flavescens, maculis inæqualibus ac rubescentibus in capite, corpore, pinna dorsi & ani plerumque variegatur. Longitudo descripti est 4 unciarum et unius linæ. Dantur tamen multo majores.

Species 4. BLENNIUS, *fronte perpendiculariter declivi, pinna dorsi in medio humili.*

*Alia Pinnarii*<sup>379</sup> *Species* Marcgravii *H. Bras. L. 1, C. 13.* — Willoughby p. 134: ad hancce<sup>380</sup> speciem videtur pertinere sed descriptio Marcgravii admodum imperfecta est.

Caput anterius admodum obtusum, seu ab oculis ad os perpendiculariter descendens. Corpus oblongius, crassius et magis rotundum quam in præcedentibus. Os amplum. Maxilla superior inferiore longior. Denticulorum splendentium et piliformium unicus ordo in utraque maxilla, et præterea in maxilla inferiore duo dentes majores caninorum instar; ad fauces supreme et inferne ossicula denticulata quoque adsunt. Color corporis albescens sed lineis, vel potius maculis, transversis obscurioribus et purpurescentibus utrinque notatus. Pinna dorsi in medio paulo humilior, ossiculorum 31 vel 32 quorum 12 anteriora breviora et simplicia sed non aculeata sunt, reliqua paulo longiora. Pinnæ pectorales ossiculorum 14. Ventrals ut in præcedentibus. Pinna ani ossiculorum 20 mollium. Cauda in extremo æqualis fere ossiculorum 13 longiorum.

Seba, *Thesaurus* vol. III, p. 91, Tab. 30, Num. 4.

Num 4. *Blennius fronte perpendiculariter declivi; pinna dorsi in medio humili.*

*Alia Punaru species* Marcgrav. *H. Bras. Lib. IV, cap. 13;* Willoughby p. 134, videtur quidem ad hancce speciem pertinere: sed Marcgravii descriptio valde imperfecta est.

Caput anterius admodum obtusum ab oculis ad os perpendiculariter descendit. Corpus oblongius, crassius & magis rotundum est, quam in præcedentibus. Os amplum. Maxilla superior inferiore longior. Denticulorum splendentium & piliformium unicus ordo in utraque maxilla, & præterea in maxilla inferiore duo dentes majores, instar caninorum, dantur: ad fauces autem superne & inferne ossicula denticulata adsunt. Color corporis albescens lineis vel potius maculis transversis obscurioribus & purpurascentibus utrinque distinguitur. Pinna dorsi, in medio paulo humilior, ossiculis 31 vel 32 constat, quorum 12 anteriora breviora & simplicia, sed non aculeata sunt, reliqua paulo longiora. Pinnæ pectorales ossiculis constant 14. Ventrals, ut in præcedentibus, comparatæ sunt. Ani pinna ossiculis 20 mollibus constat. Cauda in extremo fere æqualis ossiculis 13 longioribus gaudet.

<sup>379</sup> Pinnarii: sic ms. Punaru Seba.

<sup>380</sup> hancce scripsi Sebam secutus: verbum, quod legi nequit, habet ms.

Species 5. BLENNIUS <fronte><sup>381</sup> *perpendiculariter declivi, ossiculo primo pinnæ dorsalis alto.*

*Blennius Salviani* fol. 218. *Blennus Salviani et fortasse etiam Bellonii* Willughby p. 131 in plurimis cum hoc (5) convenit sed sed frons in hocce<sup>382</sup> magis perpendicularis videtur esse et macula [p. 74] illa pulcra ad initium pinnæ dorsalis in nostro non conspicitur.

Hic in plurimis cum præcedente (4) convenit, sed corpus respectu ad magnitudinem brevius et latius, color corporis obscurior, pinnæ pectorales oblongiores. Pinna dorsi altior et imprimis ossiculorum primum altius est quam proxime sequentia ossicula 26, quorum 12 anteriora simplicia verum mollia sunt, reliqua paulo longiora. Pinna ani ossiculorum 16 vel 17 mollium. Longitudo descripti 2 unciarum fere.

Seba, *Thesaurus* vol. III, p. 91, Tab. 30, Num. 5.

*Salviani Blennus*, p. 218, & *Blennus Salviani*, fortasse etiam *Bellonii* Willughb. p. 131, in plurimis cum hoc nostro pisce convenit; sed frons in hocce magis videtur esse perpendicularis, & macula illa pulcra ad initium pinnæ dorsalis heic non conspicitur.

Num 5. *Blennius fronte perpendiculariter declivi; ossiculo primo pinnæ dorsalis alto.*

Convenit autem noster hic multum cum præcedente Num. 4, at corpus ratione magnitudinis brevius & latius est; color corporis obscurior; pinnæque pectorales sunt magis oblongæ. Pinna dorsi altior est, & imprimis ossiculum prius altius, quam proxime sequentia: numerantur eorum 26, suntque priora 12 simplicia & mollia, reliqua paulo longiora. Ani pinna ossiculis 16 vel 17 mollibus constat. Longitudo descripti est 2 fere unciarum.

Species 6. GUNNELUS *Cornubiensium nonnullis.*

*Butter fisch quod dicitur Liparis* Willoughbij p. 115. — Raji p. 144.

Caput exiguum et multo angustius quam ipsum corpus. Corpus oblongum, cathetoplateum et multum compressum. Anus in medio corpore. Os exiguum, sursum spectans; maxilla inferior superiore paulo longior. Foraminula aliquot exigua in capite præter nares. Oculi exigui, subrotundi, cute capitis communi tecti. Iris lutea. Aperturæ branchiarum angustæ. Unus ordo dentium in utraque maxilla, ut et denticuli in palato anterius et ad fauces. Squamæ admodum exiles et parum conspicuæ.

<sup>381</sup> fronte: omitted in ms.

<sup>382</sup> hocce scripsi *Sebam secutus*: poltro ut vid. ms.

Color corporis varius vel obscuro canus, ad basin pinnæ dorsalis vero maculæ 12 satis amplæ, subrotundæ, pulchræ ac nigræ, sed circulo albo ad ambitum cinctæ, [p. 75] æquali fere a se invicem intervallo, a capite ad caudam usque disponuntur. Pinna dorsi ad ipsam caudam extensa, eique contigua, humilis,<sup>383</sup> æqualis, aculeorum 76 vel 78 caudam versus flexorum et cute crassa conjunctorum, supra quam paulum eminent, ita ut totum dorsum serratum<sup>384</sup> appareat. Pinnæ pectorales exiguæ, ossiculorum 12 vel 13 quorum media in apice bifurca. Pinnæ ventrales admodum exiguæ et sibi admodum vicinæ, ossiculorum 2 tantum quorum exterius breve, aculeatum et crassiusculum, secundum vero molle et adeo exile ut parum in conspectum veniat. Pinna ani longa ad ipsam caudam extensa, ossiculorum 41 vel 42 quorum duo prima aculeata, reliqua mollia. Cauda exigua, in extremo ossiculorum 20 quorum media in apice ramosa. Longitudo descripti 5 unciarum, 2 linearum. Latitudo maxima ad medium ventris 5 unciarum, 7 vel 8 linearum.

Seba, *Thesaurus* vol. III, p. 91, Tab. 30, Num. 6.

Num. 6. *Gunnellus Cornubiensium; nonullis* Butterfish, *Willoughb.* p. 115; *Raji* p. 144.

Caput exiguum est & multo angustius ipso corpore. Corpus oblongum, Cathetoplateum & multum compressum est. Anus medio in corpore hiat. Os exiguum sursum spectat. Maxilla inferior superiore paulo longior est. In capite aliquot, præter nares, foraminula exigua patent. Oculi exigui, subrotundi, cute capituli communi tecti, iride lutea gaudent. Aperturæ branchiarum angustæ sunt. Unus ordo dentium in utraque maxilla, tum in palato antè & ad fauces denticuli observantur. Squamæ perexiles sunt & parum conspicuæ. Color corporis varius est, vel obscure canus: ad basin vero pinnæ dorsalis maculæ 12 satis amplæ, subrotundæ, pulchræ, nigræ, circulo albo cinctæ, æquidistantes fere, a capite ad caudam usque disponuntur. Pinna dorsi ad ipsam caudam extensa, eique contigua, humilis & ubique æqualis, aculeis constat 76 vel 78 caudam versus flexis, cute crassa, supra quam paulum prominent, conjunctis: unde dorsum totum serratum apparet. Pinnæ pectorales exiguæ ossiculis 12 vel 13 constant, quorum media in apice bifurca sunt. Pinnæ ventrales admodum exiguæ, sibi mutuo valde vicinæ, ossiculis tantum duobus constant, quorum exterius breve, aculeatum & crassiusculum est, secundum vero molle & adeo exile, ut parum in conspectum veniat. Ani pinna longa, ad ipsam caudam extensa, ossiculis 41 vel 42 constat, quorum 2 prima aculeata sunt, reliqua mollia. Cauda

<sup>383</sup> humilis *scripsi* *Sebam secutus*: similis *ms.*

<sup>384</sup> serratum *addidi* *Sebam secutus*, *om. ms.*

exigua in extremo ossiculis constat 20, quorum media in apice ramosa sunt. Longitudo descripti est unciarum 5 & linæarum 2. Latitudo maxima ad medium ventris 7 vel 8 linearum.

Species 7. EXOCOETI *tertium genus Bellonio* Gesneri p. 16.

*Dracunculus* Rondeletii l. 10, c. 12, p. 304. — Aldrovandi l. 2, c. 51, p. 262.

— Willoughby p. 136. — Raji p. 79. — *Aranei Species* Gesneri fol. 43.6 edit. Germ.

Caput magnum, latum, planum imprimis inferne. Corpus ambitu non omnino subrotundo at parum plagioplateo. Anus capiti quam caudæ vicinior. Os seu rictus satis amplus. Maxilla superior inferiore multo longior.

[p. 76]

Rostrum quasi duplex est ob membranam illam inferne liberam. Nares duplices. Oculi magni, ovales, sibi admodum vicini, in suprema capitis parte siti, cute communi tecti. Iris argentei coloris. Foramina duo subrotunda in occipiti loco aperturarum branchiarum. Lamina operculorum media in tres aculeos breves et crassos desinit. Denticuli in maxillis et ad fauces. Squamæ nullæ sed cutis glabra et subsplendens in toto corpore. Color corporis ex albo flavicans cum maculis aliquot lucidioribus ad latera.<sup>385</sup> Macula illa triangularis, purpurescens, quam in summo vertice supra oculos se observasse scribit nobilis Willughby, in nostro deerat. Linea lateralis recte fere ad caudam descendit. Pinna dorsi prima ossiculorum 4 simplicium sed mollium, quorum primum altissimum est et in setam quasi longissimam producit, 3 vel 4 uncias longum in adultis, reliqua ordine breviora. Pinna dorsi secunda ossiculorum 10 admodum distinctorum et membrana lucida conjunctorum. Pinnæ pectorales longius a rostro remotæ<sup>386</sup> quam ventrales, ossiculorum 20 præter primum in apice bifurcorum. Pinnæ ventrales magnæ antè sitæ, ossiculorum 6, excepto primo admodum ramosorum. Pinna ani ossiculorum 10 mollium et distinctorum, quorum ultima reliquis longiora sunt. Cauda oblonga, in extremo subrotunda, ossiculorum 10 vel 11, quorum media bifurca sunt. Longitudo descripti 6 unciarum, 4 linearum.

Seba, *Thesaurus* vol. III, p. 92, Tab. 30, Num. 7.

<sup>385</sup> lucidioribus ad latera *scripsi Sebam secutus*: ludicioribus et lateribus *ms.*

<sup>386</sup> remotæ *scripsi Sebam secutus*: ramosæ *ms.*

*Exocoeti tertium genus Bellonio. Gesner p. 16. Dracunculus Rondelet. Lib. X, cap. 12 p. 304. Aldrovand. Lib. II, cap. 51, p. 262. Willoughb. p. 136. Raj. p. 79. Dracunculus aranei speices Gesneri fol. 43. b. edit. Germanica.*

Caput magnum, latum, planum præprimis inferne est. Corpus ambitu non penitus subrotundo, sed parum plagioplateo est. Anus capiti, quam caudæ, vicinior. Os seu rictus satis amplum hiat. Maxilla superior inferiore multo longior est. Rostrum quasi duplex apparet ob membranam ejus inferne liberam. Nares duplices sunt. Oculi magni, ovales, sibi admodum vicini, in suprema capitis parte siti, cute communi tecti, iride gaudent argentei coloris. Foramina duo subrotunda in occipite, loci aperturarum branchiarum, hiant. Lamina operculorum media in tres aculeos breves & crassos desinit. Denticuli in maxillis & ad fauces hærent. Squamæ nullæ adsunt, sed cutis glabra est in toto corpore & splendescens. Color corporis ex albo flavicans maculis aliquot lucidioribus ad latera distinguitur. Macula autem illa trigona, purpurascens, quam summo in vertice supra oculos se observasse scribit Nob. Willoughby, in nostro deest. Linea lateralis recta fere ad caudam descendit. Pinna dorsi prima ossiculis constat 4 simplicibus, mollibus, quorum primum altissimum est & in setam quasi longissimam productum, 3 vel 4 fere uncias in adultis longum, reliqua vero ordine sunt breviora. Altera dorsi pinna ossiculis constat 10 admodum distinctis, & membrana lucida conjunctis. Pinnæ pectorales, longius a rostro remotæ, quam ventrales, ossiculis constant 20, in apice bifurcatis, solo excepto primo. Pinnæ ventrales, magnæ, antè sitæ, ossiculis constant 6, admodum ramosis, excepto primo. Ani pinna ossiculis 10 constat mollibus, & distinctis, quorum ultima reliquis longiora sunt. Cauda oblonga, in extremo subrotunda, ossiculis 10, vel 11 constat, quorum media bifurca sunt. Longitudo descripti est 6 unciarum, & 4 linearum.

[p. 77]

XV Genus *Labri* cuius 7 species novi.

*Labrus* est vocabulum Ovidio Nasoni usitatum et optime huic generi quadrans, quum omnes species labra prominula ac crassa dentes tangentia ut in quadrupedibus obtineant. Vulgo hoc genus *Turdus* appellatur, sed pisces nomina generica nulla cum avibus communia habere debent.

N 8. Species prima. *LABRUS tetraodon, unicolor, cauda æquali.*

Caput et corpus perpendiculariter lata. Venter planiusculus. Os seu rictus<sup>387</sup> angustus. Labra<sup>388</sup> prominula. Oculi subrotundi, membrana<sup>389</sup> laxa

<sup>387</sup> rictus scripsi *Sebam secutus*: notus *ms.*

<sup>388</sup> labra scripsi *Sebam secutus*: lamina *ms.*

<sup>389</sup> membrana scripsi *Sebam secutus*: membra *ms.*

tecti. Iris flava. Dentes duo maximi, lati<sup>390</sup> et triangulares fere in utraque maxilla, sibi fere contigui et subtus paulisper concavi et, 2<sup>o</sup>, ad fauces os utrinque<sup>391</sup> denticulis serratum. Palatum et lingua glabra. Squamæ amplæ, molles, albescentes. Color totius corporis canescens vel flavescens. Linea lateralis ad finem pinnæ dorsalis deficit, infra quam alia<sup>392</sup> linea in medio extremo corpore incipit, quæ ad caudam extenditur. Laminæ operculorum squamis tectæ. Pinna in dorso unica, ossiculorum 19 vel 20 quorum 9 circiter simplicia sed non aculeata sunt, reliqua molliora et in apice bifurca. Pinnæ pectorales exiguæ, ossiculorum 14. Ventrals directe sub pectoralibus sibi vicinæ, ossiculorum 6. Ani ossiculorum 11 vel 12 mollium. Cauda in extremo æqualis ossiculorum 13 longiorum. Longitudo<sup>393</sup> descripti 2 unciarum 5 vel 6 linearum.

Seba, *Thesaurus* vol. III, p. 92, Tab. 31, Num. 1.

Destinavimus hanc tabellam exhibendis octo LABRI generis speciebus, quæ apud Ichthyologos nondum, aut minus perfecte descriptæ inveniuntur. *Labrus* autem est vocabulum Ovidio Nasoni usitatum, optime quadrans in hoc genus; quum omnes ejus species labris prominulis, crassis, dentes, uti in quadrupedibus, tegentibus, gaudeant. Vulgo hoc genus *Turdi* nomine venit: at quid opus est Piscium, & Avium generica nomina inter se confundere?

Num. 1. *Labrus tetraodon; unicolor; cauda æquali.*

Caput, & corpus perpendiculariter lata sunt. Venter planiusculus. Os seu rictus angustus. Labra prominula. Oculi subrotundi, membrana laxa tecti, flava gaudent iride. Dentes duo maximi, lati, fere trigoni, sibi mutuo fere contigui, subtus paulisper concavi, in utraque maxilla dantur: præterea vero ad fauces os utrinque denticulis serratum hæret; palato interim, & lingua glabris. Squamæ amplæ, molles, albescentes sunt. Color totius corporis, canescens, vel flavicans est. Linea lateralis ad finem pinnæ dorsalis deficit; sed infra hanc alia deinceps linea in medio extremi corporis incipit, quæ porro ad caudam usque porrigitur. Laminæ operculorum squamis tectæ sunt. Pinna, in dorso unica, ossiculis 19, vel 20 constat, quorum 9 circiter simplicia, sed non aculeata sunt, reliqua molliora, & in apice bifurca. Pinnæ pectorales, exiguæ, ossiculis gaudent 14: ventrals, directe sub pectoralibus sitæ, sibi vicinæ, ossiculis 6: Ani pinna ossiculis 11, vel 12 mollibus. Cauda in extremo æqualis ossiculis 13 longioribus constat. Longitudo descripti est unciarum 2, & linearum 5, vel 6.

<sup>390</sup> lati scripsi *Sebam secutus*: læti ms.

<sup>391</sup> utrinque scripsi *Sebam secutus*: utriusque ut vid.ms.

<sup>392</sup> alia scripsi *Sebam secutus*: illa ms.

<sup>393</sup> longitudo scripsi *Sebam secutus*: latitudo ms.

[p. 78]

N 9. Species secunda. LABRUS *tetraodon*, *nigrescens*, *maculis albis totus varius*.

Caput subacutius et corpus latius ac tenuius quam in præcedente. Laminæ operculorum glabræ et squamis destitutæ. Dentes duo magni, antrorsum, horisontaliter fere protensi et sibi non contigui, in utraque maxilla, non lati sunt in priore specie sed ambitu fere subrotundo vel parum presso, coloris albissimi. Ad fauces ossa, dentibus obtusis et serratis prædita conspiciuntur. Squamæ amplæ, oblongæ, molles. Color totius corporis, capitis et pinnarum nigrescens, sed maculis candidis, seu lacteis, subrotundis, exiguis et admodum crebris, varius. Linea lateralis ad finem pinnæ dorsalis admodum curvatur et perpendiculariter fere deorsum flectitur, deinde recta ad caudam tendit. Pinna dorsi maculosa, ossiculorum 21 vel 22, quorum 9 anteriora simplicia sunt sed vix aculeata, reliqua molliora et in apice ramosa. Pinnæ pectorales viridescens, ossiculorum 13. Ventrals oblongæ, ossiculorum 6 quorum primum simplex, reliqua ramosa. Pinna ani maculosa, ossiculorum 15 quorum 3 prima simplicia et parum aculeata, reliqua mollia et in apice divisa. Cauda fere quadrata vel in extremo levissime excavata, ossiculorum 14 longiorum. Longitudo descripti 5 unciarum fere.

Seba, *Thesaurus* vol. III, p. 94, Tab. 31, Num. 2.

Num. 2. *Labrus tetraodon; nigrescens, maculis albis undique varius*.

Caput subacutius, & corpus latius, ac tenuius est, quam in præcedente. Laminæ operculorum glabræ sunt, & squamis destitutæ. Dentes duo magni, antrorsum horizontaliter fere protensi, & sibi non contigui, non adeo lati, ut in specie priore, sed ambitu fere subrotundo, vel parum presso, coloris albissimi, utraque in maxilla extant. Ad fauces ossa dentibus obtusis, & serratis prædita conspiciuntur. Squamæ amplæ, oblongæ, molles, corpus tegunt. Color totius corporis, capitis, & pinnarum nigrescens maculis candidis, seu lacteis, rotundis, exiguis, admodum numerosis variegatur. Linea lateralis, ad finem pinnæ dorsalis valde incurvata, & fere perpendiculariter deorsum flexa, deinceps recta ad caudam tendit. Pinna dorsi maculosa ossiculis 21, vel 22 constat, quorum priora 9 simplicia sunt, at vix aculeata, reliqua molliora, & in apice ramosa. Macula singularis, nigra, quartum ordine ossiculum hujus pinnæ variegat: num constanter, incertum. Pinnæ pectorales, viridescens, ossiculis 13 constant. Ventrals, oblongæ, ossiculis 6, quorum primum simplex est, reliqua ramosa. Pinna ani maculosa ossiculis constat 15, quorum 3 prima simplicia, & parum aculeata, reliqua mollia, & in apice divisa sunt. Cauda, fere quadrata, vel in extremo



levissime excavata, ossiculis constat 14 longioribus. Longitudo descripti fere est 4 unciarum.

[p. 79]

*Labri* polyodontes, seu qui plures dentes in maxillis habent.

N 10. Species tertia. LABRUS, *polyodon*, *lamina operculorum media serrata*.

*Turdus viridis* Garzetto dictus *Genuæ* Willoughby p. 320 convenit quidem in numero ossiculorum ac aculeorum pinnæ dorsalis cum nostro (3), sed plura de suo Willoughby non habet, inde nihil certe determinari potest vel debet.

In multis cum præcedente (2) convenit, sed corpus latius et brevius. Iris flava et laminæ operculorum a lateribus squamosæ, media vero lamina in ambitu aculeis exiguis serrata est, quod alias rarum in hoc genere. Labium superius duplex est. Dentium satis robustorum<sup>394</sup> unus ordo in utraque maxilla, quorum duo anteriores reliquis majores. Numerus autem dentium<sup>395</sup> in maxilla superiore est 8, in inferiore 14 circiter. Dentes faucium vero ut in præcedente specie. Color corporis flavescens, maculis nigrescentibus nullo ordine positus varius. Squamæ et linea lateralis ut in præcedente. Pinna dorsi ossiculorum 24 quorum 15 anteriora aculeata, reliqua mollia et ramosa. Pinnæ pectorales subrotundæ ossiculorum 13. Pinnæ ventrales ossiculorum 6 quorum primum aculeatum. Pinna ani ossiculorum 13 quorum 3 prima aculeata et robusta, reliqua mollia et in apice bifida. [p. 80] Cauda in extremo æqualis fere ossiculorum 13 longiorum. Longitudo descripti 3 unciarum 4 linearum.

Seba, *Thesaurus* vol. III, p. 94, Tab. 31, Num. 3.

Sequuntur *Labri Polyodontes*, sive qui plures dentes in maxillis gerunt.

Num. 3. *Labrus polyodon*; *lamina operculorum media serrata*. *Turdus viridis*, Garzetto dictus *Genuæ*, Willoughb. p. 320.

Convenit quidem, quod ad numerum ossiculorum, ac aculeorum pinnæ dorsalis, cum hocce nostro; sed plura de suo non describit *Willoughbejus*: unde certi nihil determinari potest.

<sup>394</sup> robustorum *scripsi* *Sebam secutus*: robustam *ms*.

<sup>395</sup> autem dentium *scripsi* *Sebam secutus*: vel dentibus *ms*.

Convenit autem in multis cum præcedente num. 2 sed corpore est latiore, & brevior. Iride gaudent flava oculi. Laminæ operculorum a lateribus squamosæ sunt; media vero lamina in ambitu aculeis exiguis serrata est: id quod cæteroquin in hoc genere rarum est. Labium superius est duplex. Dentium satis robustorum unicus ordo in utraque datur maxilla, quorum 2 anteriores reliquis majores sunt. Est autem dentium in maxilla superiore numerus 8, in inferiore circiter 14. Dentes faucium, ut in præcedente specie, sese habent. Color corporis flavescens maculis nigrescentibus, nullo ordine digestis, variegatur. Squamæ, & linea lateralis, uti in priore, se habent. Pinna dorsi ossiculis 24 constat, quorum 15 anteriora aculeata sunt, reliqua mollia, & ramosa. Pinnæ pectorales, subrotundæ, ossiculis 13 constant. Ventrals ossiculis 6, quorum primum aculeatum est. Pinna ani ossiculis constat 13, quorum 3 prima aculeata sunt, & robusta, reliqua mollia, & in apice bifida. Cauda, in extremo fere æqualis, ossiculis constat 13 longioribus. Longitudo descripti est unciarum 3, & linearum 4.

<N 11><sup>396</sup> Species quarta. LABRUS *polyodon*, *virescens*, *pinna dorsi aculeorum decem*.

In multis cum præcedente convenit, sed laminæ capitis omnes glabræ sunt. Numerus dentium major in maxillis, in superiore enim sunt 22 vel 24, in inferiore 20 circiter. Squamæ et dentes faucium ut in præcedente specie, linea lateralis vero ut in prima specie sese habet. Color corporis<sup>397</sup> pallidior et viridescens. Pinna dorsi ossiculorum 19 vel 20 quorum 10 anteriora aculeata, reliqua mollia et in apice parum divisa. Pinnæ pectorales et ventrales ut in præcedente. Pinna ani ossiculorum 11 vel 12 quorum tertia aculeata et robusta, reliqua mollia. Cauda in extremo æqualis ossiculorum 13 longiorum. Longitudo descripti 3 unciarum, 1 vel 2 linearum.

Seba, *Thesaurus* vol. III, p. 95, Tab. 31, Num. 4.

Num. 4. *Labrus polyodon; virescens: pinna dorsi aculeorum decem*.

In multis cum præcedente convenit; sed omnes capitis laminæ glabræ sunt. Numerus itidem dentium in maxillis major est: sunt enim 22 vel 24 in superiore; in inferiore autem circiter 20. Squamæ, & dentes faucium, ut in priore specie, se habent. Linea vero lateralis, uti in prima specie num. 1 comparata est. Color corporis pallidior est, & viridescens. Pinna dorsi ossiculis 19, vel 20 constat, quorum 10 anteriora aculeata sunt, reliqua mollia, & in apice parum divisa. Pinnæ pectorales, & ventrales, ut in priore specie, se habent.

<sup>396</sup> No. 11 *om. ms.*

<sup>397</sup> Color corporis *scripsi Sebam secutus: Corpus coloris ms.*

Pinna ani ossiculis 11 vel 12 constat, quorum 3 prima aculeata, & robusta, reliqua mollia sunt. Cauda, in extremo æqualis, ossiculis constat 13 longioribus. Longitudo est 3 unciarum, & 1, vel 2 linearum.

N 12. Species quinta. LABRUS *polyodon*, *lineis utrinque duabus longitudinalibus*, *cauda æquali*.

In multis cum specie tertia convenit, sed corpus respectu oblongius est et venter minus latus. Laminæ capitis omnes glabræ et squamis destitutæ. Dentes 12 vel 14 in maxilla inferiore, in superiore quoque 12. In ipsis angulis oris utrinque duo dentes oblongi protruduntur. Color capitis superni cæruleus est, ab ore ad extrema operculorum tres lineæ extenduntur, sed media non continuatur, duæ reliquæ ex albo lucidæ sunt et ad caudam usque continuantur.

[p. 81]

Pinnæ et cauda albescunt. Pinna dorsi humilis<sup>398</sup> ossiculorum 20 vel 21, quorum 9 anteriora aculeata et brevia, reliqua mollia. Pinnæ pectorales ossiculorum 13. Ventrals ossiculorum 6, ut in præcedentibus. Pinna ani ossiculorum 14 vel 15, quorum 3 prima aculeata sed minime robusta ut in præcedentibus, reliqua mollia et in apice ramosa. Cauda in extremo æqualis, ossiculorum 13 vel 14 longiorum. Longitudo descripti 4 unciarum fere.

Seba, *Thesaurus* vol. III, p. 95, Tab. 31, Num. 5.

Num 5. *Labrus polyodon*; *lineis utrinque duabus longitudinalibus*; *cauda æquali*.

In multis cum specie tertia convenit; sed corpus pro rata oblongius est, et venter minus latus; laminæ capitis omnes glabræ sunt, et squamis destitutæ. Dentes 12, vel 14 in maxilla inferiore, in superiore quoque 12 dantur. In ipsis oris angulis utrinque duo oblongi dentes prominent. Color capitis superni cæruleus est: ab ore vero ad extrema operculorum tres lineæ extenduntur, quarum media non continuatur, duæ autem reliquæ ex albo lucidæ sunt, & ad caudam usque porriguntur. Pinnæ, & caudæ albescunt. Pinna dorsi humilis ossiculis constat 20, vel 21, quorum 9 anteriora aculeata, & brevia sunt, reliqua mollia, & paulo longiora. Pinnæ pectorales ossiculis constant 13. Ventrals ossiculis 6, ut in prioribus, sunt, reliqua mollia, & in apice ramosa. Cauda in extremo æqualis ossiculis 13, vel 14 constat longioribus. Longitudo descripti est 4 fere unciarum.

<sup>398</sup> humilis scripsi *Sebam secutus*: similis *ms*.

N 13. Species sexta. LABRUS *polyodon*, *variis maculis cæruleis*<sup>399</sup> *ad pinnarum basin pectoralium*.

Partes plurimas cum quinta specie communes habet, sed dentes plerumque 16 in maxilla superiore et paulo plures in inferiore. Color ex albescente et purpurescente mixtus cum maculis aliquot cæruleis exiguis. Macula cærulea vel purpurea ad basin pinnarum pectoralium. Ossiculum secundum et tertium pinnarum ventralium in appendicem vel prominentiam ultra reliqua extenduntur. Pinna dorsi ossiculorum 22 vel 23 quorum 9 anteriora aculeata, reliqua mollia et in apice bifida. Pinna ani ossiculorum 15, 16 vel 17, quorum 3 prima aculeata, reliqua mollia. Cauda in extremo convexa ossiculorum 14 longiorum. Longitudo descripti 3 unciarum, 9 linearum.

Seba, *Thesaurus* vol. III, p. 95, Tab. 31, num. 6.

*Labrus polyodon; varius; macula cærulea ad basin pinnarum pectoralium.*

Quoad plurima cum priore num. 5 convenit; sed dentes plerumque 16 in maxilla superiore, & paulo plures in inferiore dantur. Color ex albescente, & purpurascete mixtus maculis aliquot exiguis, cæruleis, distinguitur. Macula cærulea, vel purpurea ad basin pinnarum pectoralium datur. Ossicula, secundum, & tertium pinnarum ventralium in processum ultra reliqua extenduntur. Pinna dorsi ossiculis constatt 22, vel 23, quorum 9 anteriora aculeata sunt, reliqua mollia, & in apice bifida. Pinna ani ossiculis constat 15, 16, vel 17, quorum 3 prima aculeata, reliqua mollia sunt. Cauda in extremo convexa ossiculis 14 longioribus constat. Longitudo descripti est unciarum 3 & linearum 9. Cauda in ambitu, quam interna parte, dilutior ac clarior, ornamentum speciem addit.

N 14. Species septima. LABRUS *polyodon*, *capite cæruleo*, *cauda bifurca*.

In multis cum præcedente convenit, sed dentes in maxilla superiore sunt numero circiter 20, in inferiore adhuc plures. Dentes faucium ut in reliquis. Squamæ magnæ, oblongæ, albæ, leves. Laminæ operculorum glabræ, squamis destitutæ. Color corporis ex albo et virides- [p. 82] -cente mixtus, cui aliquid cærulescentis admiscetur. Caput totum intense cæruleum vel purpureum est. Pinnæ pectorales quoque in medio secundum longitudinem lineam latam cæruleam habent. Pinna dorsi humilis ossiculorum 22, quorum 8 prima aculeata et satis robusta, reliqua

<sup>399</sup> cærulea *ms.*

mollia et in apice ramosa. Pinnæ pectorales ossiculorum 15 vel 16. Pinnæ ventrales ossiculorum 6 ut in præcedentibus sese habent. Pinna ani ad basin cærulescens, ossiculorum 14 vel 15, quorum 3 prima aculeata, reliqua mollia et in apice ramosa. Cauda oblonga, multum bifurca, ossiculorum 14 longiorum. Longitudo descripti a rostro ad extremum caudæ 6 unciarum, 7 linearum circiter.

Notandum est, quod color in hoc genere admodum varius et multiplex sit ac sæpe ludat.

Hinc, si quis Labros quosdam cum descriptis<sup>400</sup> conferat et omnia ad amussim convenire videat præter colorem, nihil est quod retentet<sup>401</sup> quin ad eas species cum quibus in omnibus partibus secundum figuram, situm, proportionem et numerum conveniunt, suos Labros referre possit. Nihilo tamen minus in construendis nominibus specificis ad colorem interdum confugere coacti fuimus, quando nempe numerus, figura et proportio partium differentias non satis sufficientes suppeditari possent.

Numerus specierum descriptarum # 112.

[p. 83]

[Seven blank pages]

Seba, *Thesaurus* vol. III, p. 96, Tab. 3 I, Num. 7.

Num. 7. *Labrus polyodon; capite cæruleo, cauda bifurca.*

In multis cum præcedente convenit; sed dentes in maxilla superiore circiter 20, in inferiore plures adhuc dantur. Faucium dentes, uti in reliquis, se habent. Squamæ magnæ, oblongæ, albæ, læves, corpus tegunt. Laminæ operculorum glabræ sunt, & squamis destitutæ. Color corporis ex albo, & viridescente mixtus aliquid simul cærulescentis monstrat. Caput totum intense cæruleum, vel purpureum est. Pinnæ pectorales in medio quoque, secundum longitudinem, lineam latam, cæruleam gerunt. Pinna dorsi humilis ossiculis 22 constat, quorum 8 priora aculeata, & satis robusta sunt, reliqua mollia, & in apice ramosa. Pinnæ pectorales ossiculis constant 14, vel 15. Ventrales ossiculis 6, quæ, uti in præcedentibus, se habent. Ani pinna, ad basin cærulescens, ossiculis 14, vel 15 constat, quorum 3 prima aculeata sunt, reliqua mollia, & in apice ramosa. Cauda oblonga, multum bifurca, ossiculis gaudet 14 longioribus. Longitudo descripti, a rostro ad extremum usque caudæ, est 6 unciarum, et 7 linearum circiter.

<sup>400</sup> descriptis *scripsi* *Sebam secutus*: desonitis *ut vid. ms.*

<sup>401</sup> retentet *scripsi*: retendat *ut vid. ms.*

[Seba, *Thesaurus* vol. III, p. 96 *descriptionem* speciei Labri Num. 8 *habet, quæ ab Artedi non scripta apparet.*]

Num 8. *Labrus varius; maculis duabus nigris post initium pinnæ dorsalis.*

Videtur & ad Labri genus hic Piscis pertinere: saltem libet ejus iconem hoc loco superaddere; ut ab Ichthyologis examinari, suoque nomine donari possit. Num tetraodon, an polyodon sit, incertum, nec in ipso Pisce inquiri potuit, quum, distracto publica venditione Museo Auctoris, non nisi icon superfuit. Duplex color Piscem, secundum longitudinem, inde ab extremo ore ad caudæ usque initium, ita distinguit, ut pars media superior fusca sit, inferior flavicet. Maculis duabus nigris circa 5 & 6 ossiculum pinnæ dorsalis diceres accedere ad Labrum num. 2., a quo tamen in cæteris discrepat. Nihil itaque determino.

Notandum est, quod color in hoc Genere admodum varius, & multiplex sit, ac sæpe ludat: hinc si quis, *Labros* quosdam cum heic descriptis conferens, animadvertat omnia ad amussim convenire præter colorem, nihil est, quod obstat, quo minus ad eas Species, cum quibus in omnibus partibus secundum figuram, situm, proportionem, et numerum conveniunt, suos *Labros* referre possit. Nihil tamen minus in construendis Nominibus Specificis ad colorem interdum confugere coacti fuimus; quando nempe numerus, figura, et proportio partium differentias non sat strictas suppeditabant.

Præcedentibus tabulis, quæ ad Pisces pertinent, exhibuimus illas omnes cum icones, tum manuscriptas Piscium historias, quæ a D. Auctore, quum viveret, editioni destinatae, jamque paratae, post ejus mortem inveniri a nobis potuerunt.

## English translation

Ichthyological manuscript elaborated by Peter Artedi for use in Seba's *Thesaurus*, exhibiting a specimen of *Ichthyologia*

Extract from the editor's *Præfatio* to Seba's *Thesaurus*, vol. 3, second page:

*The present part of this work, dealing with the fishes, ought to be all the more dear to Ichthyophiles who love systematically, as they say, to order and separate by their constant characters the diverse genera and species of these animals, because the descriptions of the fishes, albeit not all of them that appear here, are due to that most famous Investigator of fishes, Artedius. He, the greatest Ichthyologist, had finished almost the whole of the history of fishes of Seba's Museum, when, late at night, intending to return home from Seba's house, he accidentally, because of the darkness,*

*strayed and fell into one of the dykes of this city and, grievously drowned in the waters, ended his life to the great damage and pain of our Author.*

More than one hundred Fishes, principally from Ambon and Suriname, arranged according to a certain natural Method, with their distinct Genera, new Differences of Species, and, concerning Fishes already described, with the principal naming Authorities.

I. Rough-skinned Fishes. Genus of the *Ostracion*,<sup>402</sup> of which I know 15 Species.<sup>403</sup>

X. OSTRACION, *four teeth, somewhat round, back mottled with black lines, very short prickles on all sides.*

a. Head blunt.

b. Body thick, somewhat round in circuit.

c. Mouth narrow, furnished with two very large teeth neighbouring one another, on each jaw. Lips thick.

d. Nostrils large. Eyes oval. Gill apertures small.

e. Skin tough, everywhere covered with many prickles, each bent backwards. Towards the tail, however, and on anterior part of the head there are no prickles.

f. Colour on the belly and entire nether part whitish but on back dark tawny, with five black, transverse lines, white, wide, and mottled.

g. Dorsal fin with 11 small bones, pectoral fins with 17, anal fin with 10.

Tail even at its extreme end or a little convex, with 13 small bones of which the middle ones are slightly larger than the others. Dorsal fin sited at extreme end of the body close to the tail itself, tall, of about 16 small bones of which the end ones are very short. Anal fin sited opposite to it and similar with 17 or 18 small bones. Tail wide, circling the extreme end of body, of 19 soft small bones, short and divided at the tip.

\* Extreme end of body appears almost to be cut off.

Length of specimen described of two inches, 7 lines. Width, greatest, of about 8 lines.

<sup>402</sup> Gr. Ὀστράκον (n. 'potsherd').

<sup>403</sup> As Artedi only mentions one of these 15 species by name, giving a description, we may assume that this species was the only one presented to him by Seba for analysis.

II. Genus of the *Cyclopterus*.

1. CYCLOPTERUS. *Lumpus Anglorum*, Gesner *Paralipomena*, p. 1284, French Edition; Aldrovandi Book 3, ch. 68, p. 479; Willughby p. 208, Ray p. 77.

*Lepus marinus nostras, orbis species* Schoneveld p. 41.

*Snottolf et Son-visch* in Holland, *The Lump-Fish* in England.

*Description.*

C. X. a. Body short, thick, somehow rather round and heptagonal.

b. Back pointed, crooked. Belly wide, flat, and low.

c. Mouth, that is open mouth, of moderate size.

d. Gill apertures small.

e. Many rows of small teeth in each jaw by the gullet.

f. Colour of recently caught individuals mixed of reddish and blackish.

g. Scales, none, but a tough skin is everywhere sown with sharp and blackish tubercles; of the larger tubercles, first, three rows extend longitudinally on each flank and a fourth rises on the back itself, so that the fish is somehow made septangular. The dorsal row contains 12 larger lateral tubercles, the top one containing about thirty, the middle one 20 etc., the bottom one 9 larger ones. But these latter tubercles vary very much in number in different individuals.

h. Prominence or skin appendix in front of dorsal fin.

i. Single fin at extreme end of the back towards the tail, of 10 small bones. Pectoral fins wide of 20 small bones.

k. Single ventral fin on the chest itself like a slightly rounded fringe, attached horizontally to the chest and containing in the middle some small bulges, about 15 in number, from which it is commonly said that this fish is marked with the sign of the Sun.

l. Anal fin in the dorsal region, of 9 or 10 small bones.

m. Square tail of 12 small bones.

n. Britannic and German Ocean, the Baltic Sea etc.

Order of Centrally Finned Fishes, that is those in which the small bones of the dorsal fin are mainly simple and very often pointed.



III. Genus *Balistes*, of which I know 6 species.

Species 1. BALISTES, *three prickles on its back, tail much two-pronged.*

*Gicaperica Brasiliensibus*, Peixe Porco in Portugal, Marcgraf Book IV c. XII. Jonston p: CXXXI Tab. XXXIV fig. II.

*Gicaperica maxima caudata* Willoughby, *Ichthyologia* gr. Tab 1 f: XXIII.

- a. Head and body vertically wide.
- b. Mouth narrow, teeth large and close together, of which 8 in each jaw are more conspicuous than the others.
- c. Scales very large, very hard, square. Body colour greyish, but two wide, blue and transverse lines drawn from the snout to the pectoral fins.
- d. First pectoral fin contains 3 prickles, of which 1 very strong and thick. Dorsal furrow cut in behind this fin.  
Second dorsal fin of           20 small bones  
Pectoral fin of                 15 small bones  
Anal fin of                     27 small bones.
- e. Prickle or large bone directed backwards on belly in front of anus.

Species 2. BALISTES, *three thorns on its back and three rows of prickles, 14 in number, on each side towards the tail.*

- a. In most respects it agrees with the preceding, but:
- b. Body blackish in the middle and some oblique lines, white, often descend from the inner side of the flanks to the anal fin; these are not, however, present in all individuals.
- c. Three rows of swarthy, short, prickles arranged in a straight line lengthwise, on each side towards the tail.
- d. First dorsal fin contains three prickles, of which the first is largest and from its anterior part rough with tubercles.  
Second dorsal fin of           24 small bones  
Anal fin of                     21 to 22 small bones  
Pectoral fins, short, of       14 small bones
- e. Tail square, at its extreme end even and not two-pronged as in first species. Bone, large, blunt, gifted with a joint and rough with tubercles on belly in front of anus.

Species 3. BALISTES, *three thorns on its back, the scales of this species being everywhere pointed.*

a. In many respects it agrees with second species, but:

b. towards the back it is blackish, and its scales have, in their middle, a small and very short prickle; hence, it comes out as entirely rough.

c. Second dorsal fin of 16 small bones. Anal fin of 24 small bones.

d. Tail, at its extreme end, white and even, of 12 small bones; it is about two inches long.

Species 4. BALISTES, *two thorns on its back, of one colour, small-scaled, rough.*

a. In many respects it agrees with the preceding, but:

b. Scales are very thin and everywhere roughish with very short prickles; body colour whitish.

c. Bone, thick, rough with tubercles, on belly in front of anus.

d. First dorsal fin made up of two prickles, of which the first is long and strong, but the second is so short that it barely comes into view.

Second dorsal fin of 34 small bones.

Pectoral fin of 13 small bones.

Anal fin of 30 small bones.

e. Tail is at its extreme end almost even, of 12 small bones.

Species 5. BALISTES, *of one colour, almost consistent, of 12 small bones, rough, with dorsal prickle at posterior end serrated with small hooks.*

a. In most respects it agrees with the fourth species, but:

b. First dorsal fin is made up of two prickles, of which the anterior is long, strong, and at its posterior end on both sides serrated, as it were, with small hooks, that is, small prickles. The posterior prickle is very short and hardly to be seen.

Second dorsal fin of 28 to 29 small bones.

Anal fin of 27 small bones.

c. Towards the tail there are on each flank some prickles or prominences, formed like hairs and flexible, so that at this very place it comes out

as somehow hairy. In some individuals, however, these prominences are very short and inconspicuous.

Species 6. BALISTES, *snout oblong, pointed, black stain mottled with white spots by the belly.*

- a. Head and snout much longer and narrower than in preceding species.
- b. Mouth very small and narrow.
- c. Scales small, somewhat blunt, shiny, but on each side towards tail they come out as hairy, but less so than in the fifth species. Colour whitish but mottled with spots, somewhat round, tawny and pale.
- d. First dorsal fin made up of two prickles of which the front one is long and straight and everywhere rough with small tubercles. Posterior fin is so short that it does not come into view. Furrow on the back behind this fin.

Second dorsal fin of            30 small bones

Anal fin of                        28 to 29 small bones.

Length of fish described about 3 inches.

IV. Genus of the *Chætodon*, showing its 33 Species.

Genus of the *Chætodon*.

1°. *Chætodons with lateral prickle on each side by the tail.*

Species 1. CHÆTODON *with mottled longitudinal lines, two-pronged tail and lateral prickle on each side.*

1. Head much descending from eyes to snout.
2. Teeth, one row in each jaw.
3. Scales, somewhat rough.
4. Lines, 9 narrow, blue-whitish, lengthwise on each side, and on their sides there is on each side a tawny line, so that the number of tawny lines is about — to 18; the intermediate parts, that is, the other lines are either 6 or 7.
5. Dorsal fin of 36 small bones of which 9 with prickles, pectoral fins of 16 small bones; ventrals of 6 small bones. Anal fin of 29 small bones, of which 3 with prickles.

6. Tail large, two-pronged, of 16 rather long small bones.
7. Sharp prickle on each side towards the tail, bent forward.

Species 2. CHÆTODON *blackish, tail whitish, even, and a lateral prickle on each side.*

1. Head, body, mouth, teeth, and scales as in preceding species No. 1.
2. Pectoral fins of 16 bones; ventrals of 6 bones. Dorsal fins of 38 bones of which 9 with prickles. Anal Fin of 29 bones, of which 3 with prickles.
3. Tail even at extreme end, of 16 rather long small bones.
4. Prickle by the tail, as in preceding species, No. 1.

Species 3. CHÆTODON *blackish, tail somewhat two-pronged, and a lateral prickle on each side.*

1. Mouth and teeth as in No. 2.
2. Scales very thin, somewhat rough.
3. Dorsal fin of 33 to 34 small bones of which 9 with prickles. Pectoral fins of 15 to 16 small bones; ventrals of 6. Anal fin of about 27 small bones, of which 3 with prickles.
4. Lateral prickle by the tail as in preceding.

Species 4. CHÆTODON *whitish, five swarthy transverse lines, lateral prickle on each side.*

1. Head, body, teeth, etc. as in No. 3, but five transverse, blackish lines on each side.
2. Dorsal fin with 30 bones of which 9 with prickles. Pectoral fin with 15 to 16, ventrals with 6 bones. Anal fin with 22 bones of which 3 with prickles.
3. Tail even at extreme end of 16 rather long small bones.
4. Short prickle on each side towards the tail as in preceding, No. 3.

Species 5. CHÆTODON, *black, head with two thorns, four transverse, curving lines on each side.*

*Acarauna exigua, nigra, zonis aliquot luteis eleganter depicta*, Lister in *Appendix to Willughby*, p. 23; Ray, *Synopsis* p. 103.

1. Lower jaw slightly longer than upper jaw.
2. Teeth, many rows of small ones, in each jaw.
3. Middle lamina of gill covers at its lower part ends into a large and strong prickle.
4. Dorsal fin of 41 small bones, of which 10 with prickles. Pectoral fin of 19 small bones; ventrals of 6 small bones. Anal fin of 27 small bones of which 3 with prickles.
5. Tail somewhat rounded at end, of 17 small bones, rather long.

Species 6. CHÆTODON, *two short prickles above the eyes and third small bone of dorsal fin very long.*

1. Snout long and much drawn out.
2. Teeth, longish, many rows in the jaws.
3. Small bone, serrated and a short prickle on each side above the eyes.
4. Scales very small, hard, and rough.
5. Colour made up of some black and white lines, wide and transverse.
6. Dorsal fin of 46 small bones of which 7 with prickles and 3 very long ones, drawn out, so to speak, into a thread.
7. Pectoral fins of 18 small bones; ventrals of 6 small bones; anal fin of 36 small bones of which the three first with prickles.
8. Tail long, somewhat two-pronged, of 16 small bones.

Species 7. CHÆTODON, *greyish, with prickle on each side by mouth, and the third small bone of the dorsal fin thread-like, very long.*

1. Prickle, turned backwards, on both sides by the angles of the mouth, which preceding (6) lacks.
2. Colour of body white-greyish, shiny, scales very small.
3. Dorsal fin of 46 small bones; anal fin of 36; pectoral fins of 17 to 18; ventrals of 6 small bones as in No. 6.

Species 8. CHÆTODON, *large-scaled, two black lines on each side, fourth small bone of dorsal fin very long, thread-like.*

*De Tafelvisch* of H. Ruysch in *Theatrum animalium* Tab. I, fig. 1, p. 1. According to this Figure it is in some ways similar to ours, but its

description is defective, nor does the description it does have deal with a fish with a snout altogether similar, nor does its shape in all respects answer to the rule.

1. Small teeth, many rows in each jaw.
2. Scales large, located like gutter-tiles, somewhat rough.
3. Dorsal fin of 37 small bones of which 11 with prickles. Pectoral fins of 18 small bones; ventrals of 6 small bones. Anal fin of 22 to 23 small bones.
4. Tail almost straight at extreme end.

Species 9. CHÆTODON, *large-scaled, three black lines, wide, on each side, and a fourth one on the tail itself.*

1. Rows of small teeth and large scales, rough, as in preceding species (8).
2. Colour of body whitish, with four transverse, black and wide lines on each flank.
3. Dorsal fin of 33 small bones of which 12 with prickles. Pectoral fins of 16 small bones; ventrals of 6 small bones. Anal fin of 21 small bones of which 3 with prickles.
4. Tail convex at extreme end.

Species 10. CHÆTODON, *large-scaled, blackish, with two white lines on each side by the head.*

1. Rows of teeth and scales as in No. 8 and 9.
2. Colour of almost entire body blackish, except those whitish transverse lines by the head.
3. Dorsal fin of 40 small bones, of which 12 with prickles. Pectoral fins of 16 small bones; ventrals of 6 small bones; anal fin of 24 small bones of which 3 with prickles.
4. Tail convex at extreme end.

Species 11. CHÆTODON, *large-scaled, whitish, with black line by the eyes and a round stain on the dorsal fin.*

1. Rows of small teeth and scales as in preceding species.
2. Snout oblong and drawn out.

3. Colour of entire body whitish, but a round, black stain on upper side at the end of dorsal fin.

4. Dorsal fin of 37 small bones of which 13 with prickles. Anal fin of 23 small bones of which first 3 with prickles.

5. Tail convex at extreme end.

Length about 1 inch and 8 lines.

Species 12. CHÆTODON, *large-scaled, whitish, with eight black transverse lines on each side.*

1. Rows of small teeth and scales as in preceding species No. 9, 10, and 11.

2. Snout short and very little drawn out.

3. Dorsal fin of 29 to 30 small bones, of which 11 with prickles. Anal fin of 20 small bones, of which 3 with prickles.

4. Length 1 inch and 8 lines. Width at the middle of the body 1 inch and 1 line.

Species 13. CHÆTODON, *of silvery colour, with ventral fins owing to their short length nearly invisible.*

1. Small teeth, as in No. 12.

2. Scales whitish, small.

3. Dorsal fin of 38 small bones, of which 8 with prickles. Pectoral fins of 16 to 17 small bones; ventrals of 6. Anal fin of 33 small bones, of which 3 with prickles.

4. Tail long, slightly two-pronged at extreme end, of 17 small bones.

5. Length of body about 2 inches. Width at the middle of body, 1 inch, 2 lines.

Species 14. CHÆTODON, *off-grey, very little spotted, second small bone of ventral fins thread-like.*

1. Rows of small teeth as in preceding.

2. Scales small and somewhat rough.

3. Colour of body dark grey with some irregular and hardly visible spots on each side.

4. Dorsal fin of 31 small bones, of which first 9 with prickles; pectoral fins of 17 to 18 small bones; ventral fins of 6; anal fin of 32 small bones, of which 3 with prickles.
5. Tail somewhat round at extreme end.
6. Length 1 inch 9 lines.

Species 15. CHÆTODON, *four-square, blackish, with the middle<sup>404</sup> of the dorsal and anal fins drawn out into a prominence.<sup>405</sup>*

T'Zeebotje in H. Ruysch, *Theatrum animalium* p. 18, a figure of which is given in Tab. 10, f. 7; it partly agrees with ours, but it does not have so hard and bony ventral fins as Ruysch states for his specimen.

1. Rows of small teeth as in No. 14.
2. Scales not large. Colour blackish and dark on entire body.
3. Body four-square or rather rhomboid, if you remove the fins.
4. Dorsal fin of 41 small bones of which 5 with prickles. Pectoral fins of 17 small bones; ventrals black and long, of 6 small bones; anal fin of 30 small bones of which 3 with prickles.
5. Length of body 3 inches. Width between beginning of dorsal and anal fins also 3 inches.

No. 23, for No. [16 to] 22, *see below.*<sup>406</sup>

Species 23. CHÆTODON, *whitish, large-scaled, tail two-pronged, gill covers very little serrated.*

- a. Two rows of short small teeth in each jaw and furthermore small bones, rough with small teeth, in gullet.
- b. Each lamina of the gill covers serrated in circuit, as it were, by small teeth, particularly the lower one.
- c. Very large scales, oblong-square, sharp and white.
- d. Two rather dark, transverse lines on the body itself. Colour of body itself is silvery-white.

---

<sup>404</sup> middle: 'extreme ends' would better fit Seba's icon, Tab. 25, No. 15.

<sup>405</sup> The meaning of this description is unclear but its interpretation is helped by Seba's picture.

<sup>406</sup> A new, more spacious, hand appears to have taken over the work from this point, erroneously entering the article of Species No. 23 first, and then correcting the error with notes before and after the article.



- e. Dorsal fin of 24 small bones of which 12 with prickles, the rest soft.
- f. Pectoral fins white, of 18 small bones. Ventral fins blackish of 6 small bones. Anal fin white of 14 small bones of which the first two with prickles, the rest soft.
- g. Tail white, two-pronged at its extreme end.

To the Genus of *Chætodon* above:

Species 16. *CHÆTODON*, *large-scaled, whitish, black line by the eyes and a round stain by the tail.*

- 1. Lower jaw is longer when mouth is open.
- 2. Colour of body whitish, but with, 1<sup>o</sup>, a blackish, transverse line in the region of the eyes, and, 2<sup>o</sup>, a black round spot, surrounded by a white circle, at extreme end of the body towards the tail.
- 3. Dorsal fin of 32 to 33 small bones, 13 with prickles, the rest soft. Pectoral fins of 15 small bones; ventrals of 6 small bones, of which the first is prickly and very long; anal fin of 20 small bones, of which three are strong and prickly, the rest soft.
- 4. Tail almost straight at extreme end.

Species 17. *CHÆTODON*, *large-scaled, yellowish-white, snout very long, bony, black stain by dorsal fin.*<sup>407</sup>

- 1. In many respects this agrees with the preceding one, but the snout is very long, bony and rather pointed. The mouth, however, is very small.
- 2. Colour of body is white-yellowish, but four transverse and rather dark lines on each flank, of which the
  - 1<sup>st</sup> crosses the eye,
  - 2<sup>nd</sup> and 3<sup>rd</sup> lines are in the middle of the body,
  - 4<sup>th</sup> line is wider than the others towards the tail; and besides these there is, 1<sup>o</sup>, a black, transverse line at the beginning of the tail, and 2<sup>o</sup>, at the base of the dorsal fin, at its penultimate place,<sup>408</sup> a round black, quite large, black spot.

<sup>407</sup> If the text given in *Manuscriptum* is regarded as correct, it must be construed 'by the first (transversal line) of the tail'.

<sup>408</sup> A large black spot, surrounded by a white halo, exists on the dorsal fin, between the penultimate and ultimate transverse lines. Cf. Seba *ad loc.*

3. Dorsal fin, yellowish, of 39 small bones of which 9 with prickles, short, and strong, the others soft. Pectoral fins of 15 small bones; ventrals of 6 small bones of which the first is prickly, the others soft and full of branches.

4. Anal Fin of 23 to 24 small bones of which three with prickles. Tail straight at its extreme end.

Species 18. CHÆTODON, *large-scaled, whitish, swarthy line by eyes, tail, anal fin and dorsal fin.*

1. Very similar to species No. 16, described.

2. Line, blackish, longitudinal on anal and dorsal fin, at their extreme ends.

3. Dorsal fin of 35 small bones of which 13 are prickly, the others soft. Pectoral fins of 15 small bones; ventrals of 6 small bones, of which the first with prickles.

4. Anal fin of 23 small bones, of which the first three are prickly, the others soft.

5. Tail straight or somewhat convex at its extreme end.

Species 19. CHÆTODON, *tawny-reddish, two prickles on each side below the eyes.*

1. Body more oblong than in preceding.

2. Middle and lowest laminae of the gill covers are serrated in circuit by some short prickles, but the top one, by the eyes, ends at its lower edge in two large spines of which the posterior one is three times longer than the front one.

3. Dorsal fin lower in the middle, of 28 to 29 small bones of which 10 or 11 are prickly, the others soft. Pectoral fins of 17 small bones; ventrals of 6 small bones of which the first is prickly. Anal fin of 17 small bones of which 2 are prickly, the others soft.

4. Tail wide, round at extreme end.

Species 20. CHÆTODON, *three white lines on each side, laminae of the gill covers much serrated.*

1. It is in many respects similar with the preceding No. 19 but

2. Colour of body dark grey, mottled with three wide lines or zones, transverse and whitish, of which the first is by the gill covers, the second, very wide, on the middle of body, the third at the beginning of the tail.
3. The top and bottom laminæ of the gill covers are in circuit very much serrated with many prickles but the middle one lacks these same.
4. Dorsal fin, lower in the middle, of 26 small bones of which 2 with prickles, the rest soft. Pectoral fins of 17 small bones; ventral fins of 6 of which the first is prickly.
5. Anal fin of 13 small bones of which 2 with prickles, the rest soft.
6. Tail somewhat round at extreme end.
7. Length of body about 2 inches.

Species 21. CHÆTODON, *square, of silvery colour, with two short prickles in place of ventral fins.*

- a. Body square and, because it is round, with a width surpassing its length.
- b. Lower jaw somewhat longer than upper jaw.
- c. Teeth, many rows in the jaws, palate, and gullet. Eyes large and spherical.
- d. Colour of entire body and fins silvery. Scales large, square-round, white.
- e. Pectoral fins of 17 small bones. Dorsal fin of 43 small bones of which 8 with prickles. Anal fin of 39 small bones, very large and wide of which the first 3 with prickles and very strong. Tail wide and almost straight at its extreme end.
- f. Two prickles, very short but strong, bent backwards on belly above anus, which are instead of ventral fins.

*On p. 26 of the manuscript the text is wholly erased, Species 22 and §§ 1 to 4 of Species 23 missing.*

Species 23. [Description mutilated: heading and beginning of text missing].

[1. to 4. missing]

5. Scales so small that they barely stay in view. Colour of body dark tawny or blackish.

6. Fins, one single at posterior end of back of 24 small bones, difficult to count because of a thick membrane. Pectoral fins short, of 25 to 26 small bones. Ventral fins sited below pectoral fins, of 6 soft small bones.

7. Anal fin diametrically opposite dorsal fin, of 23 small bones.

8. Tail somewhat two-pronged at extreme end, of 17 small bones, long. Length 7 inches, width at the middle of body 1 inch, 2 lines.

To the Genus of Chaetodon:

Species 24. CHÆTODON, *two shiny lines on each side, laminæ of gill covers serrated, tail straight.*

In many respects it agrees with no. 22, but the middle and upper lamina of the gill covers mainly lack prickles. One single row of teeth in jaws. Body colour tawny-blackish but two wide transverse lines, white, that is milk-coloured, on each flank, the anterior by the gill covers, the posterior on the middle of body. The extreme end of the body and also the whole tail are white. Pectoral fins of 18 or 19 small bones; ventrals of 6. Dorsal fin incised in its middle almost to its base, of 25 small bones of which 11 with prickles, the others soft. Anal fin of 15 to 16 small bones of which the first with prickles. Tail is straight at its extreme end, scales rough. Length 3 or 4 inches.

[Species 25, 26, 27 — offered by Seba — are missing in the manuscript, No 28 following directly, without comment, upon No. 24.]

Species 28. CHÆTODON, *grey, large-scaled, only the middle lamina of the gill cover serrated.*

In almost every respect this agrees with the preceding but the upper lamina of the gill covers has no teeth in its circuit, and the lower one, too, is smooth, only the middle one being serrated. Teeth, one row in the jaws. Dorsal fin of 27 to 28 small bones of which 12 with prickles, the rest soft; ventrals blackish along their edges, of 6 small bones. Anal fin of 15 small bones of which 2 with prickles. Tail somewhat two-pronged at its extreme end.

Species 29. CHÆTODON, *large-scaled, dark grey, three white lines on each side, tail two-pronged.*

All three laminæ of the gill covers are smooth in circuit and not serrated. Lines, three, white, transverse on each flank the first of which at

the edge of the covers, the second on the middle of the body, the third on the end of the body by the tail. Ventral fins, anal fin, as well as the base of the tail, blackish. Dorsal fin of 25 small bones of which 13 with prickles. Anal fin of 14 small bones of which first 2 with prickles. Tail somewhat two-pronged at extreme end.

Species 30. CHÆTODON, *white from tawny, spotted, four prickles by the anal fin.*

The back rises up from the head. Scales very small. Colour of the body white, but with mottled tawny-blackish stripes or spots. Dorsal fin of 27 or 28 small bones of which 11 with prickles. Anal fin of 17 or 18 small bones of which 4 with prickles and short. Tail straight at its end, of 15 to 16 small bones. Length, about 1 inch.

Species 31. CHÆTODON, *oblong, mottled with some large white stains.*

Body small, oblong, head blunt. Middle lamina of the gill covers lightly serrated in its circuit. Scales small. Colour of body tawny, mottled with about 6 large white spots. Dorsal fin of 31 small bones of which 13 with prickles; ventral fins white, of 6 small bones; anal fin of 10 small bones of which first 3 with prickles. Tail oblong, somewhat pointed at extreme end. It is one and a half inch long.

Species 32. CHÆTODON, *mottled with longitudinal tawny lines, dorsal fin high in front.*

Head blunt; back rising from head; upper jaw slightly longer than lower jaw; teeth, small, many lines in the jaws. Scales of medium size, somewhat rough. Colour of body whitish but mottled with longitudinal lines.

Dorsal fin long, of 49 to 50 small bones of which 11 with prickles. Ventral fins black, of 6 small bones. Anal fin small of 9 or 10 small bones of which 2 with prickles.

Genus of the *Holocentrus*.

Species 1. *Holocentrus* derives from ὅλος ‘whole’ and κέντρον ‘prickle’, for all external parts of this fish: head, fins, scales, and the tail itself, are prickly. Fishes of this kind, and also my own specimen, have until now been unknown.

*Description.*

Head and body compressed from the sides; back convex, belly rather wide. Mouth is of moderate size, jaws equal, double nostrils on each side. Eyes very large, round, covered with skin. Gill openings very large. Laminae of the head all end in very many prickles; the middle one ends in one single prickle, very much stronger than the others, and the end ones in two large prickles on each side. Small teeth or rather rough tubercles in the jaws, palate, and gullet. Colour of the body white from silvery, into which, however, some gold is inmixed mainly in adult specimens, and, furthermore, 6 or 7 lighter and more shiny lines extended lengthwise on each side. Scales very large, very hard, shiny and pretty, serrated at the posterior end by a large number of small prickles. Pectoral fins whitish, of 14 small bones. Ventral fins sited slightly lower, very close to each other, white, of 8 small bones of which the first is prickly, the rest soft.

Note: The number of eight small bones, mainly in the ventral fins, is very rare in acanthopterygian fishes, for generally, all of them have only six small bones.

Dorsal fin large, at its posterior end incised almost to its base with 24 to 25 small bones, of which the first are prickly, the others soft and branching. This fin emerges in a kind of furrow. Anal fin is whitish, of 13 small bones of which the first four with prickles, the rest soft and branching. The third prickle is very strong and thick, in its posterior part ploughed into a furrow. The tail is whitish, much two-pronged, of 19 small bones, rather long; on each side of the tail there are 4 or 5 prickles, which is very rare and shared by very few fishes. Length of specimen described 6 inches, largest width 1 inch, 9 lines.

*Inner parts.*

Liver divided into two lobes of which the left is much larger. Ventricle not large. Intestine bent backwards once. Some slightly fatty appendices by the pylorus. Air bladder very large, affixed to dorsal spine.<sup>409</sup> Ribs, 9 on each side.

---

<sup>409</sup> Or: air bladder affixed to largest dorsal spine.

VI. Genus of the *Pentanemus*.

Species 1. *Pentanemus* is derived from πεντάς 'five' and νῆμα 'thread', for at the lower part of the pectoral fins it contains on each side five small bones shaped like threads and very long, which is unusual in other fishes.

*Description:*

Head and body vertically wide. Back convex. Open mouth of moderate size. Jaws equal. Nostrils large, double on each side. Eyes of moderate size, round, covered with the skin of the head, iris of silvery colour. Some ducts in the head, under the skin. Snout blunt, round. Gill apertures very large. Small teeth or tubercles, extremely small, in the jaws, palate, and gullet. Tongue smooth. Colour of entire body silvery, all fins whitish. Scales of moderate size, white, soft, lightly serrated in posterior part, hence they feel somewhat rough. Lateral line curved, closer to back than to belly. Two fins on the back of which the first is small, of 7 small bones, somewhat prickly, and short; the second is larger and higher, of 16 small bones of which the first is prickly, the rest soft. Pectoral fins long and narrow, of 16 small bones each of which is undivided at the tip. Ventral fins white, short, close to each other, of 6 small bones of which the first is prickly, the others soft. Anal fin large, of 30 or 31 small bones of which the first 2 with prickles and short, the others soft and branching. Tail white, large, much two-pronged, of 17 small bones. Of the thread-shaped small bones on the chest, the lowest on each side is short, the two in the middle are longest and almost twice as long as the body itself, the two top ones are somewhat shorter than the middle ones.

This fish is very strange and rare.

Length in specimen described 8 inches. Largest width 1 inch, 8 or 9 lines. Length of the longest thread-shaped small bone 14 inches, 7 or 8 lines.

VII. On the Genus of the *Scomber*.

No. 3

SCOMBER, *lateral line with prickles, anal fin of twenty small bones.*

*Guara Tereba Brasiliensis* Markgraf Book IV, ch. 17; Jonson CXXXVI, Table XXXV, Fig. 4; Willughby *Species* Table Sv. XVIII, Fig. 1.

Back between fin and head pointed and somewhat rising. Mouth of moderate size, jaws of almost the same length but, when mouth is open,

the lower appears to be longer. Eyes of moderate size, round, iris yellow. Gill openings very large. Small teeth in jaws, palate, and gullet. Scales small and soft. Colour of body silvery mixed with gold. Lateral line curved in front like a bow and by the back bent and smooth, but from the middle of the body it stretches straight to the tail and is prickly with wide prickles bent backwards. Number of these prickly prominences is about 30 on each side. Two dorsal fins almost neighbouring one another, of which the first contains 8 prickles, all of which emerge as if from a furrow. The posterior of 22 small bones of which the first is stiff, the rest soft and branching. Pectoral fins, long, of 21 small bones, branching at the tip, except the first two. Ventral fins white, small, of 6 small bones, much branching, except the first one. Anal fin, long, of 19 to 20 small bones of which the first 3 with prickles, the rest soft and branching. Tail much two-pronged. Length 4 inches, 6 or 7 lines. Greatest width 1 inch, 6 lines.

No. 4

Species 2. SCOMBER, *whitish, with width half of its length, with small hairlike teeth.*

Head, back, belly, eyes, scales and colour as in preceding species, but the body is wider and the back rises more from the head. Mouth, that is its opening, is narrow. The jaws of almost the same length, or the upper jaw is somewhat more drawn out. Two small and very short prickles above each eye. Eyes very large. Gill openings of moderate size. Small and hairlike teeth in the jaws and sharp small bones at the gullet. Lateral line curved, close to the back. One single dorsal fin, long, of 23 or 24 small bones of which the first 8 with prickles and longer, the rest short and soft. Pectoral fins of 19 small bones; ventral fins small of 6 small bones, of which the first is thorny. Anal fin large, of 16 or 17 small bones of which the first 3 with prickles and longer, the rest low, soft and branching. Tail much two-pronged, similar to open scissors. Hard bone under the skin between anus and anal fin. Length 3 inches, 8 or 9 lines. Largest width 1 inch, 8 lines.

Species 3. ABUCATUAIA.

*Peixe* in Brazil. *Galle* in Portugal G. Marcgrave Book V, Ch. 11; Willughb p. 295; Ray p. 99. *Gallus marinus seu faber Indicus* in appendix to Willughby's *Ichthyologia*, p. 3. *Ican Kapelle* H. Ruysch, *Theatrum* p. 16, t. 9, p. 7.



Head and body thin and vertically wide. Back and belly much pointed. Lower jaw somewhat longer than upper. Teeth small, hardly visible, in each jaw. Colour of body silvery and shiny. Lateral line curved and bent towards the back. One single dorsal fin of 31 small bones of which the anterior 9 with prickles, the rest soft; the first of the soft ones is very long and drawn out, as it were, into a hair, the rest much shorter. Pectoral fins long, of 20 small bones. Ventral fins very long and blackish of 6 small bones. Anal fin of 20 small bones of which only the first is prickly, the rest soft. The first soft one is longest and drawn out, as it were, into a hair. Tail wide, much two-pronged of 17 long small bones. Belly between ventral fins and anal fin made up of pure bone, thin and pointed.

VIII. *Grammistes*, from γραμμή 'line', as it on each side has white longitudinal lines.

No. 6

Species 1. GRAMMISTES, *head, body vertically wide.*

Mouth, that is, open mouth, very large. Lower jaw somewhat longer than upper. Eyes of moderate size, somewhat round. Middle lamina of the gill covers is on its circuit serrated with some prickles, the outer one ends in three sharper prickles. Many small teeth in the jaws, palate, and gullet. Scales very small, soft and smooth. Colour of body reddish but mottled with longitudinal lines, white and parallel, on each side; these lines are often 7 or 8 in number. All fins are white. One single dorsal fin, incised in the middle all the way to its base, or, if you so prefer, they are two of which the anterior contains 7 or 8 prickles, the posterior one 13 and 14 branching small bones. Pectoral fins somewhat rounded, of 16 or 17 small bones. Ventral fins short, of 6 small bones of which the first is prickly. Anal fin small of 10 or 11 small bones of which the first is prickly and very short, the rest soft and branching. Tail wide, somewhat round at extreme end. Length about 3 inches, 9 lines.

Seba, *Thesaurus* vol. III, p. 75. Introduction to article on *Grammistes*:

Moreover, in our *Museum* we also offer a fish, as far as I know, not named or described before, nor to be referred to any certain genus of fishes. This is named by us, *Grammistes* from γραμμή, line, seeing that it is marked on both sides by longitudinal white lines. May the following be its description.

[Description in Latin].

No. 7

Species 1. PERCA *spotted, lower jaw longer, dorsal fin of nine prickles.*

*Description.*

1. Lower jaw longer than upper one.

2. Teeth, four, large, at the tip of the jaws, namely, 2 on each side.

3. Dorsal fin of 25 small bones of which nine with prickles. Pectoral fins of 18 small bones. Ventrals of 6. Anal fin of 13 small bones of which three prickly.

Tail, of 17 small bones, long.

4. Spots, dark or blackish, very tightly spaced on entire body, head, and fins.

Seba, *Thesaurus* vol. III, p. 75. Introduction to articles on *Perca*.

Now we shall exhibit some species of *Perca*, very rare and exotic, and not, as far as we know, described before.

IX. Genus of the *Perca*, of which I know 13 species.

Species 1. PERCA *spotted, lower jaw longer, dorsal fin of nine prickles.*

See description given above.

No. 8

Species 2. PERCA, *entirely mottled with tawny stains and white spots. Dorsal fin of eleven prickles.*

In most respects it agrees with preceding species, but the jaws are almost equal in length. The middle prickle in the last lamina of the gill covers is much longer than the other two, but in the former species they are almost equal. The spots on the body itself are fewer and larger, with white dots on the rim arranged in such a fashion that these tawny spots appear to be pentagons. Dorsal fin of 27 or 28 small bones of which 11 with prickles, the rest soft. Tail is spotted at its extreme end, of 17 longer small bones. The other fins are as in the first species.

No. 9

Species 3. PERCA, *lower jaw longer, mottled with longitudinal lines. Dorsal fins of 11 prickles.*

In many respects it agrees with No. 2, but the eyes are more yellowish. Longitudinal lines, not straight but somewhat curved, are of a darker colour than the body itself. In the fins, no spots are observed, contrary to the second species. Dorsal fin of 29 small bones of which 11 with prickles. Ventral fins of 6 small bones of which the first with prickles. Anal fin of 16 small bones of which the first 3 with prickles. Tail somewhat round at extreme end.

Species 4. PERCA, *lower jaw longer, lined transversely, very black stain by the tail.*

In many respects it agrees with preceding species, but there are small black spots on the rims of the eyes. Scales small, sharp. Colour of body whitish with lines, transverse, wide, and tawny, namely five on each flank; between the dorsal fin and the eyes there are two longitudinal lines on each side. Spot, very black, oblong, on top, by the beginning of the tail. Ventral fins of 6 small bones. Dorsal fin slightly lower in the middle, of 29 small bones of which eleven with prickles. Anal fin of 12 small bones of which 3 with prickles. Tail almost straight at extreme end.

Species 5. PERCA *of one colour, lower jaw longer, black stain at the base of the tail.*

With preceding species it agrees in some respects but the middle lamina of the gill covers is much serrated, and the final one ends in three prickles. The back is somewhat pointed and the back is wider compared to preceding species. A small blackish or tawny spot between nostrils and snout. Colour<sup>410</sup> of the body is greyish tawny, a very black spot upwards by beginning of the tail. Pectoral fins long, of 13 or 14 small bones. Ventral fins of 6 small bones. Dorsal fin of 25 small bones of which 10 with prickles. Anal fin of 11 small bones of which 3 with prickles. Tail somewhat two-pronged at extreme end.

No. 12

Species 6. PERCA, *jaws equal, two lines on each side, transverse, swarthy.*

<sup>410</sup> Ms. has *Tertius color* 'third colour', probably erroneously, as *tertius* is not given by Seba.

In many respects it agrees with preceding species (5), but the back rises more from the head and is somewhat pointed in front. The middle lamina of the gill covers is lightly serrated in circuit. Scales somewhat rough, of moderate size. Colour of body whitish-yellow, but on each side two wide transverse, blackish lines circle the body but are only slightly visible. Pectoral fins oblong and whitish. Ventrals blackish of 6 small bones of which the sixth is prickly. Dorsal fin slightly lower in the middle of 27 to 28 small bones, of which 11 prickly, the rest soft. Anal fin of 13 to 14 small bones of which three with prickles. Tail slightly two-pronged at extreme end.

No. 13

Species 7. PERCA, *jaws equal, head full of spots, tail straight.*

It has many things in common with preceding species but the middle lamina of the gill covers is lightly serrated in circuit and the outermost one is hardly prickly. Back is somewhat pointed in front. Teeth, small, in the jaws, palate, and gullet. Colour of body darkly whitish with some large spots, barely separate, blackish, on both sides of the back above the lateral line. Entire head mottled with very many spots, small, blackish or tawny. Dorsal fin of 22 small bones of which 10 prickly; they rise, so to speak, from a furrow. Pectoral fins of 14 small bones. Ventrals whitish, of 6 small bones. Anal fin of 10 small bones of which the first 3 with prickles. Tail almost straight at extreme end, of 16 to 17 small bones.

No. 14

Species 8. PERCA *of silvery colour, two longitudinal lines on each side, tail two-pronged.*

Back convex. Jaws are very nearly equal in length. Iris white. Scales small, silvery, tightly adhering, hardly rough. Colour of entire body silvery but on the back two lines on each side, pale red, extend longitudinally; however, they only barely come into view. Middle, last and first lamina of the gill covers, under the eyes, are each serrated. Dorsal fin is at the middle incised almost to its base, of 21 to 22 small bones of which 11 with prickles. Pectoral fins white and oblong. Ventrals of 6 small bones of which the first is prickly. Anal fin of 11 or 12 small bones of which the first three with prickles. Tail white, two-pronged at its extreme end. Length, 2 inches and 1 line. Width, about 6 lines.

No. 15

Species 9. PERCA, *lower jaw longer, whitish, with darker transverse lines.*

This agrees in many respects with preceding (8) but the middle lamina of the gill covers contains a single, large prickle; the two others are smooth. Medium-sized scales furnished with somewhat rough rim. Colour of body whitish from silvery, but 7 or 8 darker and barely visible lines divide the body transversally on each side. Dorsal fin incised in the middle almost to its base, of 26 small bones of which 12 with prickles, the rest soft. Pectoral fins whitish of 16 small bones. Ventrals white of 6 small bones. Anal fin whitish of 11 small bones of which 3 with prickles, the rest soft. Tail somewhat two-pronged at extreme end.

No. 16

Species 10. PERCA, *lower jaw longer, entirely mottled with stains and transverse lines.*

The head is narrow, somewhat pointed. Body longer than in preceding species. Small teeth in jaws, palate, and gullet. Middle and final lamina of the gill covers are prickly. Colour of the body whitish, but mottled with tawny-blackish unequal spots on the whole body and some fins, and, moreover, 7 or 8 lines, transverse and tawny, divide the belly between the pectoral fins and the tail. Dorsal fin spotted, of 23 small bones of which 10 with prickles. Pectorals white of 13 to 14 small bones. Ventrals white of 6 small bones of which the first is prickly. Anal fin of 11 small bones of which the first three with prickles. Tail almost straight at extreme end.

No. 17

Species 11. PERCA, *oblong, round, with eight lines, transverse, tawny, on each side.*

Head is oblong, somewhat sharp and a little plagioplateous, that is depressed. Body oblong and wholly round in front. Lower jaw appears to be a little bit longer than upper one. Eyes large and quite close to each other. Middle lamina of the gill covers is smooth in circuit, but the last one ends in two prickles. Colour of body whitish but mottled with 8 or 9 tawny lines, irregular, transverse, on each side. Fins spotted. Dorsal fin of 26 small bones of which only the anterior 5 are prickly, the rest soft. Pectoral fins whitish of 16 or 17 small bones. Ventrals of 6 small bones of which the first with prickles. Anal fin long, of 18 small

bones of which the first is very small and prickly, the rest soft. Tail long, straight at extreme end, of 17 rather small bones.

No. 18

Species 12. PERCA, *upper jaw longer, mottled with longitudinal lines, thirteen prickles on the back.*

Head blunt, much descending from eyes to snout. Anus sited at a remarkable distance from the anal fin. Upper jaw much more drawn out than lower jaw. Furrows, 6, very large, at the tip of lower jaw and two in upper jaw. Eyes large, oval. Gill openings very large. Middle lamina of the gill covers serrated in its circuit by many prickles, the other two are smooth. Scales of moderate size, rough. Colour whitish but mottled with 6 lines, longitudinal and widening. Transverse lines on neck. Dorsal fin of 33 small bones of which 13 with prickles; they come out from a furrow, incised, as it were, into the back. Pectoral fins whitish of 18 small bones. Ventrals white, of 6 small bones. Anal fin of 11 small bones of which first 3 with prickles. Tail almost straight at extreme end, of 17 small bones.

No. 19

Species 13. PERCA, *upper jaw longer, mottled with longitudinal lines, ten prickles on the back.*

In most respects it agrees with preceding (12) but the body is wider in comparison and its back rises more from the eyes and is somewhat pointed. Colour of body white, on each side longitudinally mottled with five or more tawny-reddish lines. Some longitudinal lines on the neck. Dorsal fin of 32 small bones of which the first 10 with prickles; they emerge, as it were, from a furrow. Anal fin of 11 small bones. Other things are, on the whole, as in No. 12.

Species 1. COTTUS, *full of scales, snout two-cleft, pectoral fins extending to the tail.*

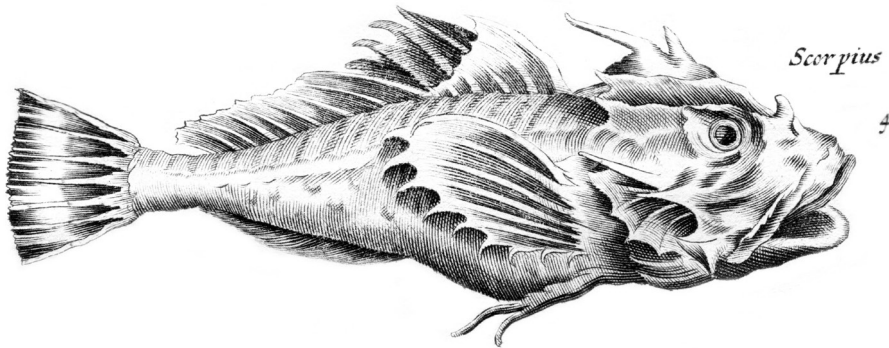
*Description.*

1. Head very prickly.

2. Dorsal Fin of 24 small bones of which 13 with prickles. Pectorals of 14 small bones, very long, not divided at extreme ends. Ventrals of 6. Anal fin of 10 small bones, of which the first 3 with prickles. Tail oblong with 14 very long small bones.

3. Black stains on each fin and on the tail.

Genus of the *Cottus*, of which I know 7 species.



**Figure 14.** A scorpionfish, after Hendrik Ruysch (1663–1727), *Theatrum universale omnium animalium piscium, avium, quadrupedum, exanguium, aquaticorum, insectorum, et angium*, 1718 (vol. 1, pl. 47, fig. 4). License: Public Domain.

Species 1. COTTUS, *full of scales, snout two-cleft, pectoral fins extending to the tail.*

See description above.<sup>411</sup>

Species 2. COTTUS, *full of scales, mottled, small appendices by the jaws, nostrils, and lateral line.*

*Scorpius* Salviani fol. 197 by the icon. *Scorpius major* Gesner, German edition. — Willughby p. 331. — Ray p. 142. [Figure 14]

The whole head abounds in many prickles, but the more prominent prickles are about 44 in number. Anus is placed a long distance from the fin. Open mouth large. Small teeth in the jaws, palate, and gullet. Large cavity between the eyes and another one midway behind the eyes. Barbels, that is small appendices, very numerous, short, in the lower jaw, fewer in the upper. Forward, by the opening of the nostrils, one single small appendix on each side and furthermore many small ones by the lateral line. By the eyes, however, none are to be seen. Scales of moderate size, hard, tightly adhering, oblong-rounded but not rough. Colour is mottled from black, reddish, and whitish, dirty and disagreeable to see. Lateral line close to the back. Dorsal fin mottled, lower in the middle, of 22 or 23 small bones of which 12 prickly and strong, the

<sup>411</sup> This heading and description appear by accident to have been entered after the first species, an error corrected by this note.

rest soft. Pectoral fins wide and mottled with spots, of 20 small bones of which 8 or 9 are two-cleft at the tip, the rest undivided. Ventral fins are mottled of 6 small bones of which the first is prickly, the rest soft. Tail long, almost straight at extreme end, of 15 small bones. Length of body 8 inches and more.

Species 3. *COTTUS*, *lower jaw longer, with barbels, ventral fins adhering to belly.*

Head is more oblong than in preceding species (2) and very much unequal, for, on each side, it contains 16 or 17 prickly prominences, jutting out far beyond the orbits of the eyes. Body vertically wide, lacking scales. Mouth large. Lower jaw somewhat longer and directed upwards, for the upper jaw is very wide at the tip. Two larger barbels and some smaller ones in the lower jaw; in the upper jaw, in the laminae of the gill covers, and on the lateral line many others are found. Eyes far removed from the snout and very near to the dorsal fin, small, separated by large bony orbit. Very large cavity between the eyes. Small teeth in the jaws, palate and gullet. Colour mottled from tawny-blackish and disagreeable to see. On the back, just above the lateral line, about five ducts or holes can be seen, ordered in a straight line on each side. Dorsal fin long and high, of 24 small bones of which 17 prickly and long, the rest soft. Pectoral fins large and mottled, of 10 small bones, but at the lower part on each side there are two small bones, somewhat removed from the others and bent at their extreme ends like hooks, so that the true number of small bones in the pectoral fins is 12. Ventral fins oblong, at their inner part affixed by a membrane to the belly itself, of 6 small bones of which the first is short and prickly, the rest soft. Anal fin long, of 13 small bones of which first 2 somewhat prickly and short, the rest soft and longer. Tail is oblong, somewhat round at its extreme end, marked with two blackish lines, of 13 to 14 small bones. Length of body about 4 inches.

Species 4. *COTTUS*, *lacking scales, mottled, lower jaw longer, much provided with barbels.*

Head plagioplateous, covered with soft skin, wider than the body itself. The body itself is on the whole somewhat round, the back convex, belly wide. Mouth, that is open mouth, very large. Lower jaw somewhat longer than upper one and on top much drawn out. Barbels, very numerous, rather thick, in lower jaw and moreover some larger and smaller at the angles of the mouth, on the gill covers and on top of the head itself. Above each eye there are two rather large ducts and various



small holes in the jaws and the head itself. Eyes somewhat round, close to the snout, upwards looking, covered with the common skin of the head. Gill openings narrow; teeth thick and short in the jaws, palate, and gullet. Scales, none, but entire body covered with smooth skin. Colour mottled, tawny-reddish and whitish and ugly. Lateral line consists entirely of small holes. Dorsal fin long, of 25 small bones of which the first three with prickles and short, the rest soft and branching. Pectoral fins mottled, of 23 small bones. Ventral fins placed more forward than pectoral ones, whitish, of 3 small bones of which the first two are undivided, the third much branching. Anal fin long, of 19 small bones, soft and branching. Tail mottled, somewhat round at extreme end, of about 15 long small bones. Head entirely smooth on top, but the outermost lamina of the covers ends in three prickles, rather blunt and covered with a membrane. Length 6 to 7 inches.

Species 5. COTTUS, *lacking scales, head with many thorns, upper jaw somewhat longer.*

*Scorpæna* of Belon, French edition p. 201; *Similar to Scorpæna Belonii* Willughby p. 138. — Ray p. 145.

*Posthofft* and *Posthoeft* in Holland and Flanders. *Rötsimpa* and *Skrabba* in Sweden. *Ulk* and *Ulka* by the inhabitants by the Danish Sound. *Father Lasher* by some in Cornwall, England.

Head large, wide, prickly. The prickles on the head are about 16 to 17. Cavity between the eyes. Belly wide and somewhat prominent. The body narrows gradually from the head all the way to the tail. Upper jaw somewhat longer, open mouth large; small teeth as in preceding species. Lateral line somewhat rough in the adults, remaining skin smooth and lacking scales. Eyes large, covered with the common skin of the head; iris dark reddish. Head, on top, back, flanks, and fins mottled with blackish and yellowish spots and smears, sometimes, however, they are reddish and sometimes the same parts are more white. Belly and lower jaw whitish. Pectoral fins of 17 small bones. Ventral fins of 4 small bones but the first adheres so tightly to the second that only three are visible to anyone inspecting it carelessly. Dorsal fin is incised in the middle to its base, of 24, 25, or 26 small bones of which the anterior 9 or 10 are simple and rigid, the rest soft but undivided at the tip. Anal fin of 11 or 12 small bones, soft and undivided at the tip. Tail almost straight at its extreme end, of 12 small bones, long. Length 7 inches, bigger or smaller.

Locality: In the Baltic Sea lapping the Swedish shore, this fish is quite frequent, particularly in the autumn. In the German Sea lapping Batavia and Flanders, it is not infrequent, it is also found by Cornwall in England, but more rarely.

This fish was first of all described by most noble Willughby, from whom the famous Ray copied his text, but although it was described well and by the art by Willughby, we have described it anew and referred it to its proper genus.

Species 6. CATAPHRACTUS of Schoneveld

[3 lines in German]

*Cataphractus* Schoneveld p. 30. 31. Jonston p. 77, T. 46, f. 5. 6; Willughby p. 211; Ray *Synopsis* p. 77.

Species 7. MILVUS *Rondeletii*.

Body is angular from rounded, and from the anus to the tails it grows very slender. Mouth not large, placed underneath, in figure semicircular or half-moonshaped. Upper jaw much longer than lower. Barbels, many in lower jaw and by mouth. Small teeth, many in each jaw and at gullet. Head bony, hard, and uneven, contains mainly 8 prickles of which 4 are visible at the tip of the snout and two on each side at the sides of the head. Body, from the head to the end of the second dorsal fin, is octagonal, but from there to the tail it is sexangular, covered with hard and bony laminae, which in the middle end in a prominence, whence the body ends up as angular. Dorsal fin, single, in the middle incised almost to its base, of 12 small bones of which the anterior five are simple and only a little prickly, the remaining 7 soft. Pectoral fins of 15 small bones. Ventral fins made up of only two small bones. Anal fin of 6 small bones. Tail somewhat round at extreme end, of 11 to 12 small bones. Length of fish is about 4 inches.

Species 3. PLEURONECTES, *smooth, large-scaled, eyes on left side of the head.*

Open mouth of moderate size, very sharp small teeth in each jaw. Eyes on left part of the head, very close to the snout. Scales large, somewhat round, whitish, soft, and smooth. Colour of entire body grey-whitish. Lateral line at the middle of the body, almost straight. Pectoral fins small, of 10 small bones. Dorsal fin of 77 small bones. Anal fin of 58 small

bones. Tail of 17 small bones, somewhat round at extreme end. Length of fish described, 3 inches, 3 to 4 lines.

[*This fish was omitted by Seba.*]

Species 4. ORBIS, *tail more drawn-out, back smooth, belly full of spines.*

Willughby p. 144; *Orbis lagocephalus* Grey R.S.; *Onus* Ray p. 43.

N. 3 't Nervolus op Tafereel 24.

OSTRACION *triangular in figure, with hexagons slightly furnished with tubercles and, so to speak, rayed; two prickles on lowest belly.* Artedi.

*Piscis triangularis parvus non nisi in imo ventre cornutus* Lister in Appendix to Willughby's *Ichthyologia* p. 20. — Ray p. 45 N8.

[*This fish was omitted by Seba.*]

Species 7. *Milvus* of Ovid.

Ovid's Poem *Halieutica*, verse 95. Salviani fols. 187, 188, 189. Willughby p. 283; Ray p. 89.

*Hirundo* Rondelet Book 10, ch. 1, p. 284.

*Falco* in Sicily and Malta.

The description can be seen in many authors, first of all by most noble Francis Willughby.

XI. Genus of the *Mystus*, of which I know 10 species.

The name, *Mystus*, fits this genus better than any other, since each separate species has barbels like a beard by its mouth.

1° Tail two-pronged, and a cutaceous appendix at extreme end of the back.

Species 1. MYSTUS, *mouth underneath, eight barbels, appendix on the back.*

Head oblong, rather flat; body cathetoplateous and rather thick. Belly wide. Anus midway between anal and ventral fins. Mouth not at the tip of the head but underneath; open mouth is square-rounded. Upper

jaw jutting out far beyond lower jaw. Barbels, eight by the mouth, viz. four short ones in the lower jaw and one on each side, longer than the rest, is on the sides of the upper jaw, and one on each side by the posterior holes of the nostrils. Nostrils, double on each side. Eyes oval, covered by the common skin of the head. Gill openings seem narrow. Many rows of small teeth in each jaw. Mouth rough with small teeth in the anterior part of the palate, and by the gullet two small bones rough with small teeth. Scales, none, but entire body covered by smooth and soft skin. Colour of the body whitish mixed with tawny. Lateral line almost straight. Clavicle bone,<sup>412</sup> large, hard, and long, affixed to the flank above the pectoral fins. Fin, single, on the anterior part of the back, of 8 small bones of which the first is a prickle, robust and thick, at its posterior end lightly serrated all over, the rest soft and branching at the tip. Appendix, large, cutaneous and fin-shaped but lacking radiating small bones, at posterior end of the back. Pectoral fins located almost horizontally by the belly, of 9 small bones of which the first is a prickle, very thick and rather flat, much serrated in its posterior part, the rest soft and branching at the tip. Ventral fins at the bottom of the belly, far behind the pectoral fins, of 6 small bones, soft. Anal fin in the region of the dorsal appendix, of 15 soft small bones. Tail large, much two-pronged, like an open pair of scissors, of 17 small bones, long, except the outermost shorter ones. Length of individual described 5 inches, 9 lines. Maximum width by the dorsal fin, 1 inch.

Species 2. MYSTUS, *mouh at the top of the head, eight barbels.*

Concerning its shape, fins, and number of small bones, it agrees in most respects with preceding species, but the head is flat and the body longer in comparison. The jaws are almost equal, or the upper jaw a little bit longer. Barbels are in location and number as in preceding species, but about three times longer. Pectoral fins of 8 small bones, the others as in former species. Tail long and much two-pronged; its upper part seems a bit longer than the lower one. Length of specimen described 3 inches, 5 lines.

Species 3. MYSTUS, *of silvery colour, with six barbels, anal fin of eighteen small bones.*

---

<sup>412</sup> The clavicle is absent in cartilaginous fishes and in the vast majority of living bony fishes. Artedi is referring here to the *cleithrum* (Pietsch).

Head is very flat and from the snout all the way to the dorsal fin armoured with a shield, hard and rough with very small tubercles. Body, belly, eyes, teeth, skin, dorsal fin, ventrals, tail, etc., are as in second species. Upper jaw juts out in front of the lower. Barbels, six long, of which the two longest ones in the upper jaw extend all the way to the end of the ventral fins, but in figure they are somewhat flat; nostrils large and close to the snout. Eyes of moderate size, covered with the common skin. Iris of silvery colour. Colour of body silvery but darker on the back. Prickle on the dorsal fin, very robust and lightly serrated on either side. Pectoral fins with placing as in preceding, of 11 small bones of which the first is a prickle, strong and thick, serrated on both sides but mainly on the posterior, the rest are soft and branching at the tip. Anal fin of 18 small bones, soft, small and very difficult to count. Tail much two-pronged, of 15 to 16 rather long small bones. Length of described 4 inches, 1 line.

Species 4. MYSTUS, *six very long barbels, triangular appendix at the extreme end of the back.*

*Bagre piscis* Markgraf, *Historia Brasiliensis*, book 4, cap. 16; Willughby p. 139; *Bagre prima* Jonston p. 143: it does agree with this species in many respects, but Markgraf's description is not perfect and the picture is very clumsy.<sup>413</sup>

In many respects this agrees with preceding species but the head is less flat and more convex. Anus much closer to the ventral fins than to the anal fin. Six barbels, very long, of which the two longest, in the upper jaw, stretch all the way to the middle of the tail and are round. Nostrils, double on each side, far removed from each other. Eyes oval; iris white. Many rows of small teeth in each jaw, as well as bones with teeth by the gullet. Colour of the lower part of the body whitish, but the back and head greyish. Clavicle<sup>414</sup> bone large and extended a long way above the pectoral fins. Dorsal fin of 7 small bones of which the first is a prickle, long, strong, and sharp, serrated at its posterior end with small teeth bent upwards, the other small bones being soft and branching at the tip. Appendix, cutaceous, almost triangular, at extreme end of the back. Pectoral fins of 10 small bones of which the first is a prickle, large, pointed, flat, and prettily serrated on each side with small sharp teeth, the others are soft. Anal fin, small, of 13 soft small bones. Tail much

<sup>413</sup> Seba adds: 'Therefore we shall describe this Fish more exactly'.

<sup>414</sup> That is, cleithrum bone.

two-pronged of 16 small bones, long. Length of specimen described 3 inches, 3 lines.

Species 5. MYSTUS, *six very long barbels, dorsal appendix extended from fin to tail.*

The shield of the head does not reach to the beginning of the dorsal fin as in the closest preceding species. Body, belly, mouth, ventral fins, etc. as in third species, but the jaws are almost equal, or the upper somewhat longer. Siting and length of the barbels are almost as in preceding (4). Small teeth as in preceding ones. Colour of body yellowish. The fins are whitish. Clavicle bone<sup>415</sup> smaller than in the preceding. Dorsal fin of 7 small bones of which the first is a round prickle, not serrated and much smaller and slender than in preceding, the rest are soft and branching at the tip. Dorsal appendix, long and quite high, extends from the dorsal fin almost to the tail. Pectoral fins of 10 small bones ordered as in preceding (4), but the first prickles are rather small teeth. Anal fin of 12 or 13 soft small bones. Tail two-pronged of 17 small bones, long. Lower part of tail is larger than upper part. Length of described 4 inches, 9 lines.

Species 6. MYSTUS, *spotted, with six long barbels, head long, flat.*

*Bagre quinta species* Markgraf, book 4, ch. 16. Willughby p. 148.

It somehow belongs to this species but Markgraf's description is on the whole deficient.

Head long, wide, and very flat. It is covered by rather hard shield. The rest of the body is somewhat round, but the back and belly are very convex. Mouth very large. Upper jaw longer than lower jaw, both describe a semicircle in circuit. Barbels, six long and threadlike of which the four longer reach to the ventral fins. Nostrils, double on each side, close to the snout. Eyes small, oval, covered by skin. Gill openings large. Bones, denticulated, on the jaws, palate, and gullet. Skin smooth and lacking scales. Lower part of the body whitish. Upper part of the head, the back and the upper part of the flanks are blackish. Spots, some black but rare, on the flanks above the line. Dorsal appendix, anal fin, tail etc. are mottled with black spots. Dorsal fin small, of 7 small bones of which the first is prickly and almost round, but on each side lightly serrated, the rest soft. Appendix, cutaceous, small, at extreme end of the back. Pectoral fins of 11 small bones of which the first is a prickle,

---

<sup>415</sup> That is, cleithrum bone.

long, serrated on both sides, mainly on the posterior part. Ventral fins of 6 small bones, soft. Anal fin of 13 small bones, soft. Tail long, much two-pronged, of 17 small bones, long. Clavicle<sup>416</sup> bone large, extended above pectoral fins. Length of described 7 inches.

2° *Mysti* with the extreme end of the tail either straight or very lightly divided, some of which lack dorsal appendix, some have it.

Species 7. *MYSTUS*, *six barbels, tail straight at its extreme end.*

Head thick, plagioplateous, on top convex and armed with a very hard shield extending to dorsal fin. Body short and thick, back convex, belly wide. Mouth of moderate size; jaws almost equal or the lower a very little bit more prominent. Barbels, 6, of which 4 longer ones reach to the end of pectoral fins. Eyes small with a large distance between them, covered with common skin. Iris bluish. Gill openings very narrow. Bones furnished with teeth in jaws and gullet. Colour ashen with blackish spots. Clavicle<sup>417</sup> bone runs forward above pectoral fins, ends in a point. Dorsal fin very close to the head, of 7 small bones of which the first is a thick and straight prickle, serrated by small teeth on its posterior side, on anterior side smooth; when elevated it can hardly by any means be depressed. Appendix, cutaceous, small, at extreme end of the back. Pectoral fins of 9 small bones of which the first is largest, prickly and strong and on each side serrated with teeth, the rest soft and small. This prickle sticks straight out from the flanks and cannot by any means be depressed. Ventral fins of 6 small bones, soft. Anal fin oblong, of 23 or 24 small bones, soft and small. Tail almost square, straight at extreme end of 19 small bones, long. Length of described 3 inches, 3 lines.

Species 8. *MYSTUS*, *two small barbels, pectoral fins lacking prickle.*

Head wide and very flat. Body, back, belly, teeth, skin, colour, dorsal appendix, etc. are as in preceding species, but the mouth is very large. Upper jaw somewhat longer than lower jaw, both semicircular in circuit. Only two barbels on the entire head, and these are at the sides of the upper jaw, that is, one on each side, short, that is about 2 mathematical lines, slender and not very conspicuous, for at its posterior end it has, as it were, a hole in which it hides itself; in the lower jaw there are none. Eyes at a very long distance from each other, covered with common

---

<sup>416</sup> That is, cleithrum bone.

<sup>417</sup> That is, cleithrum bone.

skin. Many rows of small teeth in each jaw as well as small bones furnished with teeth by the gullet. Spots, blackish, larger and more numerous than in preceding species. Clavicle<sup>418</sup> bone large but not long. Dorsal fin very close to the head, of 7 small bones of which the first is not prickly as in preceding species, but fragile and somewhat soft, the rest even softer. Pectoral fins blackish, of 14 or 15 small bones, slender, of which the first is simple but not prickly, but in its posterior part it is very lightly serrated, something which an observant inspector will note with his naked eyes or by means of the edge of a knife, the rest are softer and more slender. Ventral fins blackish of 7 small bones, all except the first divided at the tip. Anal fin oblong, of 38 or 39 small bones, soft and slender. Tail somewhat two-pronged at extreme end, of 19 small bones, long. Length of described about 4 inches.

Species 9. MYSTUS, *six barbels, lacking dorsal appendix.*

Head large, wide, somewhat flat, armed with a hard shield. Body narrowing gradually from dorsal fin, long, slender and almost round. Belly wide, somewhat flat. Mouth not large in comparison with the head. Upper jaw much longer than lower. Barbels 6, of which the two upper ones in the upper jaw are longer than the rest and reach nearly to the pectoral fins. Nostrils double on both sides. Eyes very small, looking almost straight upwards, covered with common skin. Iris bluish. Gill openings very narrow and situated in front of the base of the pectoral fins. Bones, covered with teeth, in jaws and gullet. Skin smooth and lacking scales. Colour mixed from grey and blackish. Lateral line almost straight. Clavicle<sup>419</sup> bone extended far above pectoral fins, but owing to its covering skin it barely comes into sight. Dorsal fin small, triangular, of 5 small bones of which the first is simple but not prickly nor serrated, the others soft and two-pronged. No cutaceous appendix at the extreme end of the back, but a prominence, that is a small keel, low, sharp, hard and almost bony, extends from dorsal fin to the tail. Pectoral fins of 8 small bones of which the first is a prickly bone, immoderately robust, thick, flat and on both sides serrated with large teeth, the rest being soft and two-cleft at the top. Ventral fins of 6 small bones, soft. Anal fin very long, extending to the very tail, of 54 or 55 small bones, soft but undivided. Tail small, oblong, two-pronged in such a way that a small bone outermost on each side ends in a long

---

<sup>418</sup> That is, cleithrum bone.

<sup>419</sup> That is, cleithrum bone.



prominence; it contains 8 or 9 small bones. Length of described specimen 9 inches, 5 or 6 lines.

Species 10. MYSTUS, *eight barbels, lacking dorsal appendix.*

In most respects it agrees with preceding one, but the head seems flat and the upper jaw juts out longer beyond the lower one. The mouth is also larger. Barbels, eight, that is, four in each jaw: the preceding species, however, lacks these shorter middle ones. Eyes are so small that they barely come into view. Colour of entire body ashen or whitish. Tail as in the preceding, but the small bone at the extreme end on each side is much shorter and drawn out into a short prominence, hence it seems much less two-pronged. Length of described 7 inches, 6 or 7 lines.

XII. The Genus of *Plecostomus*, of which I know 4 species.

N 11

Species 1. PLECOSTOMUS, *two barbels, tail two-pronged.*

1. Head depressed at front and flat underneath. Circuit of body somewhat round but belly flat.

2. Mouth not at the tip of the head but underneath, as in *Squalus* and *Acipenser*, having a fold, that is a semicircle of thread, on its lower part. Entrance to the mouth is narrow.

3. Barbels, two, very short, that is one on each side by the sides of the mouth.

4. Gill openings by the pectoral fins, very small and narrow.

5. Laminæ, bony, hard, and sharpened with small spines, on entire body except the belly.

6. Pectoral fins of seven small bones of which the first is very robust, thick and prickly, the rest soft.

7. Ventral fins on the middle of the belly, of six small bones of which the first is simple and robust, the rest branching.

8. Dorsal fins, two, of which the first is very high, of eight small bones of which the first is simple, the rest soft. The second is very small, towards the tail, consisting of a single short prickle, joined to the back by a membrane.

9. Anal fin small, of five small bones.

10. Tail long and much two-pronged.

11. Length of body 3 inches, 8 lines; greatest width 8 lines.

N 12

Species 2. PLECOSTOMUS, *numerous barbels, nail-shaped prickles by the gill openings.*

1. Body, mouth, gill openings, colour, bony laminæ on the body, placing and number of small bones in the fins, etc., as in preceding species, but

2. Numerous barbels, about 22, in upper jaw.

3. Numerous hard and nail-shaped prickles on both sides, in front of the gill openings, which first species altogether lacks.

4. Tail much shorter, barely two-pronged.

5. Length in specimen described 3 inches, 9 lines.

N 13

Species 3. PLECOSTOMUS, *four long barbels.*

*Tamaota* Markgraf book 4, ch. 5; Jonston p. 126, Tab. 32, Fig. 10.

Head horizontally wide and almost flat. The rest of the body cathetoplateous but more vertically wide. Mouth almost underneath, incised transversely, narrow, lacking teeth. Four long barbels, viz. two on each side, by the flanks or angles of the mouth, one inch longer in grown individuals. Eyes immoderately small and spherical. Gill openings narrow. Colour of the body grey-blackish. Scales, or rather bony laminæ, hard, oblong, and transversely sited on entire body, except the middle of the belly, are ordered in four rows and come together on the middle of the flanks; not so on the back and belly. Each row contains 27 to 28 separate laminæ. These laminæ are rough in their circuit as if with small hooks. Dorsal fins, 2, of which the first, not far from the head, of 9 small bones. The posterior, at the extreme end towards the tail, is made up of one single prickle. Pectoral fins of 8 small bones, as in preceding species. Ventral fins on the whole as in preceding species (12). Anal fin underneath, at the extreme end of the body, placed very far from the anus, of 7 small bones. Tail somewhat round at extreme end, of 14 small bones. Length of the body 5 inches, smaller or larger. Locality: rivers in Brazil and American Suriname.

## N 14

Species 4. PLECOSTOMUS, *body with prickles, mouth with barbels, back with one fin.*

Head and entire body plagioplateous. Mouth not at the tip of the head but underneath, on all sides furnished with barbels. Teeth, some long and flexible ones in anterior and posterior part of the mouth, as also small bones, rough, by the gullet. Eyes of moderate size in the uppermost part of the head. Gill openings very small. Colour of the body darkly whitish. Laminæ, bony, very hard, on entire body, ordered in four or more rows. The dorsal and ventral rows are smooth and flat, but the lateral ones end in the middle in some prickles, turned backwards and much pointed; hence the fish in its anterior part ends up angular. Head is covered with laminæ, hard and almost smooth. Dorsal fin, single, of 8 small bones, the posterior one is missing in this species. Pectorals of 7 small bones. Ventrals of 6 small bones of which the first is longest of all. Anal fin situated far from anus, of 6 small bones of which the first is undivided. Tail two-pronged, of 12 small bones, long, of which the upmost one extends, as it were, into a thread, about four inches long, in the adults. Length from snout to the extreme end of the threadlike small bone of the tail is about 12 inches.

XIII. Genus of *Gobius* of which I know three species.

## N 15

Species 1. GOBIUS, *mottled from blackish, second dorsal fin of fourteen small bones.*

Synonyms of the Authorities<sup>420</sup>

*Description.*

Head almost round in circuit, the rest of the body vertically wide. Mouth large. Jaws equal, gifted with teeth. Some ducts, that is small holes, in the head, besides the nostrils. Eyes very close to each other, covered by the common skin of the head. Teeth, many rows in each jaw and furthermore bones, furnished with teeth, by the gullet. Scales of moderate size, somewhat round, sharp. Colour blackish but mottled with some ducts. Two dorsal fins, the first of 6 somewhat stiff small bones, the second higher and longer of 14 or 15 small bones, soft and branching

<sup>420</sup> See Latin edition.

at the tip. Pectoral fins wide of 19 or 20 small bones.<sup>421</sup> Ventrals have grown together into one single, somehow funnel-shaped, one, of 12 small bones of which the two anterior are short, the rest in their order longer and much branching. Anal fin of 13 or 14 small bones, soft and branching. Tail spotted, somewhat round at extreme end. Length of described 4 inches, 5 or 6 lines.

N 16

Species 2. GOBIUS *whitish, the small bones of the dorsal fin very long and thread-like.*

*Gobius tertius*, Jozo Romæ of Salviani, maybe *Gobius albus Rondeletii* of Willughby p. 207, appears to belong to this species, but is not described perfectly enough by any authority, not even by Willughby himself.

Head and body have a vertical width. Mouth of moderate size. Eyes, teeth, scales etc. are as in preceding species. Colour of body whitish grey, but by the belly between the pectoral fins and the anal fin can be seen on each side 5 or 6 transverse lines, rather whitish and shiny, but this colour may vary in different specimens. Anterior dorsal fin of 6 small bones of which the second, third and fourth are very high and rise like threads above the membrane. Second dorsal fin of 16 small bones, soft and unusually long. Pectoral fins whitish of 19 small bones. Ventral fins have grown together into one funnel-shaped fin of 12 small bones. Anal fin of 16 small bones, soft and long. Tail oblong, somewhat round at extreme end, of 15 small bones, long. Length of described 2 inches, 7 or 8 lines.

N 17

Species 3. GOBIUS, *ventral fins separated.*

Head is almost square and at front, from the eyes to the mouth, vertically sloping. The back is somewhat wide and convex, as is also the case in the belly. The mouth can be dilated quite widely but is not deeply incised. Lips very large. Upper jaw somewhat longer than lower one. Eyes bulging, on the top of the head, very close to each other. Large cavity, that is a small furrow, on both sides below the eyes. Gill openings narrow. One row of teeth in each jaw, and, secondly, two small

---

<sup>421</sup> This sentence and the first words of the following were erroneously entered at the bottom of p. 66 and then abandoned; the correcting sentence was written in its proper place on page 68. Cf. Latin text.

bones on each side by the gullet. Tongue and palate smooth. Scales are white, densely sited on the head itself as well as on the body, somewhat rough. Colour of entire body whitish. Lateral line hardly visible and almost straight. First dorsal fin of 8 small bones, soft and simple; the second of 18 small bones, soft and undivided at the tip. Anal fin of 13 small bones, also soft and undivided. Pectoral fins have something that emulates an arm and are, by their middle part, densely covered with scales and contain 13 to 14 small bones. Ventral fins short, white and, connected to each other at the base, but they are not grown together in their lower part, as is the case in preceding species, each of six small bones, much branching, the first excepted. Tail somewhat rounded-pointed at extreme end, of about 18 small bones of which those in the lower part are much shorter in comparison with those in the upper part. Length of fish described 2 inches, 9 lines. Greatest width 3 lines.

This fish is very curious and hitherto not described by any authority.

#### XIV. Genus of the *Blennius*, of which 6 Species are exhibited.

*Blennius* is a word of Pliny's, Book 32, ch. 9,<sup>422</sup> and taken over by other Authorities: it is written *blennus* as an adjective, and not unfittingly so, for it derives from the word βλέννος, 'slothful' or 'slimy', for these fishes are rich in slime.

Species 1. *BLENNIUS*, *head somewhat pointed, dorsal fin wholly prickly.*

Head and body vertically wide. Head somewhat pointed. Belly somewhat jutting out, mouth narrow. Lower jaw slightly longer than upper, both furnished with lips. Small furrows in the head, excepting the nostrils. Eyes covered with the skin of the head with a small appendix above each eye. Small teeth in both jaws, palate, and gullet. Scales so small that they hardly come into view. Colour of the body grey or ash-en-grey. Lateral line above the belly, bent upwards and curved. Dorsal fin, extending from the neck to the tail of 45 small bones. Pectorals, slightly rounded at the tip, of 12 small bones. Ventrals sited forward, of only 2 small bones. Anal fin long, of 29 small bones of which the two first with prickles, the rest soft but not divided at the top. Tail small, somewhat round at extreme end, of 13 small bones, long. Length of described 2 inches, 6 lines.

---

<sup>422</sup> c. 9 should be c. 102.

Species 2. BLENNIUS, *greyish, the outermost small bones of the dorsal fin soft.*

It agrees in most respects with preceding species, but the head is somewhat blunter and thicker. Pectoral and ventral fins as in preceding. Dorsal fin higher at its beginning than in prior species and soft at its extreme end, but not wholly prickly as in preceding, of 37 small bones of which 31 are somewhat prickly, the rest soft. Anal fin of 23 small bones undivided at the tip. Tail more even in its extreme end than preceding, of 14 small bones, long. Length of described about 2 inches.

Species 3. BLENNIUS, *mottled, head somewhat pointed, last small bones of the dorsal fin soft.*

In most respects it agrees with the two preceding ones but the three first small bones in the dorsal fin are notably longer than the others. Body shorter and thicker than in the first species. Dorsal fin of 44 or 45 small bones of which the 37 or 38 anterior ones are prickly, the rest soft but non divided at the tip. Pectoral fins somewhat round at the extreme end, of 15 small bones, undivided. Ventrals are as in preceding species. Anal fin long of 28, 29 or 30 small bones of which the two first are shorter and somewhat prickly, the rest soft but undivided. Tail, of 13 small bones, long. Colour of the body yellowish but often mottled with reddish spots of unequal size, on the head, body, dorsal and anal fins. Length of described 4 inches, 1 line. There are, however, much larger ones.

Species 4. BLENNIUS, *forehead vertically sloping, dorsal fin low in the middle.*

*Pinnarius, second species*, Markgraf *Historia Bras.* Book 4, ch. 13. — Willughby p. 134: it seems to belong to this very species, but Markgraf's description is very deficient.

Head very blunt in front, that is, sloping vertically from the eyes to the mouth. Body longer, thicker and rounder than in preceding species. Mouth large. Upper jaw longer than lower. Single row of small teeth, glistening and hair-shaped, in each jaw, and moreover, in the lower jaw two larger teeth like canines; by the gullet, upwards and downwards, there are also small bones furnished with teeth. Colour of the body whitish, but marked with lines, or rather spots, transverse, rather dark and purple, on both sides. Dorsal fin somewhat lower in the middle,

of 31 or 32 small bones of which the 12 anterior ones are shorter and simple but not prickly, the others somewhat longer. Pectoral fins of 14 small bones. Ventrals as in preceding. Anal fin of 20 small bones, soft. Tail almost straight at extreme end, of 13 long small bones.

Species 5. *BLENNNIUS*, *forehead vertically sloping, first small bone of dorsal fin tall.*

*Blennius Salviani* fol. 218. *Blennus Salviani* and perhaps also *Bellonii* Willughby p. 131 in most respects agrees with this (5) but the forehead in this very fish appears to be more sloping and that pretty spot at the beginning of the dorsal fin cannot be seen in our specimen.

This agrees in most respects with preceding species (4), but the body, in relation to its size, is shorter and wider, the colour of the body darker, the pectoral fins are longer. Dorsal fin is higher and, most of all, the first of the small bones is higher than the following 26 small bones, of which the 12 anterior are simple but soft, the others somewhat longer. Anal fin of 16 or 17 soft small bones. Length of described about 2 inches.

Species 6. *GUNNELLUS* *among many in Cornwall.*

*Butterfish* which is called *Liparis* Willughby p. 115, Ray p. 144.

Head is small and much narrower than the body itself. The body is oblong, cathetoplateous and much compressed. Anus at the middle of the body. Mouth small, tending upwards; lower jaw somewhat longer than upper one. Some small openings in the head besides the nostrils. Eyes small, somewhat round, covered with the common skin of the head. Iris yellow. Gill openings narrow. One row of teeth in each jaw, as well as small teeth in anterior part of the palate and by the gullet. Scales very small and hardly noticeable. Colour of the body mottled or dark grey, but at the base of the dorsal fins are arranged 12 quite large spots, somewhat round, pretty, and black, but surrounded at their rims by a white circle, at an almost equal distance from each other, from the head all the way to the tail. Dorsal fin stretching to the tail itself, touching it, low, even, of 76 or 78 prickles bent towards the tail and joined together by a thick skin, above which they stand out a little, so that the whole back seems serrated. Pectoral fins small, of 12 or 13 small bones of which the middle ones are two-pronged at the tip. Ventral fins very small and very close to one another, of only two small bones of which the outer one is short, prickly, and somewhat thick, the second soft and so small that it hardly comes into view. Anal fin long and stretching all the way to the tail itself, of 41 or 42 small bones of which the two

first with prickles, the others soft. Tail small, at its extreme end of 20 small bones of which the middle ones are branching at the tip. Length of described 5 inches, 2 lines. Maximum width at the middle of belly 5 inches, 7 or 8 lines.

Species 7. EXOCOETUS, *third genus by Belon Gesner* p. 15.

Head large, wide, flat mainly underneath. Body not entirely round in circuit but a little bit plagioplateous. Anus closer to the head than to the tail. Mouth, that is open mouth, very large. Upper jaw much longer than lower. Snout is somehow double owing to that membrane which is free underneath. Nostrils double. Eyes large, oval, very close to each other, sited on top of the head, covered with common skin. Iris of silvery colour. Two holes, somewhat round, in the neck in place of gill openings. Middle lamina of the gill covers ends in three short and thick prickles. Teeth, small, in the jaws and by the gullet. Scales, none, but a smooth and somewhat glistening skin on entire body. Colour of the body yellowish from white with some lighter spots on the flanks. That triangular purple spot, which the noble Willughby writes that he had observed on the top of the neck above the eyes, was lacking in our specimen. Lateral line runs down almost straight to the tail. First dorsal fin of 4 small bones, simple but soft, of which the first is the highest and is drawn out, as it were, into a very long thread, 3 or 4 inches long in adults, the rest shorter in their order. Second dorsal fin of 10 small bones, very distinct and joined by a shiny membrane. Pectoral fins farther removed from the snout than the ventrals, of 20 small bones, except for the first one much branching. Anal fin of 10 small bones, soft and distinct, of which the last are longer than the others. Tail oblong, somewhat round at extreme end, of 10 or 11 small bones of which the middle ones are two-pronged. Length of described 6 inches, 4 lines.

XV. Genus of the *Labrus* of which I know 7 species.

*Labrus* is a name used by Ovidius Naso and perfectly fitted to this genus, as all its species have prominent, thick lips that touch the teeth, as in quadrupeds. This genus is popularly called *Turdus* but fishes ought not to have generic names that they share with birds.

N 8. First species. LABRUS, *four teeth, of one colour, tail even.*

Head and body vertically wide. Belly rather flat. Mouth, that is open mouth narrow. Lips prominent. Eyes rather round, covered with a loose membrane. Iris yellow. Two teeth, very large, wide and almost



triangular, in each jaw, very close to each other and somewhat concave beneath, and, 2°, by the gullet a bone, serrated on each side with small teeth. Palate and tongue smooth. Scales large, soft, whitish. Colour of entire body greyish or yellowish. Lateral line ends by the end of the dorsal fin, below which another line begins in the middle of the extreme end of the body; it reaches all the way to the tail. Laminæ of the gill covers covered with scales. One single dorsal fin of 19 or 20 small bones of which about 9 are simple but not prickly, the others softer and two-pronged at the tip. Pectoral fins small of 14 small bones. Ventral fins directly under the pectoral fins, neighbouring each other, of 6 small bones. Anal fin of 11 or 12 small bones, soft. Tail, even at its extreme end, of 13 small bones, long. Length of described 2 inches, 5 or 6 lines.

N 9. Second species. LABRUS, *four teeth, blackish, entirely mottled with white spots.*

Head is a little more prickly and the body wider and thinner than in preceding. Laminæ of the gill covers are smooth and lacking scales. Two teeth, large, in front, directed almost horizontally and not close to each other, in each jaw, are not wide as in prior species but almost round in circuit or somewhat depressed, of a very white colour. By the gullet bones can be seen, furnished with blunt and serrated teeth. Scales large, oblong, soft. Colour of entire body, head, and fins, is blackish but mottled with white, that is, milky spots, somewhat round, small and very numerous. Lateral line curves very much by the end of the dorsal fin and bends almost vertically upwards, then runs straight to the tail. Dorsal fin spotted, of 21 or 22 small bones of which the 9 anterior are simple but hardly prickly, the others softer and branching at the tip. Pectoral fins greenish, of 13 small bones. Ventrals oblong, of 6 small bones of which the first is simple, the others branching. Anal fin spotted, of 15 small bones of which the 3 first are simple and somewhat prickly, the others soft and divided at the tip. Tail is almost square or slightly curved inward at its extreme end, of 14 long small bones. Length of described about 5 inches.

*Labri* of many teeth, that is those that have more teeth in their jaws.

N 10. Third species. LABRUS, *many teeth, middle lamina of the gill covers serrated.*

*Turdus viridis* Garzetto *dictus Genuæ* of Willughby p. 320 does agree with ours (3) as to the number of small bones and prickles on the dorsal

fin, but Willughby does not offer more details about his fish, hence nothing certain can or should be determined.

In many respects it agrees with preceding (2), but the body is wider and shorter. Iris yellow and the laminæ of the gill covers are scaly on their sides, but the middle lamina is serrated in its circuit by small prickles, which is otherwise rare in this genus. The upper lip is double. Teeth, quite strong, one row in each jaw, of which the two anterior are larger than the rest. The number of teeth in the upper jaw is 8, in the lower, about 14. Teeth of the gullet as in preceding species. Colour of the body yellowish, mottled with blackish spots sited without order. Scales and lateral line as in preceding. Dorsal fin of 24 small bones of which the 15 anterior with prickles, the others soft and branching. Pectoral fins somewhat round of 13 small bones. Ventral fins of 6 small bones of which the first is prickly. Anal fin of 13 small bones of which the 3 first prickly and strong, the others soft and two-cleft at the tip. Tail long, almost straight at extreme end, of 13 small bones. Length of described 3 inches, 4 lines.

N 11. Fourth species. LABRUS, *many teeth, greenish, dorsal fin of ten prickles.*

In many respects it agrees with preceding but all the laminæ of the head are smooth. The number of teeth in the jaws is larger, for they are 22 or 24 in upper jaw, in lower jaw about 20. Scales and teeth of the gullet as in preceding species, but the lateral line is as in the first species. Colour of body paler and greenish. Dorsal fin of 19 or 20 small bones of which the 10 anterior are prickly, the rest soft and somewhat divided at the tip. Pectoral and ventral fins as in preceding. Anal fin of 11 or 12 small bones of which the third is prickly and strong, the others soft. Tail, even at extreme end, of 13 small bones, long. Length of described 3 inches, 1 or 2 lines.

N 12. Fifth species. LABRUS, *many teeth, two longitudinal lines on each side, tail straight.*

In many respects it agrees with the third species, but the body is longer in comparison and the belly less wide. All the laminæ of the head are smooth and lacking scales. Teeth, 12 or 14 in lower jaw, in the upper also 12. In the very angles of the mouth two oblong teeth jut out. Colour of the top of the head is blue, from the mouth to the extreme end of the gill covers three lines extend, but the middle one does not

continue, the two others are shiny white and continue all the way to the tail. Fins and tail are whitish. Dorsal fin low, of 20 or 21 small bones of which the nine anterior prickly and short, the others soft. Pectoral fins of 13 small bones. Ventrals of 6 small bones, as in preceding species. Anal fin of 14 or 15 small bones of which the 3 first with prickles but least of all strong as in preceding, the others soft and branching at the tip. Tail straight at extreme end, of 13 or 14 long small bones. Length of described about 4 inches.

N 13. Sixth species. LABRUS, *many teeth, mottled with blue spots at the base of the pectoral fins.*

It has most parts in common with the fifth species, but often 16 teeth in the upper jaw and slightly more in the lower. Colour mixed from whitish and purple with some small blue spots. A spot, blue or purple, at the base of the pectoral fins. Second and third small bones of the ventral fins extend into an appendix or prominence beyond the others. Dorsal fin of 22 or 23 small bones of which the 9 anterior with prickles, the others soft and two-cleft at the tip. Anal fin of 15, 16 or 17 small bones of which the 3 first with prickles, the others soft. Tail convex at its extreme end, of 14 small bones, long. Length of described 3 inches, 9 lines.

N 14. Seventh species. LABRUS, *many teeth, head blue, tail two-pronged.*

In many respects it agrees with preceding, but the teeth in the upper jaw are about 20 in number, in the lower jaw even more. Teeth of the gullet as in the others. Scales large, oblong, white, smooth. The laminæ of the gill covers are smooth, lacking scales. Colour of the body mixed from white and greenish, into which some bluish hue is inmixed. The whole head is intensely blue or purple. The pectoral fins also have a wide blue line all along their middle. Dorsal fin low, of 22 small bones of which the 8 first with prickles and quite strong, the rest soft and branching at the tip. Pectoral fins of 15 or 16 small bones. Ventral fins are of 6 small bones, as in the preceding species. Anal fin bluish at its base, of 14 or 15 small bones of which the 3 first with prickles, the rest soft and branching at the tip. Tail oblong, much two-pronged, of 14 small bones, long. Length of described, from the snout to the extreme end of the tail, 6 inches and about 7 lines.

It ought to be noted that the colour in this genus is much varied and manifold and often capricious. Hence, if anyone should compare some *Labri* with those described here and should notice that everything is in

exact agreement, except the colour, there is nothing to stop him from referring his *Labri* to those species with which they agree in all parts as to shape, site, proportion and number. Nonetheless, when making up specific names, we were at times compelled to take refuge in their colour: more precisely when the numbers, shapes and proportions of the body parts could not provide sufficiently satisfactory differences.

Number of Species described = 112.

[Seba, *Thesaurus* vol. III, p. 96 has a description of Species 8 of *Labrus*, which seems not to have been written by Artedi.]

Num. 8. *Labrus*, mottled; two black spots behind the beginning of the dorsal fin.

This fish, too, seems to belong to the genus of *Labrus*: it is at least permitted to add its icon at this place, so that it can be examined by Ichthyologists and be given its own name. Whether it has four teeth or many is uncertain, nor can this be studied in the Fish itself, because only the icon is left after the Author's Museum was sold separately by public auction. A double colouring distinguishes this Fish along its length, then from the extreme end of the mouth all the way to the beginning of the tail, in such a way that the upper middle side is tawny, the under side yellow. You could say that by its two black spots around the fifth and sixth small bones of the dorsal fin, it approaches *Labrus* No. 2, but in other respects it differs from it. Therefore I determine nothing.

It ought to be noted that the colour in this genus is much varied and manifold and often capricious. Hence, if anyone, while comparing some *Labri* with those here described, should notice that everything is in exact agreement, except the colour, there is nothing to stop him from referring his *Labri* to those species with which they agree in all parts as to shape, site, proportion, and number. Nonetheless, when making up specific names, we were at times compelled to take refuge in their colour: more precisely when the numbers, shapes and proportions of the body parts could not provide sufficiently satisfactory differences.

In the preceding Tables pertaining to Fishes, we exhibited all those icons as well as the manuscript histories of Fishes that the Author destined, and had already prepared, for publication, and we could find after his death.



## 6. Peter Artedi, *Idea institutionum Trichozoologiæ*

### A new Latin edition by Hans Aili

This new edition of the Latin text of *Trichozoologia* is the result of my own reading of Petrus Löfling's copy,<sup>423</sup> of November 1746, of Artedi's original manuscript (Stockholm University Library, Bergianska Biblioteket. H. VII: 8.1. n. 4), with constant comparison with the *Editio princeps* published by Orvar Nybelin, 1934.

Editing from a manuscript copy, whether it should be a first generation copy or the latest in a long line of copies, permits the editor greater freedom to enter corrections of errors in language and spelling into the text to be published. All corrections against the manuscript and Nybelin's edition are reported in the footnotes. As the present edition, too, was finalised during the years of the Covid epidemic, when the Stockholm University Library was closed to visitors, it is entirely based on a digital copy provided by the kind services of this library.

---

<sup>423</sup> Note at the bottom of the title page: *Secundum manuscriptum proprium Artedi excripsit Petrus Löfling. Ups. 1774 in Novembri.*

---

#### How to cite this book chapter:

Aili, H. and Pietsch, T. W. 2024. *Peter Artedi: Reformer of 18th Century Zoology Volume I. Peter Artedi's Life and Works*, pp. 315–404. Stockholm: Stockholm University Press. DOI: <https://doi.org/10.16993/bcm.g>. License: CC BY-NC 4.0

## Latin edition

[p. 2]

Ordo primus animalium pilosorum unguulatorum.

Sectio prima solidipedorum seu unguulam indivisam habentium.

1. Equus.

2. Asinus cum Onagro, Mulo et Zebra.<sup>424</sup>

Character Generis Equini.

1. Ungula indivisa.

2. Dentes numero sex, tam primores utrinque, quam molares in utroque latere utriusque

maxillæ, figura lati et in apice plani. Spatium vacuum inter Primores et Molares. Summa 36.

3. Cauda longa.

4. Mammæ duæ in feminis ad inguina.

[p. 3]

Species Generis Equini.

1. EQUUS *cauda undique setosa*.

*Equus*, *Caballus*, *Equa* Gesneri, editio Germanica fol. 132.

*Equus* Charleton *Onomasticon Zoicon* p. 2.

— Raji, *Synopsis Quadrupedum*. p. 62.

\* Magnitudine, colore, et aliis accidentibus in diversis regionibus admodum differt.

2. EQUUS *cauda in extremo tantum setosa*.

*Asinus*, Gesneri, E.G. fol. 40.b

— Raji, *Syn.* p. 63.

*Asinus domesticus* Charleton p. 3.

\* *Onager* Charletoni O.Z. p. 3., Raji p. 63 etc. ab hac specie vix differt, nisi quod ferus sit.

---

<sup>424</sup> *ms. ante scribæ correctionem*: Asinus cum Mulo et Onagro et Zebra.

## English translation

First Order, of Hairy Animals with Hooves.

First Section, of those having a solid foot, that is, an undivided hoof.

1. Horse.
2. Donkey with Wild Ass, Mule, and Zebra.

Character of the Genus of the Horse.

1. Uncloven hoof.
2. Teeth, six in number, front teeth<sup>484</sup> on both sides as well as molars on each side of both jaws, wide in shape and flat at the tip. Empty space between the front teeth and the molars. Sum: 36.
3. Tail long.
4. Udders, two in the females by the groins.

Species of the Genus of the Horse.

1. HORSE, *tail bristly everywhere*.

*Equus*, *Caballus*, *Equa* Gesner; *Equus* Charleton, Ray.

\* In size, colour, and other accidental traits it varies a great deal in different regions.

2. HORSE, *tail bristly only at its extreme end*.

*Asinus* Gesner, Ray; *Asinus domesticus* Charleton.

\* *Onager*, Charleton, Ray: it does not differ much from this species, except that it is wild.

---

<sup>484</sup> Artedi generally used *dens primoris*, or 'front tooth', instead of *dens incisor*. He did, however, use *dens incisor* in one instance, when describing the elephant (cf. this passage, below) and he knew and consistently employed the terms *dens caninus* and *dens molaris*.



3. EQUUS *lineis multis transversis distinctus.*

*Zebra* Raji Syn. p. 64. *Zebra Indica* Charletoni O.Z. p. 4.

Descriptionem ejus vide in Pigafettæ Italici *Historia regni Congi.*

[4]

Sectio secunda animalium pilosorum, plerumque bisulcorum, acerastorum.

1. Sus.

Character<sup>425</sup> generis suilli.

1. Ungula plerumque bisulca, interdum vero indivisa seu solida, in singulis pedibus.

2. Dentes: 1<sup>o</sup>, molares utriusque maxillæ utrinque tres, 4, 5 vel 6, quorum interiores duo majores, medius latissimus. Superficies omnium inæqualis. 2<sup>o</sup>, Primores quatuor utrinque horizontaliter siti. 3<sup>o</sup>, Dentes 4 longi, exerti, unus scilicet utrinque in utraque maxilla inter primores et molares.

3. Corpus cathetoplateum pilis duris plerumque præditum.

4. Mammæ 10,<sup>426</sup> seu utrinque 5, in ventre foeminarum.

5. Cauda jam adest, jam abest.

6. Costæ utrinque 15.

[p. 5]

Species generis suilli.

1. SUS *domesticus, dorso setoso et cauda pilosa.*

*Sus* Charletoni On. z. p. 11. *Sus, seu Porcus domesticus* Raji p. 92.

2. SUS *ferus, auribus, pedibus et cauda nigris.*

*Aper* Gesneri Ed. G. fol. 146, 147

—— Charletoni p. 11.

*Sus agrestis sive Aper* Raji p. 96.

\* Color corporis ferreus semper, non variat ut in domestico.

<sup>425</sup> Character e characteres corr. ms.

<sup>426</sup> 10 ex octo supra lin. corr; 5 ex quatuor supra lin corr. scriba.

3. HORSE, *marked by many transverse lines.*

*Zebra* Ray, *Zebra Indica* Charleton.

See its description in the *History of the Kingdom of Congo* by the Italian, Pigafetta.<sup>485</sup>

Second Section comprising hairy animals, commonly with cloven feet, and lacking horns.

1. Pig.

Character of the Genus of the Pig.

1. Hoof mostly cloven, sometimes however undivided, that is solid, on each foot.

2. Teeth: 1°, molars in each jaw on both sides: three, 4, 5, or 6, of which the two inner ones are larger, the middle one widest. The surface of all teeth uneven. 2°, four front teeth on each side, seated horizontally. 3°, four long teeth, projecting, that is, one in each jaw between the front teeth and the molars.

3. Body cathetoplateous, often furnished with hard hairs.

4. Udders, ten, that is, 5 on each side on the belly of the females.

5. Tail is sometimes present, sometimes missing.

6. Ribs, 15 on each side.

Species of the Genus of the Pig.

1. PIG, *domestic, back bristly and tail hairy.*

*Sus* Charleton; *Sus seu Porcus domesticus* Ray.

2. PIG, *wild, ears, feet, and tail black.*

*Aper* Gesner, Charleton; *Sus agrestis sive Aper* Ray.

\* Colour of the body always iron-coloured, it is not mottled as in domestic pig.

---

<sup>485</sup> Antonio Pigafetta (c.1491–c.1534), *Relazione del primo viaggio intorno al mondo*, 1524.

3. SUS *corpore piloso, ruffo et cauda longa, glabra.*

*Porcus Guineensis* Marcgr.

— Raji p. 96.

1. Aures superne in apicem longum et acutum desinit.

2. Pili ruffi, et setæ nullæ in corpore, quibus et in dorso caret, et tantum versus caudam easdem obtinet.

3. Cauda ad talos propendens, pilorum expers.

4. SUS *elaphoides, dentibus quatuor exertis, magnis, incurvis.*

*Babiroussa, seu porcus Indicus* Charlet. O.Z. p. 12.

*Porcus Indicus Babyroussa dictus* Raji p. 96.

1. Locus: insula Boero<sup>427</sup> Indiæ orientalis.

Iconem vide in François Valentijn, *Hodoeporicon in O.*,<sup>428</sup> part. 3, p.m. 268.

5. SUS *dorso admodum setoso, cauda carens.*

*Tajacu seu Aper Mexicanus moschiferus* Dominus Tyson

— Raji p. 97.

1. Glandulam foramine perviam in extremo dorso habet, ex qua liquor odoriferus sensim collectus transsudat.

[p. 6]

Sectio tertia animalium pilosorum, bisulcorum, cornubus perpetuis præditorum.

1. Bos.

2. Ovis.

3. Capra.

I. Character generis bovini.

1. Ungula bifida in singulis pedibus cum duobus unguis quasi succenturiatis in postica parte.

---

<sup>427</sup> Boero: Bouro *ms.*: Bonro Nybelin, *perperam ut vid.*, *cfr.* Valentijn 1724 page 1.

<sup>428</sup> This is not the title of a book but a loose reference: *cf.* Bibliography, Valentijn (1724).

3. PIG, *body hairy, reddish, and tail long, smooth.*

*Porcus Guineensis* Marcgrave, Ray.

1. The ears end upwards in a long and sharp tip.
2. Hairs reddish, and no bristles on the body; it also lacks these on its back, and only has them towards the tail.
3. The tail hangs down to the knucklebones, lacking hairs.

4. PIG, *deer-like, with four teeth, projecting, large, curving inwards.*

*Babiroussa, seu porcus Indicus* Charleton; *Porcus Indicus Babyroussa dictus* Ray.

1. Locality: The Island of Boero of East India.

See an icon in François Valentijn's *Travels in the Orient*, part 3, p.m. 268.

5. PIG, *back very bristly, lacking tail.*

*Tajacu seu Aper Mexicanus moschiferus* Mr Tyson,<sup>486</sup> Ray.

1. At the extreme end of the back it has a gland with a passage-hole, whence an odorous liquor, gradually collected, is emitted.

Third Section comprising hairy animals, with two-cleft feet, furnished with permanent horns.

1. Ox.
2. Sheep.
3. Goat.

I. Character of the Genus of the Ox.

1. Cloven hoof on each of the feet, with two supplementary hooves, as it were, in the hind part.

---

<sup>486</sup> Edward Tyson (1650–1708).

2. Dentes primores tantum in inferiore maxilla numero 7, (8 et 9) ac interdum 6, immo 10, 11, vel 12. Molares v in utraque maxilla.

3. Cauda longa.

4. Mammæ binæ, sed papillæ quatuor oblongæ ad inguina in feminis.

[p. 7]

Species generis bovini.

1. BOS *domesticus*, *cornubus rectis vel parum flexis*.

*Bos. Vacca* Gesneri Ed. G. fol. 116. 117 etc.

*Bos domesticus* Charletoni p. 5.

— Raji *Syn.* p. 70.

2. BOS *ferus*, *cornubus magnis, intortis et nigris*.

*Buffelus* Charleton p. 6.

*Bubalus* Raji p. 72.

1. Locus in Italia, Græcia, Asia. Cicur non fit eo minus quam domestici.

3. BOS *ferus*, *juba longissima et cornubus in circulum fere flexis*.

*Bonasus* Gesneri Ed. G. fol. 126.b.

— Charletoni *O.z.* p. 6.

— Aristot. *H. an.* l. 9. c. 45. Raji p. 71.

4. BOS *ferus*, *dorso gibboso et juba colli longissima*.

*Bison jubatus* Charletoni *O.Z.* p. 6.

*Bison* Raji p. 11.

1. Locus in America, etc.

5. BOS *flavus*, *splendens*, *cornubus surrectis et in se recurvis*. *Vel secundo: BOS setis caudæ equinis duplo crassioribus*.

*Bubalus* Bellonii *Observ.* l. 2. c. 50. p. 281. 282.

*Bubalus Africanus* Gesneri Ed. G. fol. 128.b.

*Bubalus Africanus* Charletoni p. 6.

*Bos Africanus Bellonii* Raji. p. 73.

2. Front teeth only in the lower jaw to a number of 7 (8 and 9) and sometimes 6, or even 10, 11 or 12. 5 molars in each jaw.

3. Tail long.

4. Udders, two, but four oblong nipples by the groin of the females.

Species of the Genus of the Ox.

1. OX, *domestic, horns straight or somewhat bent.*

*Bos, Vacca* Gesner; *Bos domesticus* Charleton, Ray.

2. OX, *wild, horns large, twisted, and black.*

*Buffelus* Charleton; *Bubalus* Ray.

Locality: Italy, Greece, Asia. It does not become tame to a lesser degree than the domestic oxen.

3. OX, *wild, mane very long, and horns twisted almost into a circle.*

*Bonasus* Gesner, Charleton, Aristotle, Ray.

4. OX, *wild, back crooked, and mane on its neck very long.*

*Bison jubatus* Charleton; *Bison* Ray.

1. Locality: America, etc.

5. OX, *yellow, shiny, horns erect and curving back towards themselves; alternatively: OX, with bristles of the tail twice as thick as those of the horse.*

*Bubalus* Belon; *Bubalus Africanus* Gesner, Charleton; *Bos Africanus Bellonii* Ray.

I. Cornua et cauda nigra.

[p. 8]

II. Character generis ovilli.

1. Ungula in singulis pedibus bifida etc.<sup>429</sup>

2. Dentes primores in inferiore tantum maxilla, numero ——. Molares.

3. Cauda variæ longitudinis et figuræ.

4. Mammæ duæ totidemque papillæ ad inguina in foeminis.

5. Pili corporis plerumque crispi sunt et appellantur imprimis Lana.

Species generis ovilli.

1. OVIS *auribus erectis et cauda brevi*.

*Ovis Gesneri* E.G. fol. 138.

*Ovis domestica* Raji p. 73.

2. OVIS *platyceros, cauda inferne latissima*.

*Ovis Arabica lata caudæ* Gesneri E.G. fol. 141.

*Ovis laticauda* Raji p. 74.

1. Locus: Africa, Ægyptus, Syria, Arabia.

3. OVIS *cauda longissima in terram propendente*.

*Ovis Arabica altera cauda longa* Gesneri E.G. fol. 141b.

4. OVIS *cornubus rectis et turbinatis*.

*Strepsiceros aries Cretensis* Bellon Obs. l. 1. c. 14.

*Strepsiceros Bellonii* Gesneri E.G. fol. 66b (p. 35 et 38).

*Ovis strepsiceros Cretica Bellonii* Raji p. 75.

1. Locus: Creta.

[p. 9]

---

<sup>429</sup> etc. ms: cum duobus unguis quasi succenturiatis in postica parte: *haec verba supplenda esse credo, cf. supra*, Character generis bovini § 1.

I. Horns and tail are black.

II. Character of the Genus of the Sheep.

1. Cloven hoof on each of the feet etc.<sup>487</sup>

2. Front teeth only in the lower jaw, to a number of ———. Molars.

3. Tail of varying length and shape.

4. Udders, two, with the same number of dugs at the groin of the females.

5. Body hairs are often curly and called 'wool'.

Species of the Genus of the Sheep.

1. SHEEP, *ears erect and tail short*.

*Ovis* Gesner; *Ovis domestica* Ray.

2. SHEEP, *tail flat and widest at its lowest end*.

*Ovis Arabica latæ caudæ* Gesner; *Ovis laticauda* Ray.

1. Locality: Africa, Egypt, Syria, Arabia.

3. SHEEP, *tail very long and hanging down to the ground*.

*Ovis Arabica altera cauda longa* Gesner.

4. SHEEP, *horns straight and cone-shaped*.

*Strepsiceros aries Cretensis* Bellon; *Strepsiceros Bellonii* Gesner;  
*Ovis strepsiceros Cretica Bellonii* Ray.

1. Locality: Crete.

5. SHEEP, *ears hanging down, and a mane under the neck*.

---

<sup>487</sup> etc.: 'with two supplementary hooves, as it were, in the hind part' should be supplied from Character of the Genus of the Ox, above.



5. *OVIS auribus pendulis et juba sub collo.*

*Ovis Guinensis seu Angolensis Marcgravii* Raji p. 75.

*Ovis Æthiopica f.* Charleton p. 6.

1. Cauda ad suffragines usque.

2. Cornua parva, deorsum ad oculos incurvata et quasi torta.

3. Pili hircini pro lana.

6. *OVIS pilis brevibus, hirtis, loco lanæ.*

*Ovis Africana* Raji p. 75

An differt a prima specie?

III. Character generis caprini.

1. Ungula bifida in singulis pedibus etc.<sup>430</sup>

2. Dentes primores in inferiore tantum maxilla numero ——. Molares.

3. Barba seu pili longiores plurimi sub mento.

4. Cauda brevis.

5. Mammæ binæ, totidem papillæ in foeminis.

6. Odor: fetor.<sup>431</sup>

Species generis caprini.

1. *CAPRA domestica, cornubus compressis et parum reflexis.* P.A.<sup>432</sup>

*Capra domestica* Raji p. 77.

*Capra Gesneri* ed. Ger. fol. 57. 58 etc.

*Hircus domesticus* Charletoni p. 7.

[p. 10]

2. *CAPRA fera, cornubus nodosis in dorsum reclinatis.*<sup>433</sup> P.A.<sup>434</sup>

*Ibex Gesneri* Ed.G. fol. 65.b.

---

<sup>430</sup> etc.: cum duobus unguis quasi succenturiatis in postica parte *supplendum credo, cf. supra*, Character generis bovini § 1.

<sup>431</sup> fetor: feter *fortasse ms.*, feter Nybelin.

<sup>432</sup> P.A. *add. manus secunda, scripsit Nybelin.*

<sup>433</sup> reclinatis *scripsi: rec/tinatis ut vid. ms.*, Nybelin.

<sup>434</sup> P.A. *add. manus secunda, scripsit Nybelin.*

*Ovis Guinensis seu Angolensis Marcgravii* Ray; *Ovis Aethiopica* f. Charleton.

1. Tail all the way to the hocks.
2. Small horns, bent downwards to the eyes, and somehow twisted.
3. Goat's hair instead of wool.
  
6. SHEEP, hair short, shaggy, instead of wool.

*Ovis Africana* Ray.

Does this differ from the first Species?

III. Character of the Genus of the Goat.

1. Two-cleft hoof on each foot etc.<sup>488</sup>
2. Front teeth only in the lower jaw, to a number of ———. Molars.
3. Beard, that is many rather long hairs, under the chin.
4. Tail short.
5. Udders, two, with the same number of dugs in the females.
6. Odour: evil smell.

Species of the Genus of the Goat.

1. GOAT, *domestic, with horns compressed and turned back only a little*. P.A.

*Capra domestica* Ray p. 77; *Capra* Gesner; *Hircus domesticus* Charleton.

2. GOAT, *wild, horns knotty, bent towards the back*. P.A.

*Ibex* Gesner, Charletoni, Ray; *Hircus ferus Cretensis* Belon.

---

<sup>488</sup> etc.: with two supplementary hooves, as it were, in the hind part, supplied from Character of the Genus of the Ox, above.

— Charletoni p. 7. Raji p. 77.

*Hircus ferus Cretensis* Bellonii l. 1, c. 13. p. 33. 34.

3. CAPRA *fera, cornubus longitudinaliter striatis, subrectis cum apice recurvo.* P.A.<sup>435</sup>

*Rupi capra?* Gesneri E.G. fol. 63.b. — Bellonii *Obs.* l. 1. c. 54. p. 126.  
— Charletonii p. 7. — Raji p. 78.

Germanis et Helvetis *Gems.*

1. Linea atra secundum spinam<sup>436</sup> dorsi.

4. CAPRA *cornubus teretibus, erectis vel quasi spiralibus.*

*Gazella Africana* Raji p. 79.

*Capra Strepsiceros* Charletoni p. 8.

Antilope.<sup>437</sup>

5. CAPRA *fera, cornubus rectis, longissimis, ad basin solum annulatis.*

*Capra Indica cornibus rectis, longissimis, prope caput tantum annulatis*  
Raji. p. 79.

1. Cauda pedalis, pilis longis.

2. Pili cinerei.

6. CAPRA *cornubus longis, parum curvis, per totum annulatis.*

*Gazella Africana, cornibus brevioribus, ab imo ad summum fere annulatis, et circa medium inflexis* Raji. p. 80.

1. Lineæ duæ, albæ, inter oculos et nasum.

7. CAPRA *fera, fasciculo piloso in capite et cavitate utrinque infra oculos.*

*Capra sylvestris Africana* Grimmii *Ephem. Germ. anno 14 observ.* 57.  
Raji p. 80.

1. Liquor flavus, oleosus in cavitatibus continetur.

8. CAPRA *auribus in terram fere pendulis.*

---

<sup>435</sup> P.A. *add. manus secunda, scripsit Nybelin.*

<sup>436</sup> dorsum *in* spinam *corr. ms.*

<sup>437</sup> antilope *add. secunda manus.*

3. GOAT, *wild, horns furrowed lengthwise with the tip curved back*. P.A.  
*Rupi capra?* Gesner; *Rupi capra* Belon, Charleton, Ray.

Gems in Germany and Switzerland

1. Black line along the dorsal spine.

4. GOAT, *horns round, straight or, as it were, twisted*.

*Gazella Africana* Ray; *Capra Strepsiceros* Charleton.

*Antilope*.

5. GOAT, *wild, horns straight, very long, with rings only at their base*.

*Capra Indica cornibus rectis, longissimis, prope caput tantum annulatis*  
Ray.

1. Tail one foot long, long hairs.

2. Hairs ash-coloured.

6. GOAT, *horns long, somewhat curved, wholly furnished with rings*.

*Gazella Africana, cornibus brevioribus, ab imo ad summum fere annulatis, et circa medium inflexis* Ray.

1. Lines, two, white, between the eyes and the nose.

7. GOAT, *wild, hairy bundle on the head and cavity on both sides under the eyes*.

*Capra sylvestris Africana* Grimm, Ray.

1. Fluid, yellowish, oily, is contained in cavities.

8. GOAT, *ears hanging down almost to the ground*.

*Capra Mambrina seu Syriaca Gesneri* Ray; *Caper Mambrinus*  
Charleton; see Belon.

*Capra Mambrina seu Syriaca Gesneri* Raji p, 81.

*Caper Mambrinus* Charleton p. 8, vide Bellon Obs. l. 2. c. 25 p. 232.

1. Apendices 20<sup>438</sup> sub gutture, cornua exigua.

Locus: Syria.

9. CAPRA *collo utrinque jubato et longis densisque pilis ad genua.*

*Tragelaphus Caji apud Gesnerum e montibus Mauritanicæ allatus* Raji p. 82.

10. CAPRA *barba carens, pilis longis.*

*Tragelaphus Bellonii* Obs. l. 1. c. 54. p. 127. 128.

*Tragelaphus Bellonii Pygargus veterum* Gesneri E.G. fol. 67.

*Tragelaphus Bellonii* Raji. p. 82.

\* Ad genus ovillum etiam referri potest.

[p. 11]

Sectio quarta animalium bisulcorum, vel acerastorum vel cornubus deciduis præditorum.

2. Camelus.

1. Cervus cum alce, rangifero, capreolo, etc.<sup>439</sup>

II. Character generis camelini.

1. Ungula multum divisa, seu bifida, in singulis pedibus. Planta vero pedis subtus cute crassa solum tegitur.

2. Dentes primores in inferiore tantummodo maxilla, numero —. Molares.

3. Collum longum, dorsum plerumque gibbosum.

4. Mammæ binæ, sed papillæ quatuor in ventre feminarum.

---

<sup>438</sup> 20 ut vid. supra lin. add prima manus: 2° Nybelin.

<sup>439</sup> The reversed numerical order, also used by Nybelin, follows that of the ms.

1. Appendages, 20,<sup>489</sup> under the throat, small horns.

Locality: Syria.

9. GOAT *with a mane on both side of the neck and long and dense hairs by the knees.*

Caius's *Tragelaphus*<sup>490</sup> in Gesner, brought from the mountains of Mauretania, Ray p. 82.

10. GOAT, *beard lacking, hair long.*

*Tragelaphus* Bellon; *Tragelaphus Bellonii Pygargus veterum* Gesner; *Tragelaphus Bellonii* Ray.

\* It may also be referred to the Genus of the Sheep.

Fourth Section comprising animals of two-cleft feet, either lacking horns or furnished with deciduous horns.

2. Camel.<sup>491</sup>

1. Deer including Elk, Reindeer, Roebuck, etc.

II. Character of the Genus of the Camel.

1. Hoof is much split, that is two-cleft, on each foot, the sole of the foot underneath covered only by a thick hide.

2. Front teeth only in the lower jaw, to a number of ———.<sup>492</sup> Molars.

3. Neck long, back very often hunched.

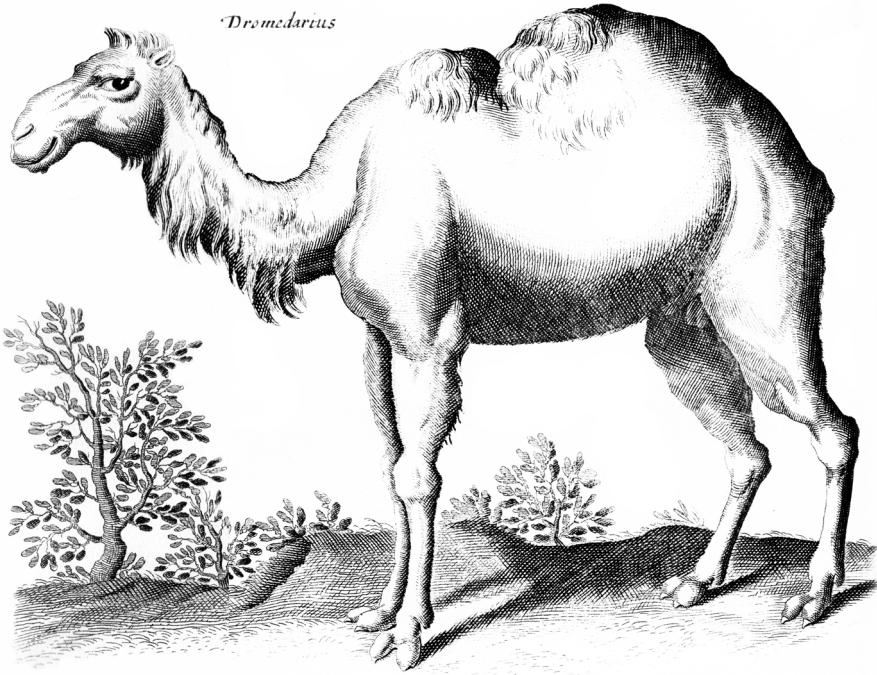
4. Udders, two, but four dug in the belly of the females.

<sup>489</sup> Number uncertain—see Latin ed.

<sup>490</sup> *Tragelaphus*, cf. Pliny 8, 33, 50.

<sup>491</sup> The reversed numerical order, also used by Nybelin, follows that of the ms.

<sup>492</sup> Numeral omitted in ms.



**Figure 15.** The dromedary, *Camelus dromedarius*, after Hendrik Ruysch (1663–1727), *Theatrum universale omnium animalium piscium, avium, quadrupedum, exanguium, aquaticorum, insectorum, et angium*, 1718 (vol. 2, pl. 42, fig. 1). License: Public Domain.

Species generis camelini.

1. CAMELUS *unico dorsi gibbo*.

*Dromedarius* Gesneri E. Germ. fol. 96. 97.

*Dromedarius* Charletoni p. 11.

*Camelus unico in dorso gibbo seu Dromedarius* Raji p. 143.

[p. 12]

2. CAMELUS *duobus in dorso gibbis*.

*Camelus* Gesneri E. Germ. fol. 95.

*Camelus Bactrianus* Charletoni p. 10.

*Camelus duobus in dorso tuberibus, scilicet Bactrianus* Raji p. 145.

Locus: Asia.

Species of the Genus of the Camel.

1. CAMEL, *one hump on the back.*

*Dromedarius* Gesner, Charleton; *Camelus unico in dorso gibbo seu Dromedarius* Ray p. 143.

2. CAMEL, *two humps on the back.*

*Camelus* Gesner; *Camelus Bactrianus* Charleton; *Camelus duobus in dorso tuberibus, scilicet Bactrianus* Ray.

Locality: Asia.



3. CAMELUS *dorso plano, pectore gibboso.*

*Elaphocamelus* Matheoli *Epist.* l. 5.

*Camelus Peruvianus Glama dictus* Raji p. 145.

1. Locus: Peru in America.

4. CAMELUS *gibbis carens, lanigerus.*<sup>440</sup>

*Ovis Peruana* Charletoni p. 7. *Camelus seu camelo congener Peruvianum, Lanigerum, Pacos dictum* Raji p. 147.

*Ovis Indica* seu *Peruviana* vulgo.

I. Character generis cervini.

1. Ungula bifida in singulis pedibus, ungułæ subcenturiatæ in postica parte, longe a se invicem distantes.

2. Dentes primores in inferiore tantum maxilla, exigui, numero octo etc. Molares.

3. Cornua cute et pilis vestita, plerumque ramosa.

4. Cauda brevis, pili corporis breviusculi.

5. Mammæ quatuor ad inguina.

[p. 13]

Species generis cervini.

1. CERVUS *cornubus ramosis, reflexis, rotundis.* P.A.

*Cervus, Cerva, Hirculus* Gesneri E. G. fol. 79.

*Cervus* Charletoni p. 20. — Raji. p. 84.

2. CERVUS *cornubus planis, seu palmatis.* P.A.

*Dama vulgaris, Platyceros* Gesneri E. G. fol. 84.

*Cervus Platyceros, vel Platyceros simpliciter dictus* Plinii l. ii. c. 38. Raji p. 85.

*Dain* Gallis. *Fallow-dear*<sup>441</sup> Anglis. *Dåf-diur* Svecis.

---

<sup>440</sup> lanigerus e laginerus corr. Nybelin.

<sup>441</sup> Fallow-dear Nybelin.

3. CAMEL, *back flat, chest hunched.*

*Elaphocamelus Matheoli; Camelus Peruvianus Glama dictus* Ray.

1. Locality: Peru in America.

4. CAMEL *lacking humps, fleecy.*

*Ovis Peruana* Charleton; *Camelus seu camelo congener Peruvianum, Lanigerum, Pacos dictum* Ray p. 147.

Universally: Indian, that is Peruvian, Sheep.

I. Character of the Genus of the Deer.

1. Two-cleft hoof on each foot, with supplementary hooves on the hind part, separated far from each another.

2. Front teeth only in the lower jaw, small, to a number of eight, etc., Molars.

3. Antlers<sup>493</sup> clad in skin and hair, often branching.

4. Tail short, body hair somewhat short.

5. Udders, four by the groin.

Species of the Genus of the Deer.

1. DEER, *antlers branching, bent backwards, rotund.* P.A.

*Cervus, Cerva, Hirculus* Gesner; *Cervus* Charleton, Ray.

2. DEER, *antlers flat, that is, palmate.* P.A.

*Dama vulgaris, Platyceros* Gesner; *Cervus Platyceros, vel Platyceros simpliciter dictus* Pliny, Ray.

*Dain* in France; *Fallow-dear*<sup>494</sup> in England; *Dåf-diur* in Sweden.

---

<sup>493</sup> Antler, referring to the horns of the Cervidae, is attested in English since the 17th century (OED).

<sup>494</sup> Follow-dear *Nybelin*.

1. Cervo multo<sup>442</sup> minor est.

3. CERVUS *cornubus superne latis cum ramulis in ambitu*. P.A.

*Alces* Gesneri E. G. fol. 138. — Charletoni p. 9.

*Alce* Raji p. 86.

4. CERVUS *cornubus præaltis, ramosissimis et subrotundis*. P.A.

*Rangifer* Gesneri E. G. fol. 130. — Charletoni p. 9.

*Cervus Rangifer* Raji p. 88.

*Tarandrus*<sup>443</sup> Agricolæ. Eliotæ. — Charletoni p. 9.

*Machlis* Plinii.

5. CERVUS *cornubus erectis, teretiformibus*. P.A.

*Capra. Capreolus seu Dorcas* Gesneri Ed. G. fol. 64.

*Dorcas* Charletoni p. 9.

*Caprea Plinii, Capreolus vulgo* Raji p. 89.

Svecis Råget.

1. Reliquis omnibus minor, cornua brevia.

6. CERVUS *cornubus ulnaribus, ramosis, rotundis*. P.A.

*Caprea Grönlandica* Raji p. 90.

7. CERVUS *macrocercos, cornubus carens*. P.A.

*Axis Bellonii Observ.* l. 2. c. 51. p. 283.

*Axis Plinii Bellonii* Raji p. 29.

1. Corpus maculatum.

8. CERVUS *macrocercos*,<sup>444</sup> *cornubus simplicibus*. P.A.

*Camelopardalis Bellonii Observ.* l. 2. c. 49, p. 279. 280. — *Gesneri*  
E.G. fol. 97. 98. — Raji p. 91.

---

<sup>442</sup> multo e paullo corr. ms.

<sup>443</sup> Tarandrus: Tarandus *perperam* ms.

<sup>444</sup> macrocercos e macroceros corr. Nybelin.

1. Much smaller than the Deer.

3. DEER, *antlers wide at the top, with little branches in their circuit.* P.A.  
*Alces* Gesner, Charleton; *Alce* Ray.

4. DEER, *antlers very high, rich in branches and somewhat round.* P.A.  
*Rangifer* Gesner, Charleton; *Cervus Rangifer* Ray; *Tarandrus*<sup>495</sup>  
Agricola, Eliot, Charleton; *Machlis* Pliny.

5. DEER, *antlers straight, round in shape.* P.A.

*Capra. Capreolus seu Dorcas* Gesner; *Dorcas* Charleton; *Caprea Plinii*,  
*Capreolus* popularly Ray.

*Råget* in Sweden.

1. Smaller than all the others, antlers short.

6. DEER, *antlers one ell long, branching, rotund.* P.A.  
*Caprea Grönlandica* Ray.

7. DEER, *tail large, lacking antlers.* P.A.  
*Axis Belloni*; *Axis Plinii Bellonii* Ray.

1. Body spotted.

8. DEER, *tail large, antlers simple.* P.A.

*Camelopardalis* Belon, Gesner, Ray. *Camelopardalis* Charleton; *Giraffa*  
among later authorities.

---

<sup>495</sup> *Tarandrus*: *Tarandus* erroneously *ms.*

*Camelopardalis* Charletoni p. 10.

*Giraffa* recentiorum.

1. Collum longum, pedes anteriores posterioribus multo longiores.
2. Maculæ variæ in corpore.

[p. 14]

Sectio quinta animalium pilosorum unguis quadrifidis præditorum

1. Hippopotamus.
2. Rhinoceros.
3. Elephas, fortasse.

I. Character generis hippopotami.

1. Ungulæ in singulis pedibus quadrifidæ bisulcorum modo, præter talum.
2. Dentis. 1°. Primores utrinque sex, quorum bini exteriores in mandibula inferiore utrinque, reliquis grandiores, trigoni et bene conspicui, non tamen clauso ore exerti nec adunci. 2°. Intermedii acie trigona præditi. In maxilla inferiore sex magnitudine inæquales, tali figura<sup>445</sup> cf. ΠΠΠΠΠΠΠ. 3°. <sup>446</sup> Molares utrinque in singula maxilla septem crassi, lati, breves admodum. Summa 40 fere.
3. Cauda admodum brevis.
4. Aures breves, tenues. Oculi parvi.
5. Mammæ binæ ad pedes posteriores in foeminis.
6. Pili ad rostrum ut in Fele. Ambitus corporis crassus, rotundus. Rostrum crassum et repandum.

*Hippopotamus Solini Polyh. c. 34.* Bellonii. — Gesner *Ichthyol.* p. 417 et *Paral.* 2 fol. 200.a. Ed. Germ. — Antiquorum: F. Columna *Obser. c. 15*, p. 28 et icon p. 30.

Ἴπποπόταμος Aristotelis *De nat. an.* l. 2, c. 7.

Ἴππος ποτάμιος Ælianus l. 5, c. 53.

<sup>445</sup> Manuscript has a primitive figure omitted by Nybelin:



<sup>446</sup> 3° : 2° ms., Nybelin.

1. Neck long. Front legs much longer than hind legs.
2. Spots, mottled, on the body.

Fifth Section comprising hairy animals furnished with four-cleft hooves.

1. Hippopotamus.
2. Rhinoceros.
3. Elephant, perhaps.

#### I. Character of the Genus of the Hippopotamus.

1. Hooves in each foot four-cleft in the manner of the animals with two-cleft feet, excepting the knucklebone.
2. Teeth 1°. Front teeth, six on each side of which the outer pair in the lower jaw on each side, larger than the others, three-cornered and very visible, but with mouth closed they are not projecting nor hooked; 2°. The middle ones are furnished with a three-cornered tip. In the lower jaw there are six unequal in size, as in this figure: ΠΠΠΠΠΠΠΠ; 3°. Molars, seven on each side in each jaw, thick, wide, very short. In sum: 40 ca.
3. Tail very short.
4. Ears short, thin, Eyes small.
5. Udders, two by the hind legs in females.
6. Hairs by the snout, as in Cat. Circuit of the body thick, rotund. Snout thick and wide.

*Hippopotamus Solini Polyb.* Belon, Gesner. Among the ancients: F. Columna, with picture.

Ἴπποπόταμος Aristotle.

Ἴππος ποτάμιος Aelianus.

II. Character generis rhinocerotis.

[*Ms. lacunam habet p. 15, textum huius descriptionis omittens.*]

[p. 16]

III. Genus elephantis. Character genericus.

1. Pes subtus, non ungula, de<sup>447</sup> cute crassa tectus, tubercula quinque digitis respondentia in ambitu superne. Plantæ pedum planæ et non unguæ, sed cute crassa, duriore, tantum tectæ.

2. Dentes. 1<sup>o</sup>. Incisores<sup>448</sup> omnino nulli. 2<sup>o</sup>. Molares (4) quatuor in utraque maxilla, ab utroque nempe latere duo. Singulus vero dens, seu massa dentis, ex plurimis dentibus minoribus in os quoddam solidum ita infixis, ut invicem et cum osse illo corpus continuum constituent. Lineæ parallelæ undulatæ 8 vel 9 in superficie massæ dentium. Massa integra dentium singularium per gomphosin maxillæ inseritur.

3. Dentes bini, longissimi in maxilla superiore longe extra os prominentes, utrinque scilicet unus sursum reflexus. Hi dentes ebur constituunt. Summa: 10 tantum.

3.<sup>449</sup> Cutis crassa tuberculis verrucosis plurimis et pilis raris, crassis et satis longis, prædita.

4. Oculi exigui, porcini.<sup>450</sup> Auriculæ satis magnæ. Os parvum.

5. Nasus in proboscidem longissimam extensus, quæ<sup>451</sup> cava est foramine quod antè duplex est, directo in pulmones terminato.

6. Mammæ binæ, totidem papillæ in pectore feminarum.

7. Penis retrorsum flexus.

8. Larynx ampla et epiglottide destituta. Costæ in universum utrinque (20) viginti. Claviculæ nullæ. Maxilla inferior ut in Porco.

[p. 17]

Ordo secundus animalium pilosorum unguiculatum.

---

<sup>447</sup> de ut vid ms. sed Nybelin.

<sup>448</sup> De hoc verbo, vide translationem!

<sup>449</sup> 4 scripsi: 3 ms.

<sup>450</sup> porcini scripsi Nybelin secutus: pocini ms.

<sup>451</sup> quæ ms.: qua Nybelin.

## II. Character of the genus of the Rhinoceros.

[*Blank half page and text missing in ms, p. 15*]

## III. Genus of the Elephant. Character of the Genus.

1. Foot underneath, not hoof, covered below by thick skin, five tubercles corresponding to toes on its upper circuit. Soles of the feet flat and not hooves, but only covered by a thick and very hard skin.

2. Teeth. 1°. Incisors,<sup>496</sup> none at all. 2°. Molars, four (4) in each jaw, that is two on each side. Each tooth, that is the mass of the tooth, is built up by many rather small teeth, fixed into a solid bone in such a manner that they, mutually and with this bone, form a solid body. Lines, parallel and wavy, eight or nine, on the surface of the tooth mass. The entire mass of each single tooth is inserted all through the structure<sup>497</sup> of the jaw.

3. Teeth, two, very long, in the upper jaw, jutting out far beyond the mouth, that is, one on each side, bent upwards. These teeth constitute Ebony. Sum: ten teeth only.

3.<sup>498</sup> Skin, thick, furnished with many warty tubercles and hairs, sparse, thick, and very long.

4. Eyes small, pig-like. Ears very large. Mouth small.

5. Nose drawn out into a very long proboscis which is hollow, with a tube which is double at its outer end and finishing straight into the lungs.

6. Udders, two, and the same number of dugs on the chest of the females.

7. Penis bent backwards.

8. Larynx large, lacking an epiglottis. Twenty (20) ribs in all on each side. Clavicles,<sup>499</sup> none. Lower jaw as in Pig.

Second Order comprising hairy animals with small claws.

<sup>496</sup> As Artedi everywhere else used *dens primoris*, 'front tooth', for incisor, the latter word must stem from his source.

<sup>497</sup> Artedi used *gomphosis*, γόμφωσις, a loan from the Greek.

<sup>498</sup> 3.: *sic ms.*, error retained by Nybelin.

<sup>499</sup> That is, cleithra.



Sectio prima animalium pilosorum, unguibus latiusculis, longis, vel obtusis vel acutis præditorum.

1. Vespertilio. [*Descriptio deest*]

2. Mus araneus et Talpa.

1. Ungues magni, acuti.

2. Digiti 5 in singulis.

3. Auriculæ vel<sup>452</sup> nullæ vel exiles.

4. Oculi exiles et minimi.

5. Coecum nullum.

3. Echinus seu Erinaceus.

1. Dentes: 1<sup>o</sup> Primores sex quorum 2 longi. 2<sup>o</sup> Molares utrinque 3 in superiore maxilla.

2. 5 digiti in singulis.

3. Oculi parvi, exstantes.

4. Auriculæ amplæ.

5.<sup>453</sup> Ventriculus rugosus.

6. Coecum nullum.

7. Claviculas habet.

1. Genus vespertilionis. Character genericus.

1. Digitus unicus tantum in pedibus anterioribus, in posterioribus vero quinque, omnes ejusdem longitudinis. Ungues adunci, acuti, cathetoplatei.

2. Dentes: 1<sup>o</sup> Primores in maxilla superiore sex cum spatio intermedio. In inferiore vero quinque, omnes admodum exiles. 2<sup>o</sup> Canini in maxilla inferiore utrinque tres, quorum medius minimus, anterior vero maximus, omnes præter medium interiore latere parum concavi. In superiore maxilla canini utrinque duo, quorum anterior duplo major, ambo ab interiore latere concavi. [p. 18] 3<sup>o</sup> Molares tres in utroque latere utriusque maxillæ, quorum interiores breviores seu minores. Omnes vero cavitatibus et cuspidibus tribus acutis præditi. Summa 33 vel 34.

<sup>452</sup> vel *scripsi*: ò *ms.*, non *Nybelin quod sensu caret.*

<sup>453</sup> 5: *numero caret ms.*, *Nybelin.*

First Section comprising hairy animals, furnished with claws, rather wide, long, either blunt or pointed.

1. Bat. [*Description missing*]

2. Shrew and Mole.

1. Claws large, pointed.

2. Toes, five in each paw.

3. Ears, either none or small.

4. Eyes, small, indeed, very small.

5. Caecum, none.

3. Echinus, that is, Hedgehog.

1. Teeth: 1°. Front teeth, six, of which two are long. 2°. Molars, three on each side in upper jaw.

2. Toes, five in each paw.

3. Eyes small, protruding.

4. Ears large.

5. Belly wrinkled.

6. Caecum, none.

7. It has clavicles<sup>500</sup>

1. Genus of the Bat. Character of the Genus.

1. Toe, one only, on front feet but on hind feet five, all of the same length. Claws hooked, pointed, cathetoplateous.

2. Teeth, 1°. Front teeth, six in upper jaw with gap between them. In lower jaw five, all very small. 2°. Canines, three on each side in lower jaw, of which the middle one is smallest, but the front one largest, all, except the middle one, somewhat concave on inner side. In the upper jaw two canines on each side, of which the front one is double in size, both concave on inner side. 3°. Molars, three on both sides of each jaw, of which the inner ones are shorter, that is, smaller. All, however, furnished with cavities and three sharp points. Sum: 33 or 34.

<sup>500</sup> That is, cleithra.

3. Caput et corpus plagioplatea.
4. Membrana lata totum corpus circumiens, a pedibus anterioribus nempe ad posteriores extensa, caudæ quoque continua et sic totum corpus horizontaliter ambiens.
5. Cauda exigua, glabra. Aures magnæ et patulæ cum appendice ad radicem. Oculi exigui, protuberantes. Nares in apice rostri. Rostrum superne glabrum et nullis pilis longis præditum.
6. Lineæ transversæ 6 vel 7 in palato. Intestinum coecum nullum nec appendix; ventriculus intus rugosus.
7. Mammæ binæ duntaxat in pectore. Rajus p. 244.

[p. 19]

Sectio secunda animalium pilosorum ungues aduncos acutosque, jam vero subrectos et obtusos,<sup>454</sup> et præterea binos utrinque dentes primores habentium.

1. Castor seu Fiber.
2. Hystrix.
3. Lepus cum Cuniculo.
4. Mus et Sciurus.

I. Character generis fibri.

1. Dentes primores utrinque bini, magni et acuti. 2°. Molares in utraque maxilla utrinque, quatuor obtusi et apice inæquali. Summa 20.<sup>455</sup>
2. Corpus plagioplateum, pilosum. Cauda quoque plagioplatea sed pilis destituta et squamosa. Caput plagioplateum.
3. Digiti, 5 discreti in pedibus anterioribus; in posterioribus quinque item membrana crassi juncti, ungues vel lati vel rotundi vel obtusi.
4. Auriculæ minutæ, rotundæ.
5. Mammæ.
6. Appendix ad intestinum coecum.

---

<sup>454</sup> obtusos scripsi *Nybelin secutus*: abtusos ut vid. ms.

<sup>455</sup> Summa 20 in marg. add.

3. Head and body plagioplateous.
4. Membrane, wide, surrounding the whole body, extending from the front feet to the hind feet, continuing even to the tail and thus covering the entire body horizontally.
5. Tail small, smooth. Ears large and wide with an appendage by the root. Eyes small, protruding. Nostrils at the tip of the snout. Snout smooth on upper side, not furnished with long hairs.
6. Lines, transverse, 6 or 7 in the palate. No *intestinum caecum* or appendix; belly wrinkled inside.
7. Udders, only two on the chest. Ray p. 244.

Second Section comprising hairy animals having hooked and pointed claws, mostly straight and blunt, and also two front teeth on each side.

1. Castor, that is Beaver.
2. Porcupine.
3. Hare with Rabbit.
4. Mouse and Squirrel.

I. Character of the genus of the Beaver.

1. Front teeth, on each side, large and sharp. 2. Molars, on each side of each jaw, four, blunt and with unequal tips. Sum: 20.
2. Body plagioplateous, hairy. Tail also plagioplateous but lacking hairs and full of scales. Head platioplateous.
3. Toes, five separate ones on front feet; on hind feet five, also joined by a thick membrane, claws either wide or round or blunt.
4. Ears small, rotund.
5. Udders.
6. Appendix at the *intestinum caecum*.

[*Post pag. 19 paginae duae sine textu vacuae relictæ sunt, textus p. 20 resumitur*].

I. *Fiber Solini Polyh.* cap. 19.

*Fiber Gesneri* Ed.G. fol. 21.22.

*Castor Rondeletii Ichthyol.* c. 2. p. 236.

— *Gesneri Ichthyol.* p. 185.

— *Charletoni O.Z.* p. 17.

*Castor sive Fiber Raji Syn.* p. 209.

*Fiber sive Castor Schoneveldii Ichthyol.* p. 34.

*Biber Hildegardis Abbatissæ Phys.* p. 115.

Κάστωρ *Æliani* l. 6. c. 34. p.m. 359.

<II. Character generis hystricis.><sup>456</sup>

[p. 21]

III.<sup>457</sup> Character generis leporini.

1. Digi distincti quinque in anterioribus et quatuor in posterioribus pedibus. Ungues parum obtusi, vix curvati, subtus parum excavati.

2. Dentes primores bini utrinque acuti et præterea duo exiles succenturiati in superiori maxilla sub primoribus. Molares quinque (5) in interiore maxilla, superficies<sup>458</sup> inæqualis, horum intimi minimi sunt. In superiore maxilla itidem utrinque quinque. Summa: 26.

3. Labium superius in medio perpendiculariter fissum. Palatum striis transversis notatum.

4. Cauda brevis. Auriculæ longæ.

---

<sup>456</sup> *Textus deest ms., Nybelin.*

<sup>457</sup> III *scripsi*: II *ms.*

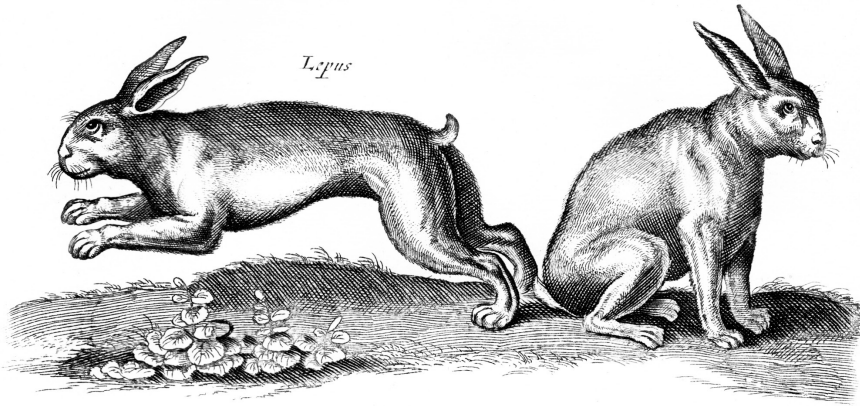
<sup>458</sup> *superficies scripsi Nybelin secutus: superficies ms.*

*Fiber* Solinus, Gesner. *Castor* Rondelet, Gesner, Charleton. *Castor sive Fiber* Ray. *Fiber sive Castor* Schoneveld. *Biber* Hildegard of Bingen. Κάστωρ Aelianus.

<II. Character of the genus of the Porcupine.> [*This heading and section omitted in ms.*]

III. Character of the Genus of the Hare.

1. Fingers, five, separate, on front feet and four on hind feet. Claws somewhat blunt, barely bent, somewhat hollow underneath.
2. Front teeth, two on each side, sharp, and furthermore two small additional ones in upper jaw under the front teeth. Five molars in lower jaw, surface uneven; among these, the innermost are smallest. In upper jaw, in the same manner, five on each side. Sum: 26.
3. Upper lip vertically split in the middle. Palate marked with transverse stripes.
5. Tail short. Ears long.



**Figure 16.** A pair of hares or jackrabbits, *Lepus* sp., after Hendrik Ruysch (1663–1727), *Theatrum universale omnium animalium piscium, avium, quadrupedum, exanguium, aquaticorum, insectorum, et angium*, 1718 (vol. 2, pl. 65, fig. 1). License: Public Domain.

1. *LEPUS caudatus, pupilla nigrescente*. P.A.

*Lepus* 3. Raji p. 204. Hare.<sup>459</sup>

— 1. Gesneri E.G. fol. 69.a.

— 2. Charletoni O.Z. p. 20.

2. *LEPUS caudatus, pupilla rubra et lucida*. P.A.

1. *Cuniculus* Gesneri Ed. Germ. fol. 72. 73.

— 2. Charletoni O.Z. p. 20.<sup>460</sup>

— 3. Raji p. 204.

3. *LEPUS cauda carens, pupilla nigra*.

*Cuniculus Brasiliensis Tapeti dictus* Raji p. 205.

[p. 22]

IV. Character generis murini.

1. Digi quatuor in pedibus anterioribus, in posterioribus vero quinque (5) præter morum aliorum, ungues acuti et parum adunci.

2. Dentes primores utrinque bini. Molares vero in utraque maxilla utrinque sunt tres (3), primus seu anterior reliquis major. Omnes numero 16.

<sup>459</sup> Hare scripsi Nybelin secutus: Hase fortasse ms.

<sup>460</sup> 20 ms.: 21 Nybelin.

1. HARE, *with tail, pupil blackish*. P.A.

*Lepus* Gesner, Charleton, Ray.

*Hare*.

2. HARE *with tail, pupil red and shiny*. P.A.

*Cuniculus* Gesner, Charleton, Ray.

3. HARE *lacking tail, pupil black*.

*Cuniculus Brasiliensis Tapeti dictus* Ray.

#### IV. Character of the Genus of the Mouse.

1. Toes, four on front feet, but five (5) on hind feet, differing from the manner of other animals. Claws sharp and somewhat hooked.

2. Front teeth, two on each side. The molars, on each side in each jaw, are three, the first, that is anterior tooth, larger. All, 16 in number.



3. Corpus plagioplateum. Cauda longa, aures magnæ cum appendice quasi ad inferiorem partem.
4. Mamillæ decem, scilicet utrinque quinque, in ventre foemellarum.
5. Palatum striis transversis notatum.
6. Claviculis donantur.

Species generis murini.

1. MUS *sylvestris*<sup>461</sup> *ruffus vel cinereus, cauda villosa corpus æquante.*

*Sciurus Gesneri* E. G. fol. 13.a.

*Sciurus vulgaris* Raji p. 214.

2. MUS *sylvestris, cinereus, sesquipedalis, cauda villosa.*

*Sciurus Virginianus cinereus major* Raji 215.

[p. 23]

3. MUS *sylvestris, cute laterali utrinque inter pedes extensa et cauda plana.*

*Sciurus Americanus, volans* Raji p. 215.

*Mus Ponticus aut Schycticus. Sciurus volans* Gesneri Ed. G. fol. 159.

4. MUS *sylvester ex ruffo niger, lineis utrinque longitudinalibus.*

*Sciurus Getulus* Gesneri Ed. G. fol 159.

*Sciurus seu Mus Getulus* Charletoni p. 21.

*Sciurus Getulus Caji apud Gesnerum* Raji p. 216.

5. MUS *domesticus fuscus, pedalis.*

*Mus domesticus major* Gesneri E. G. fol. 109.

*Sorex domesticus* Charletoni p. 22.

*Mus domesticus major sive Rattus* Raji p. 217.

---

<sup>461</sup> NB. The variants *sylvestris/silvestris* and *sylvester/silvester* are merely orthographical and contain no intrinsic difference in meaning.

3. Body plagioplateous. Tail long, ears large with an appendix, as it were, on the underside.
4. Udders ten, that is five on each side, on the belly of the young females.
5. Palate marked with transverse stripes.
6. Furnished with Clavicles.<sup>501</sup>

Species of the Genus of the Mouse.<sup>502</sup>

1. WOOD MOUSE, *reddish or ash-grey, tail hairy and equally long with the body.*<sup>503</sup>

*Sciurus* Gesner; *Sciurus vulgaris* Ray.

2. WOOD MOUSE, *ash-grey, one and a half foot long, tail hairy.*

*Sciurus Virginianus cinereus major* Ray.

3. WOOD MOUSE, *lateral skin on each side stretched between the feet, and tail flat.*

*Sciurus Americanus, volans* Ray. *Mus Ponticus aut Schyticus. Sciurus volans* Gesner.

4. WOOD MOUSE, *black from reddish, lines, longitudinal, on each side.*

*Sciurus Getulus* Gesner. *Sciurus seu Mus Getulus* Charleton. *Sciurus Getulus Caji apud Gesnerum* Ray.

5. HOUSE MOUSE, *tawny, one foot long.*

*Mus domesticus major* Gesner. *Sorex domesticus* Charleton. *Mus domesticus major sive Rattus* Ray.

---

<sup>501</sup> That is, cleithra.

<sup>502</sup> When naming the different species of the Mouse, Artedi departs from his stated principle of not including the animal's locality in its diagnostic name; cf. *Ichthyologia*, Part II *Philosophia* p. 87, 3<sup>o</sup>: 'This difference, when assumed from the natural locality, is often very faulty for the reason that one and the same fish is simultaneously an inhabitant of the sea and rivers and lakes, and European, African, and American.' However, the indications of the various localities (*silvester, domesticus*, etc.) are not crucial to the individual diagnoses as these are so dissimilar in themselves that they are sufficient to identify the different species.

<sup>503</sup> The diagnostic names of the various species are here translated following the assumption that they may be Artedi's own.

6. MUS *aquaticus, digitis membrana junctis et cauda tereti.*

*Mus major aquaticus sive Rattus aquaticus* Raji p. 217.

7. MUS *aquaticus, digitis membrana junctis et cauda plana.*

*Mus aquaticus exoticus* Clusii p. 375. Raji p. 217.

8. MUS *domesticus, cinereus, triuncialis.*

*Mus domesticus vulgaris seu minor* Raji p. 218.

9. MUS *domesticus, auriculis rotundis et cauda superne nigra, subtus albicante.*

*Mus domesticus medius* Raji 218.

10. MUS *agrestis, rostro obtuso et cauda admodum brevi.*

*Mus agrestis, capite grandi, brachyurus* Raji p. 218.

11. MUS *sylvestris, pedalis, cauda villosa, cruribus postice glabris.*

*Sorex. Mus Avellanarum* Gesneri E. G. fol. 110 a.b.

*Mus Avellanarius* Charletoni p. 22.

*Mus Avellanarum major Sorex Plinii* Raji p. 219.

12. MUS *sylvestris, quadriuncialis, cauda villosa.*

*Mus Avellanarum minor* Ray p. 220.

\* Reliquas species vide ad calcem p. 47.

[Species muris infra descriptas pag. 47 add. ms.]

Species Muris vide supra.

13. MUS *brachyurus, auriculis carens.*

*Mus Noricus vel Citellus* Gesneri E. G. fol. 110.b. — Raji p. 220.

14. MUS *sesquipedalis, ventre nigro, maculis utrinque tribus albis.*

*Critecus, Hamester* Gesneri E. G. fol. 111.

*Critecus* Gesneri Raji p. 221.

6. WATER MOUSE, *toes joined by membrane and tail round.*

*Mus major aquaticus sive Rattus aquaticus* Ray.

7. WATER MOUSE, *toes joined by membrane, and tail flat.*

*Mus aquaticus exoticus* Clusius, Ray.

8. HOUSE MOUSE, *ashen-grey, three inches long.*

*Mus domesticus vulgaris seu minor* Ray.

9. HOUSE MOUSE, *ears round, and tail black on upper side, whitish beneath.*

*Mus domesticus medius* Ray.

10. FIELD MOUSE, *snout blunt, and tail very short.*

*Mus agrestis, capite grandi, brachyurus* Ray.

11. WOOD MOUSE, *one foot long, tail hairy, shanks smooth at the back.*

*Sorex, Mus Avellanarum* Gesner. *Mus Avellanarius* Charleton. *Mus Avellanarum major Sorex Plinii* Ray.

12. WOOD MOUSE, *four inches long, tail hairy.*

*Mus Avellanarum minor* Ray.

[*Species Nos. 13 to 16 described separately on ms. page 47.*]

Species of the Mouse, see above.

13. MOUSE, *tail short, lacking ears.*

*Mus Noricus vel Citellus* Gesner, Ray.

14. MOUSE, *one and a half foot long, belly black, three white spots on each side.*

*Critecus, Hamester* Gesner. *Critecus Gesneri* Ray.

15. MUS *montanus, bipedalis, unguibus nigris.*

*Mus alpinus* Gesneri E. G. fol. III. 112. — Charletoni p. 18. —  
*Plini* Raji p. 221.

1. Auriculæ mutilæ et quasi decurtatæ.

16. MUS *varius, quincuncialis, rostro fisso et auriculis in dorsum reclinatis.*<sup>462</sup>

*Mus Norvegicus* Charletoni p. 22.

*Mus Norvegicus vulgo Lemming* Wormi *Mus.* p. 322. Raji p. 227.

[p. 24]

Sectio tertia animalium pilosorum ungues obtusos et parum aduncos habentium.

1. Meles, seu *Taxus.*<sup>463</sup>

2. Phoca cum *Morso.*<sup>464</sup>

3. Lutra.

4. Lupus, Vulpes et Canis.

I. Genus melis. Character genericus.

1. Digiti.

2. Dentes caninis similes.

3. Cauda brevis. Pili corporis rigidi. Crura brevia.

4. Auriculæ exiguæ, subrotundæ.

5. Mammæ.

6. Orificium intus pilosum, statim sub cauda supra anum.

7. Intestinis crassis et coeco caret.

I. MELES.

*Meles* Gesneri Ed. G. folio 33.a.

---

<sup>462</sup> reclinatis: rectinatis *Nybelin.*

<sup>463</sup> *Taxus*: 'Medieval Latin name of the badger: formerly sometimes used in English'.  
*OED. Cf. Germ. Dachs.*

<sup>464</sup> *Morsus*: *cf.* 3. *Phoca.*

15. ALPINE MOUSE, *two feet long, claws black.*

*Mus alpinus* Gesner, Charleton; *Mus alpinus Plini* Ray.

1. Ears mutilated and, as it were, truncated.<sup>504</sup>

16. MOUSE, *mottled, five inches long, snout cloven, and ears reclining on the back.*

*Mus Norvegicus* Charleton; *Mus Norvegicus vulgo Lemming Worm*,<sup>505</sup> Ray.

Third Section comprising hairy animals having claws, dull and only somewhat hooked.

1. Badger, that is, *Taxus*.<sup>506</sup>

2. Seal with *Morsus*.<sup>507</sup>

3. Otter.

4. Wolf, Fox, and Dog.

I. Genus of the Badger. Generic Character.

1. Toes.

2. Teeth, similar with Dog's.

3. Tail short. Body hairs rigid. Shanks short.

4. Ears small, slightly rounded.

5. Udders.

6. Opening, hairy inside, immediately under the tail in front of anus.

7. Lacking large intestine and caecum.

I. BADGER.

*Meles* Gesner; *Taxus* Charleton; *Taxus sive Meles* Ray.

<sup>504</sup> Artedi: *Auriculæ mutilæ et quasi decurtatæ*. Cf. Cicero, *Orator* 73: *mutila et quasi decurtata sentire* ('expressing mutilated and, as it were, truncated sentences').

<sup>505</sup> Ole Worm (1588–1654), *Museum Wormianum*, Leyden 1655.

<sup>506</sup> *Taxus*: 'Medieval Latin name of the badger: formerly sometimes used in English' (OED). Cf. Germ. *Dachs*.

<sup>507</sup> *Morsus*: *cfr.* 3. *Phoca*

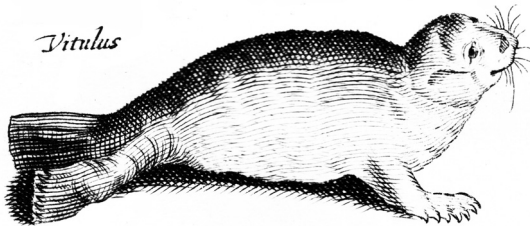
*Taxus Charletoni* O.Z. p. 17.

*Taxus sive meles* Raji Syn. p. 185.

[p. 25]

II. Genus phocæ. Character genericus.

1. Digi quinque (5), membrana juncti, in singulis pedibus, quorum posteriores majores sunt et retrorsum extensi. Anteriores vero antrorsum protensi. Ungues.
2. Dentes ut in Lupo.
3. Auriculæ nullæ externæ sed foramina duo angusta aurium loco.
4. Cauda ad modum brevis. Pili curti.
5. Setæ quadratæ, nodosæ, ad nares, ad oculos vero nullæ.
6. Mammæ quatuor in foeminis.
7. Penis intus osseus.



**Figure 17.** The common seal, *Phoca vitulina*, after Hendrik Ruysch (1663–1727), *Theatrum universale omnium animalium piscium, avium, quadrupedum, exanguium, aquaticorum, insectorum, et angium*, 1718 (vol. 1, pl. 44, fig. 4). License: Public Domain.

Species generis phocæ.

1. PHOCA *quadricubitalis, cana.*

*Phoca seu Vitulus marinus* Ray p. 189 cum hac specie convenire videtur, sed ex descriptione minus perfecta nil certi determinari potest.

1. Color cinereus est et maculatus.
2. Parit ab ipsis Calendis Februarii ad Idus fere ejusdem unicum Patulum, vitulo recens nato non minorem.

II. Genus of the Seal. Generic Character.

1. Fingers, five (5) joined by a membrane in each foot, of which the posterior are larger and extended backwards, but the anterior extended forwards. Claws.
2. Teeth, as in the Wolf.
3. Ears, no external ones but two narrow holes instead of ears.
4. Tail, very short. Hairs short.
5. Bristles, stiff, squared and knotty, by the nostrils but by the eyes, none.
6. Udders, four in females.
7. Penis with internal bone.

Species of the Genus of the Seal.

1. SEAL, *four cubits long, grey.*

*Phoca seu vittulus marinus* Ray p. 189 seems to agree with this species, but owing to a less than perfect description nothing can be determined for certain.

1. Colour is ash-grey and spotted.
2. It gives birth, from the first of February to the 13th of the same month, to one single cub, not smaller than a new-born calf.



3. Foetum sequentis speciei enecat et carnem devorat, corio et adipe relictis.

4. Gregatim incedunt in magna copia supra glaciem Svecis *Gråskjäl*.

2. PHOCA *tricubitalis*, *pilis brevibus nigrescentibus*.

Svecis *Vikare* et *Wikare-Själ*.

1. Circa Calendas Februarii foetum parit magnitudine Felis et quidem unicum, raro geminos, idque apud nos sæpius super glacie.

2. Halitu suo foramina in glacie facit ab inferiore parte vaporem calidum spirando.

3. Gregatim non incedit.

3. PHOCA *oculis rubris et dentibus duobus exertis, seorsum flexis*. *Equus marinus et Hippopotamus falso dictus* Raji Syn. p. 191.

*Morsus et Walrus* aliis.

[p. 26]

III. Genus *lutræ*. Character.

1. Digiti 5 (quinque) ejusdem fere longitudinis, omnes in singulis pedibus, singuli membrana intermedia juncti. Ungues curti albescentes et cathetoplatei.<sup>465</sup>

2. Dentes ut in Cane.

3. Auriculæ exiguæ infra oculos.

4. Cauda satis longa, pilosa.

5. Mammæ.

6. Intestina ubique æqualia et coeco destituta.

7. Renes e decem glandulis conglomerati.

1. LUTRA *digitis pedum omnibus ejusdem longitudinis*.

*Lutra Solini Polyh.* c. 19. — Gesneri *E. G.* fol. 129. — Schoneveldi *Ichthyol.* p. 46. — Charletoni p. 17. — Raji p. 187. — Gesneri *Ichthyol.* p. 515.

<sup>465</sup> cathetoplatei *scripsi*: cathetoplateæ *ms.*, Nybelin.

3. It kills the cubs of the following species and devours their flesh, leaving the skin and the fat.

4. They move in packs of large size over the ice.

Sweden: *Gråskjäl*.

2. SEAL, *three cubits long, hair short, blackish*.

Sweden: *Vikare* and *Wikare-Själ*.

1. About the first of February it gives birth to a cub the size of a Cat, but only one, seldom twins, and this, in our country, very often on the ice.

2. With its breath it makes holes in the ice by breathing steam from underneath the ice.<sup>508</sup>

3. It does not move in packs.

3. SEAL, *eyes red and two teeth, protruding, bent downwards*.

Erroneously named *Equus marinus et Hippopotamus*, Ray. By others, *Morsus* and *Walrus*.

### III. Genus of the Otter. Character.

1. Toes, 5 (five), of about the same length, all joined, on each foot, by an intermediate membrane. Claws short, whitish, and cathetoplateous.

2. Teeth, as in Dog.

3. Ears, small under the eyes.

4. Tail very long, hairy.

5. Udders.

6. Intestines of even thickness, devoid of caecum.

7. Kidneys conglomerated from ten small glands.

1. OTTER, *toes on the feet, all of the same length*.

*Lutra* Solinus, Gesner, Schonevelde, Charleton, Ray, Gesner.

---

<sup>508</sup> Nybelin (1934, 56): 'Trovärdiga äro däremot uppgifterna om hur sälen med sin varma andedräkt underhåller sina andhål i isen liksom uppgifterna om yngeltiderna (gamla stilen!)' ('Credible, on the other hand, is the information on how the Seal, by means of its warm breath, keeps open its breathing-holes in the ice, as well as the information on the dates of breeding (Old Style!').

2. LUTRA *digito pedum interiore reliquis breviorē.*

*Lutra Brasiliensis Jiya et Carigueibeiu Brasiliensibus Margravii Raji*  
p. 129.

IV. Genus lupi. Character genericus.

1. Digiti quinque (5) in anterioribus pedibus, in posterioribus ———.<sup>466</sup>  
Ungues parum curvi, crassi et minus acuti.

2. Dentes 1° primores utrinque sex. 2° Canini dicti duo in utraque  
maxilla, ab utroque scilicet latere unus. 3° Molares in utroque latere  
ambarum maxillarum sex. Summa: 40.

3. Caput oblongum. Cauda mediocris.

4. Mammæ.

5. Claviculæ nullæ in pectore. Penis ossiculo intus donatur. Coecum habet.

[p. 27]

1. CANIS *sylvestris, auribus erectis*,<sup>467</sup> *tetradactylus.*

*Lupa Gesneri* E. G. fol. 152. 153.

*Lupus vulgaris* Charletoni p. 14.

*Lupus Raji* p. 173.

2. CANIS *sylvestris aurei coloris, auribus erectis.*

*Adil Bellonii Obs.* l. 2. c. 108. p. 382.

*Lupus aureus* Charlet. p. 14. — Raji p. 174.

3. CANIS *sylvestris, totus rufescens, macrourus, tetradactylus.*

*Vulpes Gesneri* E. G. fol. 55 a.b. — Charletoni p. 14. — Raji  
p. 177.

1. Cauda ampla, admodum pilosa, aures erectæ.

---

<sup>466</sup> Numerus pedum om. ms.

<sup>467</sup> erectis: anectis ms., Nybelin, in erectis corr. manus secunda.

2. OTTER, *toe on the inner side of the foot shorter than the others.*

*Lutra Brasiliensis Jiya et Carigueibeiu Brasiliensibus Marcgravii* Ray.

Genus of the Wolf. Generic Character.

1. Toes, five (5) on front feet, on hind feet ———. Claws a little bent, thick, and not very pointed.

2. Teeth: 1°. Front teeth, six on each side. 2°. Canines, so called, two in each jaw, that is, one on each side. 3°. Molars, six, on each side in both jaws. Sum: 40.

3. Head oblong, tail of moderate length.

4. Udders.

5. No clavicles<sup>509</sup> in chest. Penis furnished with small interior bone. It has a caecum.

1. WOOD DOG, *ears erect, four toes.*

*Lupus, Lupa* Gesner; *Lupus vulgaris* Charleton; *Lupus* Ray.

2. WOOD DOG, *of golden colour, ears erect.*

*Adil* Belon; *Lupus aureus* Charleton, Ray.

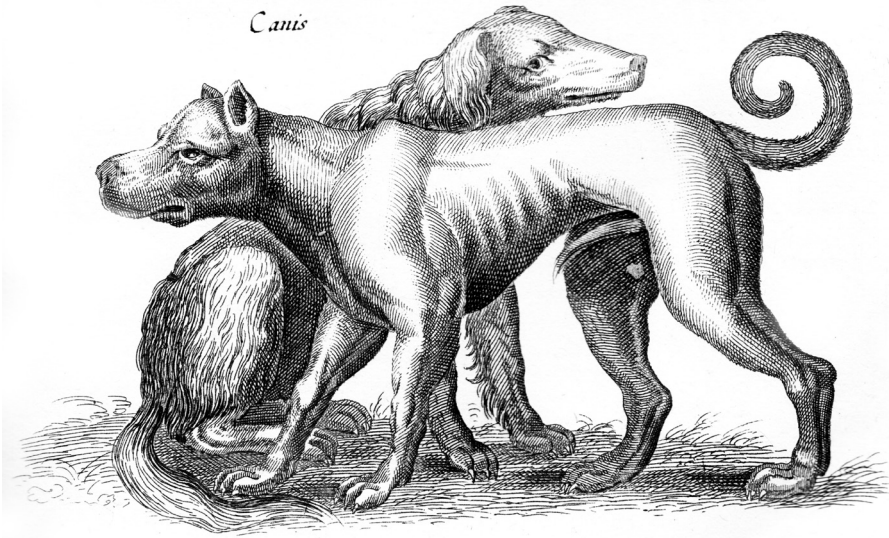
3. WOOD DOG, *wholly reddish, tail large, four toes.*

*Vulpes* Gesner, Charleton, Ray.

1. Tail large, very hairy, ears erect.

---

<sup>509</sup> That is, cleithra.



**Figure 18.** A pair of domestic dogs, *Canis familiaris*, after Hendrik Ruysch (1663–1727), *Theatrum universale omnium animalium piscium, avium, quadrupedum, exanguium, aquaticorum, insectorum, et angium*, 1718 (vol. 2, pl. 69, fig. 3). License: Public Domain.

4. CANIS *domesticus*, *rostrō obtusissimo, auribus pendulis, tetradactylus.*

*Canis sagax* Charletoni O.Z. p. 23.

*Canis sagax, Sanguinarius apud Anglos* Gesneri E. G. fol. 92.b.

*Blodhund.*

[p. 28]

5. CANIS *domesticus, maxillis æqualibus, auribus pendulis, tetradactylus.*

*Canis socius et fidelis* Gesneri E. G. fol. 91.

*Canis villaticus* Charletoni p. 23.

*Canis οἰκουρὸς domesticus seu socius* Raji. 177.

1. Magnitudinis variæ et coloris admodum diversi est, plerumque exiguus.

4. DOMESTIC DOG, *snout very blunt, ears hanging, four toes.*

*Canis sagax* Charleton; *Canis sagax, Sanguinarius apud Anglos* Gesner.  
*Blodhund.*

5. DOMESTIC DOG, *jaws equal, ears hanging, four toes.*

*Canis socius et fidelis* Gesner; *Canis villaticus* Charleton; *Canis οἰκουρός domesticus seu socius* Ray.

1. It is of varying size and very diverse colouring, often small.

V. Genus caninum.<sup>468</sup> Character genericus.

1. Digni quinque in pedibus anterioribus, in posterioribus vero jam quatuor, jam quinque. Ungues obtusi.

2. a. Dentes primores sex in utraque maxilla, non omnino ambitu rotundi sed parum compressi, extremus utrinque reliquis major. b. Dens magnus caninus proprie dictus in utraque maxilla utrinque a lateribus primorum. c. Molares sex in utroque latere ambarum maxillarum.

3. Caput oblongum.

4. Mammæ octo in foeminis, scilicet 4 utrinque.

5. Intestina quatuor. Coecum adest. Penis intus osseus.

[p. 29]

6. CANIS *domesticus*, *pilis crispis*, *auribus pendulis*. *Tetradactylus*.

*Canis aquarius*, *aquaticus* Gesneri E. G. fol. 93.a.

*Canis Hispaniolus*, *aquaticus* Charleton p. 23.

*Canis aviarius*, *aquaticus* Raji p. 177.

*Water-Spaniel* Anglis.

7. CANIS *domesticus*, *auribus pendulis*, *pentadactylus*.

Sv. *Liten Jagthund*.

8. CANIS *domesticus*, *auribus erectis*, *tetradactylus*.

Sv. *Gemen Fåhund* vel *Bondhund*.

9. CANIS *domesticus*, *auribus erectis*, [...] <sup>469</sup>

*Canis molossus*, *bellicosus*, *Anglicus* Charl. p. 23.

*Mastivus*, *nonnullis Mastinus* Raji p. 176.

1°. Omnium maximus est.

10. CANIS *domesticus*, *longus*, *gracilis*, *rostro acuto*.

*Canis Britannicus venaticus* Gesneri E. G. fol. 92. 93.

<sup>468</sup> Annotatio mutilata in margine: -venit in / -ribus / Charac- / gene / Lupi. Om. Nybelin.

<sup>469</sup> Descriptio deest ms.

V. Genus of the Dog.<sup>510</sup> Generic Character.

1. Toes, five on anterior feet but on posterior sometimes four, sometimes five. Claws blunt.

2. a. Front teeth, six in each jaw, not entirely round in circuit but a little compressed, the outermost on each side larger than the others. b. Tooth, large, canine properly called, in each jaw, on each side of the front teeth. c. Molars, six, on each side in both jaws.

3. Head oblong.

4. Udders, eight in females, that is 4 on each side.

5. Intestines, four. Caecum present. Penis bony inside.

6. DOMESTIC DOG, *hairs curly, ears hanging. Four toes.*

*Canis aquarius, aquaticus* Gesner.

*Canis Hispaniolus aquaticus* Charleton.

*Canis aviarius, aquaticus* Ray.

*Water-Spaniel* in England.

7. DOMESTIC DOG, *ears hanging, five toes.*

*Liten Jagthund* in Sweden.

8. DOMESTIC DOG, *ears erect, four toes.*

*Gemen Fåhund* or *Bondhund* in Sweden.

9. DOMESTIC DOG, *ears erect [...]*<sup>511</sup>

*Canis molossus, bellicosus, Anglicus* Charleton.

*Mastivus, nonnullis Mastinus* Ray.

1. It is the largest of all.

10. DOMESTIC DOG, *long, slender, snout pointed.*

---

<sup>510</sup> Note in outer margin, partly trimmed off; see note in Latin text.

<sup>511</sup> Rest of description missing in ms.



*Canis leporarius*, *Scoticus* Charleton p. 23.

*Canis venationis Grajus seu Græcus*, *nonnullis Scoticus* Raji p. 176.

*Greyhound* Anglis.

Sectio quarta animalium pilosorum unguibus aduncis et acutis præditorum.

1. *Mustela* cum *Zobela* et *Martes*.

2. *Felis*.

3. *Lynx*.

4. *Hictus*<sup>47°</sup> seu *Gulo*.

5. *Leo*.

6. *Tigris* et *Pardalis*.

7. *Ursus*.

I. Genus *mustelæ*. Character genericus.

1. *Digiti* (5) *quinque* in *singulis pedibus*. *Ungues acuti*, *adunci*, *cathetoplatei*.

2. *Dentes*: 1° *Primores sex* utrinque, *admodum exigui*, *erecti*. 2° *Canini duo* in *utraque maxilla*, *longi et robusti*. 3° *Molares octo* in *utraque maxilla*, *quatuor scilicet ab utroque latere maxillarum*, *anteriores minimi sunt*. *Summa*: 32.

3. *Auriculæ breves*, *latæ*, *appendice ad imam partem donatæ*.

4. *Corpus longum et gracile*, *cauda oblonga*.

5. *Mammæ*.

6. *Intestina ubique fere æqualia*, *coeco et colo carentia*.

I. *MUSTELA corpore sescunciali, vel rubro vel candido, oculis nigris*.

*Mustela* Gesneri E. G. fol. 149.b.

*Mustela sylvestris* Charletoni p. 19.

*Mustela vulgaris* Raji. p. 195.

[p. 31]

---

<sup>47°</sup> *Hictus*: *nomen ignotum*, cf. Gr. ἰκτίς, -ίδος (= *Ictis*) f., *the yellow-breasted Marten* L&S.

*Canis Britannicus venaticus* Gesner.

*Canis leporarius, Scoticus* Charleton.

*Canis venationis Grajus seu Graecus, nonnullis Scoticus* Ray.

*Greyhound* in England.

[p. 30]

Fourth section comprising hairy animals furnished with claws, hooked and sharp.

1. Weasel with Sable, and Marten.
2. Cat.
3. Lynx.
4. *Hictus*,<sup>512</sup> that is, Wolverine.
5. Lion.
6. Tiger and Panther.
7. Bear.

I. Genus of the Weasel. Generic Character.

1. Toes, (5) five on each foot. Claws sharp, hooked, cathetoplateous.
  2. Teeth, 1. Front teeth, six on each side, very small, erect. 2. Canines, two in each jaw, long and robust. 3. Molars, eight in each jaw, that is four on each side of the jaws. The anterior ones are smallest. Sum: 32.
  3. Ears short, wide, gifted with an appendix at their lowest end.
  4. Body long and slender. Tail oblong.
  5. Udders.
  6. Intestines, almost everywhere equal, lacking caecum and colon.
1. WEASEL, *body one and a half inch long, either red or white, eyes black.*

---

<sup>512</sup> Hictus: unknown word, but cf. Gr. ἰκτίς, -ίδος (= Ictis) f., the yellow-breasted Marten (Liddell and Scott).

*Num etiam pertinet Mustela candida scilicet animal Ermineum recentiorum* Ray p. 198. *Hermellanus* Charleton p. 19.

1. Ungues albi.

2. *MUSTELA ex albo flavescens, oculis rubicundis.*

*Viverra* Charlet. p. 19.

*Furo* Gesn. E. G. fol. 150.b.

*Mustela sylvestris, Viverra dicta* Ray p. 192.

1. Locus: Africa.

3. *MUSTELA corpore pedali, nigrescente, ore albo et unguibus superne fuscis.*

*Putorius Gesneri* E. G. fol. 137.b. — *Charletoni* p. 19. — *Raji* p. 199.

*The Polecat.*

4. *MUSTELA corpore pedali ex fulvo nigrescente, gutture flavo vel albo.*

*Martes Gesneri* E. G. fol. 151. — *Charlet.* p. 19.

*Martes aliis Fojjna* *Raji* p. 200.

1. Ungues albi.

5. *MUSTELA pedalis, obscure fulva, gutture, occipite, et auriculis albetibus.*

*Mustela Zobela* *Gesneri* E. G. fol. 192.

*Mustela Zibelina* *Charl.* p. 19. — *Raji* p. 201.

*Sabel.*

*Mustela* Gesner; *Mustela sylvestris* Charleton; *Mustela vulgaris* Ray.  
Does this also belong:<sup>513</sup> *Mustela candida seu Ermineum recentiorum*  
Ray p. 198. *Hermellanus* Charleton p. 19.

1. Claws white.

2. WEASEL, *light-yellow from white, eyes red.*

*Viverra* Charleton; *Furo* Gesner; *Mustela sylvestris*, *Viverra dicta* Ray.

1. Locality: Africa.

3. WEASEL, *body one foot long, blackish, mouth white and claws swarthy on top.*

*Putorius* Gesner, Charleton, Ray.

The Polecat.

4. WEASEL, *body one foot long, throat yellow or white.*

*Martes* Gesner, Charleton; *Mustela aliis Fojjna* Ray.

1. Claws white.

5. WEASEL, *one foot long, dark tawny, with throat, top of the head, and ears white.*

*Mustela Zobela* Gesner; *Mustela Zibelina* Charleton, Ray.

Sabel.

---

<sup>513</sup> Artedi introduces this query with *num*, an interrogative particle indicating that a negative answer is expected.

II. Genus felinum. Character genericus.

1. Digni divisi, quinque in pedibus anterioribus, in posterioribus vero quatuor. Ungues adunci, acuti, cathetoplatei.

2. Dentes 1<sup>o</sup> primores sex utrinque. 2<sup>o</sup> Canini duo utrinque scilicet utrinque in singula maxilla. 3<sup>o</sup>. Molares sunt tres utrinque in maxilla inferiore, in superiore vero duo utrinque, quorum ultimus minimus utrinque, infimo autem proximus maximus est. Summa: 26.

3. Cauda ejusdem longitudinis cum ipso corpore.

4. Mammæ octo, scilicet quatuor utrinque.

5. Penis non est osseus, ut in Canino genere.

[p. 32]

1. FELIS *sylvestris fusca, maculis et apicibus aurium nigris, cauda spithamali.*

*Lupus cervarius* Gesneri E. G. fol. 155. 156.

*Lynx Charletoni* p. 13. — Raji p. 166.

2. FELIS *sylvestris alba, maculis nigerrimis, cauda vix spithamali.*  
*Svecis Kattlo*, hucusque non descripta est.

3. FELIS *sylvestris flavescens, maculis nigris et cauda longa.*  
*Pardus, an Lynx Brasiliensis Jaguar dicta Marcgr.* Raji p. 163.  
*Jaguara Brasiliensibus Marcgr.* l. 6. c. 10. p. 235.

4. FELIS *sylvestris rufescens, gula alba et maculis nigris.*  
*Catus Pardus sive Catus montanus Americanorum* Raji p. 169.

1. Cauda mediocris, minor proportione quam in Fele domestica.

2. Maculæ nigræ in dorso oblongæ, in ventre et pedibus rotundæ.

3. Setæ nullæ in superciliis. Magnitudo tripedalis.

II. Genus of the Cat. Generic Character.

1. Toes divided, five on anterior feet but four on posterior. Claws hooked, sharp, cathetoplateous.
2. Teeth, 1°, Front teeth, six on each side. 2°, Canines, two on each side, that is on each side in each jaw. 3°, Molars are three on each side in lower jaw but in upper jaw two on each side, of which the last is the smallest on each side, the one nearest to the innermost is largest. Sum: 26.
3. Tail of equal length with the whole body.
4. Udders eight, that is four on each side.
5. Penis is not bony, as in the Genus of the Dog.

1. WOOD CAT, *swarthy, with black spots and ear tips black, tail one span long.*

*Lupus cervarius* Gesner; *Lynx* Charleton, Ray.

2. WOOD CAT, *white, with very black spots, tail barely one span long.*  
Sweden: *Kattlo*, until now it was not described.

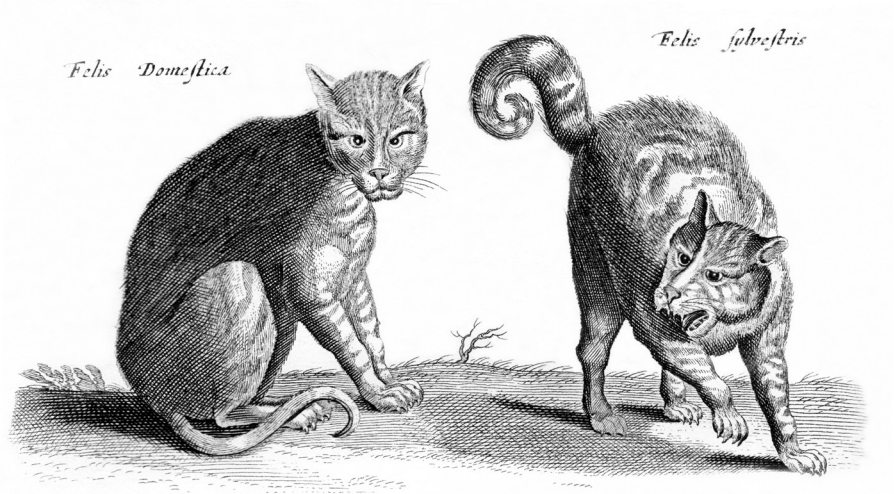
3. WOOD CAT, *yellowish with black spots and long tail.*

*Pardus, an Lynx Brasiliensis Jaguará dicta* Marcgrave, Ray; *Jaguará Brasiliensibus* Marcgrave.

4. WOOD CAT, *reddish, with throat white and with black spots.*

*Catus Pardus sive Catus montanus Americanorum* Ray.

1. Tail of middle length, proportionally shorter than in domestic Cat.
2. Spots, black, oblong on back, on belly and feet, rotund.
3. No bristles in eyebrows. Size: three feet.



**Figure 19.** A pair of domestic cats, *Felis domestica*, after Hendrik Ruysch (1663–1727), *Theatrum universale omnium animalium piscium, avium, quadrupedum, exanguium, aquaticorum, insectorum, et angium*, 1718 (vol. 2, pl. 72, fig. 1). License: Public Domain.

5. FELIS *domestica*, pupilla oblonga et cauda corpus æquante.

*Felix vulgo Catus* Gesneri E. G. fol. 98.b.

*Felis domestica* Charlet. p. 20.

*Felis domestica seu Catus* Raji p. 170.

1. Secundum colorem admodum variat.

[p. 33]

Genus lyncis. Character genericus.

1. Digni (5) quinque in anterioribus pedibus, in posterioribus (4) quatuor. Ungues adunci et acuti, albicantes.

2. Dentes 1° Primores utrinque sex. 2° Canini duo prælongi in utraque maxilla. 3° Molares duo tantum, utrinque in maxilla superiore. In inferiore vero utrinque tres. Summa 26.

3. Lingua aculeis retroversis refertur ut in Fele et Leone.

4. Corpus pulcre maculatum.

5. Caput et auriculæ felinæ sed cauda brevis.

5. DOMESTIC CAT, *pupil oblong, tail equal in length with body.*

*Felix vulgo Catus* Gesner; *Felis domestica* Charleton; *Felis domestica seu Catus* Ray.

1. In colouring it varies very much.

Genus of the Lynx. Generic Character.

1. Toes, five (5) on anterior feet, on posterior four (4). Claws hooked and sharp, whitish.

2. Teeth. 1<sup>o</sup>, Front teeth, six on both sides. 2<sup>o</sup>, Canines, two, very long, in each jaw. 3<sup>o</sup>, Molars, only two on each side in upper jaw but in lower jaw there are three on each side. Sum: 26.

3. Tongue furnished with prickles turned backwards, as in Cat<sup>514</sup> and Lion.

4. Body prettily spotted.

5. Head and ears like the Cat's but the tail is short.

---

<sup>514</sup> Information omitted by author in article on Genus of the Cat.



6. Mammæ.

7. Ventriculus felinus. Intestina ut in Leone.

6. FELIS *domestica*, *maculis plurimis varia*.

*Felis Syriaca*, *multis punctis interstincta* Charlet. p. 20.

*Felis Syriaca*, *multis punctis variegata* Raji p. 171.

[p. 34]

7. FELIS *sylvestris*, *macrourus*, *maculis nigrescentibus oblongis*.

*Tigris* Gesneri E. G. fol. 148 a.b. — Raji p. 165.

*Tygris* Charletoni p. 13.

1. Color pallide fuscus.

8. FELIS *sylvestris*, *macrourus*, *maculis nigris orbiculatis*.

*Panthera seu Pardalis. Pardus. Leopardus* Gesneri E. G. fol. 104.6.

*Pardus* Charletoni p. 15.<sup>471</sup>

*Pardalis* Raji p. 166.

Varia Plinii.

1° Tigride auctorum minor est.

9. FELIS *sylvestris*, *unicolor*, *cauda in extremo floccosa*.

*Leo* Gesneri E. G. fol. 102. — Charletoni p. 13. — Raji p. 162

1. Color pallide fuscus. Mas collum et caput admodum pilosum habet.

<IV. Genus Hictidis seu Gulonis.> [*Textus deest lacuna absente*].

[p. 35]

V. Genus leoninum. Character genericus.

1. Digni (5) quinque in pedibus anterioribus, in posterioribus quatuor (4), ungues adunci, robusti, acuti.

2. Dentes 1° Primores sex utrinque. 2° Canini duo in utraque maxilla, longi, robusti, acuti. 3° Molares sex in utraque maxilla, tres scilicet ab utroque latere.

---

<sup>471</sup> 15: 13 *Nybelin*.

6. Udders.

7. Belly like the Cat's. Intestine as in Lion.

6. DOMESTIC CAT, *mottled with many spots.*

*Felis Syriaca, multis punctis interstincta* Charleton; *Felis Syriaca, multis punctis variegata* Ray.

7. WOOD CAT, *tail large, spots blackish, oblong.*

*Tigris* Gesner, Ray; *Tygris* Charleton.

1. Colour is pale tawny.

8. WOOD CAT, *tail large, spots black and circular.*

*Panthera seu Pardalis. Pardus. Leopardus* Gesner; *Pardus* Charleton; *Pardalis* Ray; various names in Pliny.

1. It is smaller than *Tigris* of the Authorities.

9. WOOD CAT, *of one colour, tip of tail full of flocks of wool.*

*Leo* Gesner, Charleton, Ray.

1. Colour is pale tawny. The male has a very hairy neck and head.

<IV. Genus of the Wolverine.> [Text missing in ms. leaving no lacuna.]

V. Genus of the Lion. Generic Character.

1. Toes, five on front feet, four on hind feet. Claws hooked, strong, sharp.

2. Teeth. 1°, Front teeth, six on each side. 2°, Canines, two in each jaw, long, robust, sharp. 3°, Molars, six in each jaw, that is, three on each side.

3. Cauda admodum longa.
  4. Lingua aculeis retroversis prædita.
  5. Mammæ duæ in ventre foeminarum.
- \* Catulos 5 parit Leæna. D. Willughby.
- \* Retro mingit et coit eodem modo quo Cameli.

Species generis leonini.

[p. 36: *hac pagina vacua relicta textus deest, sed vide supra, Genus Lyncis 9!*]

[p. 37]

VI. Genus tigridis. Character genericus.

1. Digiti 5 in pedibus anterioribus, in posterioribus 4 (quatuor). Ungues adunci, longi, robusti, acuti.
2. Dentes 1<sup>o</sup> Primores utrinque sex. 2<sup>o</sup> Canini duo in utraque maxilla, magni, crassi, et robustissimi. 3<sup>o</sup> Molares sex in utraque maxilla, tres scilicet in utroque latere.
3. Cauda crassa, robusta, et longa.
4. Caput subrotundum, corpus plerumque maculatum vel striatum.
5. Mammæ quatuor foeminis, in medio ventre, ut in Pantheris seu Pardis.

Species generis.

1. TIGRIS *maculis seu lituris oblongis*.

*Tigris* 2. Raji p. 165 et aliorum auctorum. — 1. Gesneri Ed. Germ. fol. 148 a.b.

2. TIGRIS *maculis corporis orbiculatis*.

*Pardalis* Raji p. 166.

*Pardus, Panthera, Leopardus etc.* aliorum.

Varia Plinii.

*Panthera seu Pardalis, Bardus, Leopardus*, Gesneri E. G. fol. 104.b.

1. Tigride auctorum minor est.

[p. 38]

3. Tail very long.
4. Tongue furnished with prickles turned backwards.
5. Udders, two on the belly of females.
- \* The Lioness gives birth to 5 cubs. Mr Willughby.
- \* It urinates backwards and couples in the same way as Camels.

Species of the Genus of the Lion.

[*Ms. has a lacuna, page 36 being blank, but cf. Genus of Lynx, 9. Felis*].

VI. Genus of the Tiger. Generic Character.

1. Toes, 5 on anterior feet, on posterior, four. Claws hooked, long, robust, pointed.
2. Teeth. 1<sup>o</sup>, Front teeth, six on each side. 2<sup>o</sup>, Canines, two in each jaw, large, thick and very robust. 3<sup>o</sup>, Molars, six in each jaw, that is, three on each side.
3. Tail thick, robust, and long.
4. Head somewhat round, body often spotted or striped.
5. Udders, four in females on the middle of the belly, as in Panther, that is Pardus.

Species of the Genus.

1. TIGER, *spots, that is stripes, oblong.*

*Tigris* Gesner, Ray and other authors.

2. TIGER, *spots, circular on body.*

*Pardalis* Ray; *Pardus, Panthera, Leopardus etc.* in other authors. various names in Pliny. *Panthera seu Pardalis, Bardus, Leopardus* Gesner.

1. It is smaller than Tiger of the authorities.

3. TIGRIS *unicolor, cauda corpus æquante.*

Leo 2. Raji p. 162. et omnium auctorum. — 1. Gesneri E.G. fol. 102.  
[*Reliqua pagina 38 vacua relicta est.*]

VII.<sup>472</sup> Genus ursinum. Character genericus.

1. Digniti distincti, numero (5) quinque in singulis pedibus. Ungues aduncti, robusti, parum acuti, cathetoplatei.

2. Dentes primores, canini et molares ut in Leonibus.

3. Cauda valde brevis, oculi admodum exigui.

4. Figura corporis informis et foeda.

5. Mammæ quatuor in foeminis.

\* Mammæ binæ sub humeris Willough.

6. Costæ utrinque (14) quatuordecim. Claviculæ nullæ. Vertebræ 33. Intestina ejusdem latitudinis, coecum nullum.

7. Renes ex 56 quasi renulis constantes.

[p. 40]

1. Ursus.

Ursus.

— Gesneri E. Germ. fol. 14. — Charletoni O.Z. p. 13. — Raji. *Syn. Quadr.* p. 171.

[*Pagina 40 vacua relicta est.*]

[p. 41]

Sectio quinta animalium plus minus pilosorum, ungues latiores habentium.

1.<sup>473</sup> Simia et cercopithecus.<sup>474</sup>

2. Simia<sup>475</sup> [1. Ignavus seu Ai. Mam. 2.]<sup>476</sup>

---

<sup>472</sup> VII *scripsi Nybelin secutus: 8 ms.*

<sup>473</sup> 2 *ex 1 corr. ut vid. ms.*

<sup>474</sup> et cercopithecus, *del. ms.; om. Nybelin.*

<sup>475</sup> Simia *del. ms.*

<sup>476</sup> Ignavus sei Ai. Mam. 2. *exclusi ut ex Systemate naturæ Linnæi (ed. I, 1735, I. Quadrupedia, Bradypus) excerpta.*

3. TIGER, *one colour, tail equally long with body.*

*Leo* Gesner, Ray, and all authors.

[*This article ends on p. 38, line 4, the rest of the page left blank*].

[p. 39]

VII.<sup>515</sup> Genus of the bear. Generic Character.

1. Toes separate, five (5) in number on each foot. Claws hooked, robust, not very sharp, cathetoplateous.

2. Front teeth, canines, and molars as in Lions.

3. Tail very short, eyes very small.

4. Shape of the body formless and ugly.

5. Udders, four in females.

\* Two pairs of udders under the shoulders: Willughby.

6. Ribs on each side, (14) fourteen. No clavicles.<sup>516</sup> Vertebrae 33. Intestines of equal thickness, no caecum.

7. Kidneys consisting, as it were, of 56 small kidneys.

1. *Ursus*.

*Ursus* Gesner, Charleton, Ray.

[*One page left blank*]

Fifth Section comprising animals more or less hairy, having very broad claws.

1. Ape and Cercopithecus

2. Ape<sup>517</sup>

---

<sup>515</sup> VII: 8 *ms.*

<sup>516</sup> That is, cleithra.

<sup>517</sup> The manuscript contains words culled verbatim from 1st (1735) ed. of Linnaeus's *Systema Naturae*, and are here omitted (cf. Latin edition, apparatus criticus).

3. Homo.

I. Genus simiæ vel cercopithecii. Character genericus.

1. Digiti (5) quinque longi in singulis pedibus, ungues lati humanorum fere modo. Digiti medii, tam in manibus, tam pedibus posterioribus, reliquis longiores sunt. Plantæ pedum molli cute tectæ. Incessus interdum posteriorum solum pedum ope peragitur.

2. Dentes 1° Primores ut in homine. 2° Canini vero in superiore maxilla prælongi, in inferiori etiam primoribus longiores, alias humanis similes et non acuti. 3° Molares ut in homine.

3. Cauda vel nulla vel brevis vel oblonga. Collum vel breve vel oblongum.

4. Mammæ binæ in pectore foeminarum.

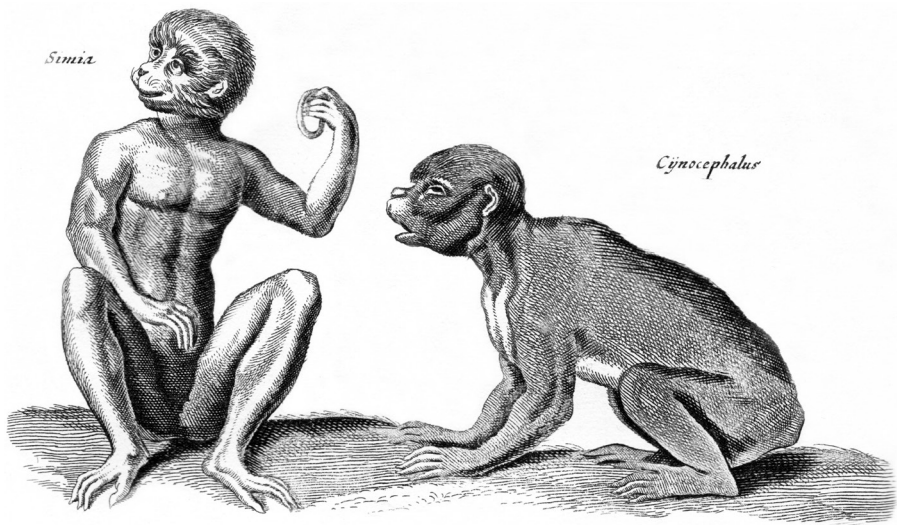
5. Cilium in utraque palpebra, contra morem brutorum.<sup>477</sup>

6. Intestinum coecum appendice veriforme caret.

---

<sup>477</sup> brutorum: brutarum Nybelin.

## 3. Man



**Figure 20.** A pair of monkeys, after Hendrik Ruysch (1663–1727), *Theatrum universale omnium animalium piscium, avium, quadrupedum, exanguium, aquaticorum, insectorum, et angium*, 1718 (vol. 2, pl. 59, fig. 1). License: Public Domain.

1. Genus of the Ape or *Cercopithecus*.<sup>518</sup> Generic Character.

1. Fingers, five (5) long, on each foot; claws wide, rather like those of humans. The middle fingers, on the hands as well as on the posterior feet, are longer than the others. The soles of the feet covered with soft skin. The walk is sometimes performed by means of the posterior feet only.
2. Teeth. 1. Front teeth as in Man. 2. Canines very long even in upper jaw, in lower jaw also longer than the front teeth, in other respects similar with human ones and not pointed. 3. Molars as in Man.
3. Tail, either none, or short, or oblong. Neck either short or oblong.
4. Udders, two, on the breast of the females.
5. Lashes on each eyelid, contrary to what is usual in wild animals.
6. The *intestinum caecum* lacks its vermiform appendage.

<sup>518</sup> The numbering of the two genera and their species (1. Apes with Tails, 16 species; 2. Apes without Tails, 1 species, and 3. Humans) is clear in the body text but confused in the list of contents. The latter is therefore here corrected from the former.



\*<sup>478</sup> *Simiæ cauda carentes differunt ab homine corpore hirsutiore rudioreque, proportione digitorum in pedibus posterioribus et carentes loquela.*<sup>479</sup>

[p. 42]

1° Caudatæ.

1. *SIMIA nigra, barbata, cauda extrema nuda.*<sup>480</sup>

*Guariba Brasiliensibus tertius* Marcgr. L. 6. c. 5. p. 226. — Raji p. 153.

2. *SIMIA ex nigro cinerea, auribus nigris, glabris, et cauda pedali, ruffa.*

*Cagui Brasiliensibus* Marcgr. l. 6. c. 5. p. 227.

*Cagui Brasiliensibus, Congensibus Pongi Marcgravii* Raji p. 154.

3. *SIMIA sescuncialis, cauda corpus superante, ex albo et fusco quasi annulata.*

*Cagui minor* Raji p. 154.

1. Color ex fusco et albo mixtus.

2. Aures pilis albis circumvallatæ.

4. *SIMIA ex albo flavescens, macrourus, moschum redolens.*

*Caitaia Brasiliensibus* Margr. l. 6. c. 5. p. 227. — Raji p. 155.

5. *SIMIA corpore pedali, nasibus calvis et cauda arcuata.*

*Cercopithecus Angolensis major, Congensibus Macaquo Marcgravii,* Raji p. 156.

6. *SIMIA caudata, fuscescens, mento et barba alba.*

*Cercopithecus barbatus Guinensis, in Congo vocatur Exquima* Marcgr. l. 6. c. 5. p. 227. *Cercopithecus barbatus, Guinensis, Congensibus Exquima* Raji. 156.

---

<sup>478</sup> \* *Simiæ cauda carentes ... carentes loquelæ verba a manu secunda scripta credo.*

<sup>479</sup> *carentes loquela scripsi: carentia loquelæ ms. Nybelin.*

<sup>480</sup> *cauda extrema nuda ms. ante corr.: cauda in extremo nuda manus secunda, Nybeliin.*

\* Apes lacking a tail differ from Man by their hairier and ruder body, the proportions of the fingers on their posterior feet, and by lacking speech.<sup>519</sup>

I. Apes with Tails.

1. BLACK APE, *bearded, extreme end of tail bare.*

*Guariba Brasiliensibus tertius* Marcgrave, Ray.

2. APE, *ash-grey from black, ears black, smooth, and tail one foot long, reddish.*

*Cagui Brasiliensibus* Marcgrave; *Cagui Brasiliensibus, Congensibus Pongi* Ray.

3. APE, *one and a half inch long, tail longer than body, ringed, as it were, in white and reddish.*

*Cagui minor* Ray.

1. Colour of mixed reddish and white.

2. Ears surrounded by white hairs.

4. APE, *yellowish from white, tail large, redolent of musk.*

*Caitaia Brasiliensibus* Marcgrave, Ray.

5. APE, *body one foot long, nostrils bald, and tail curved.*

*Cercopithecus Angolensis major, Congensibus Macaquo* Marcgravi Ray.

6. APE *with tail, tawnyish, chin and beard white.*

*Cercopithecus barbatus Guinensis, in Congo vocatur Exquima,* Marcgrave,

*Cercopithecus barbatus, Guinensis, Congensibus Exquima* Ray.

---

<sup>519</sup> This sentence appears to be an addition by a slightly different hand.

7. *SIMIA nigricans, caudæ medietate et barba flavescensibus.*

*Alius Guinensis* Raji p. 156.

1. Os coerulescit, crura et pedes nigra.

[p. 43]

[*Textus novem linearum huius paginæ deletus est*]

8. *SIMIA multicolor, macrourus.*

*Guinensis tertius* Marcgr. l. 6. c. 5. Raji p. 157.

1. Caret barba.

9. *SIMIA caudata, nigra, barba incana, longa.*

*Cercopithecus niger, barba incana promissa, Wanduru Zeilanensibus*  
Raji p. 158.

[p. 44]

10. *SIMIA nigrescens, barba alba et cauda longa in extremo floccosa.*

*Cercopithecus barbatus primus* Clusii *Exot.* — Raji p. 159.

An eadem cum N<sup>o</sup> 6, ut putat Rajus?

11. *SIMIA macroceros, pectore albo et barba cana, mucronata.*

*Cercopithecus barbatus secundus* Clusii *Exot.* — Raji p. 159.

1. Cauda in extremo non desinit in floccum.

12. *SIMIA fusca, gutture et pectore albescentibus, cauda in extremo floccosa.*

*Cercopithecus non barbatus primus* Clusii *Exot.* — Raji. p. 160.

1. Barba caret.

13. *SIMIA macroceros, rostro fusco, collo subtus et pectore jubato.*

*Cercopithecus non barbatus* Clusii *Exot.* — Raji p. 160.

14. *SIMIA sescuncialis, macroceros, ex albo, nigro, fusco et rubro varia.*

*Galiopithecus Sagoin* Gesneri E.G. fol. 158.b.

*Cercopithecus Sangoium*<sup>481</sup> Clusii *Exot.* — Raji p. 160.

---

<sup>481</sup> *Sangoium ut vid. ms: Sangoim Nybelin.*

7. APE, *blackish, middle of tail and beard yellowish.*

*Alius Guinensis* Ray.

1. Mouth bluish, shanks and feet black.

[*On upper half of p. 43, 9 lines deleted*]

8. APE, *many-coloured, tail large.*

*Guinensis tertius* Marcgrave, Ray.

1. Lacks beard.

9. APE *with tail, black, beard long and hoary.*

*Cercopithecus niger, barba incana promissa, Wandaru Zeilanensibus* Ray.

10. APE, *blackish, beard white and tail long with flocks of wool at extreme end.*

*Cercopithecus barbatus primus* Clusius, Ray.

Is this the same as No. 6, as Ray believes?

11. APE, *tail large, chest white and beard grey, pointed.*

*Cercopithecus barbatus secundus* Clusius, Ray.

1. Tail in its extreme end does not finish in flock of wool.

12. APE, *tawny, throat and chest whitish, tail with flocks of wool at extreme end.*

*Cercopithecus non barbatus primus* Clusius, Ray.

1. Lacks beard.

13. APE, *tail large, throat tawny, mane on underside of neck and chest.*

*Cercopithecus non barbatus* Clusius, Ray.

14. APE, *one and a half inch long, tail large, mottled in white, black, tawny, and red.*

*Galiopithecus Sagoin* Gesner; *Cercopithecus Sangoium* Clusius, Ray.

15. SIMIA *cauda brevissima, et unguiculo unico posteriorum pedum acuto.*

Vid. Raji *Syn. M. Quad.* p. 161.

16. SIMIA *rostro oblongo et cauda brevi.*

*Papio* Ray p. 158.

*Babio* Charletoni *On.Z.* p. 15.

## II. Cauda carentes.

17. SIMIA *acercos, incana, barba nigra longa.*

*Simia alba seu incanis pilis, barba nigra promissa, ex Zeylonia, Zeylonensibus* Elawandum D.I. Robinson, Raji p. 158.

[p. 45]

## III. Genus humanum per se innotescit, alias vero Character Genericus sic habet:

1. Digniti quinque longi, tam in manibus quam pedibus, ungues plani, lati et fere recti. Digitus intimus in pedibus maximus est.

2. Dentes singulo sunt numero 32, quorum quinque interiores utrinque in singula maxilla vocantur molares, reliqui primores et duo utrinque canini. Ex molaribus tres interiores maximi sunt.

3. Cauda nulla. Incessus posteriorum tantummodo pedum officio peragitur.

4. Mammæ duæ et totidem papillæ, tam in viris quam imprimis mulieribus.

5. Loquela pollet, qua simiæ carent.

[Pag. 46 *vacua relicta est; pag. 47 descriptiones specierum generis muris* No. 13, 14, 15, 16 *habet; pagg. 48 seq. textum sequentem habent.*]

[p. 48]

*Panthera* quam vidi Londini, from<sup>482</sup> Buenos Aÿres

1. Maculas nigras, quadrangulares, triangulares, pentagonas, irregulares et subrotundas habet in corpore toto; dorsales et laterales majores sunt, et in medio sui, ubi color fuscus, maculas nigras minores habebat.

2. Caput crassum, subrotundum.

---

<sup>482</sup> from: *sic Artedi.*

15. APE, *tail very short, and a small claw, single, and pointed on posterior legs.*

See Ray *Syn. M. Quad.* p. 161.

16. APE, *snout oblong and tail short.*

*Papio* Ray; *Babio* Charleton.

II. Apes lacking tails.

17. APE, *no tail, hoary, beard black and long.*

*Simia alba seu incanis pilis, barba nigra promissa, ex Zeylonia, Zeylonensibus Elawandrum* Mr I. Robinson,<sup>520</sup> Ray.

III. Genus of Man is known by itself; otherwise, however, its generic character is as follows:

1. Fingers, five long ones on hands as well as on feet, nails flat, wide, and almost straight. Innermost toe on the feet is the largest.

2. Teeth, only 32 in number, of which the five interior ones on each side in each jaw are called molars, the others are front teeth, and two on each side are canines. Of the molars, the three innermost ones are largest.

3. No tail. Walk is performed by means of the posterior feet only.

4. Two breasts and the same number of nipples, on men as, primarily, on women.

5. It rules by speech, which Apes lack.

[Page 46 blank, p. 47 contains descriptions of the genus *Mouse*.]

[On pp. 48 and 49:]

PANTHER, *which I saw in London, from Buenos Ayres.*

1. It has black spots, square, triangular, pentagonal, irregular, and slightly rounded, all over its body; those on the back and flanks are larger, and on its middle part, where the colour is tawny, it had smaller, black spots.

2. Head is thick, somewhat rounded.

---

<sup>520</sup> Unknown reference.

3. Color corporis fuscus fere.
4. Minor paulo erat quam Leopardus dictus ibidem.

Leopardus ibidem.

1. Paulo major erat, ejusdem coloris, sed maculas dorsales minores quam in Panthera, nigras, subrotundas, irregulares, cruciformes etc. obtinebat.

Tigrides ambo in Moorefield.

1. Zonas vel lineas nigras, transversas, continuas, non multum curvas in postica corporis parte imprimis habebant.
2. Color pallide fuscus.
3. Corpus secundum proportionem longius et gracilius quam in Leone et Panthera.

[p. 49]

Hyæna in Morefield.

1. Magnitudo ut Canis majoris laniorum. Corpus magis cathetoplateum quam plagioplateum.
2. Color corporis obscure fuscus, cum maculis aliquot nigris irregularibus sed raris.
3. Caput non rotundum sed parum oblongum, non crassum.
4. Cauda brevis, vix pedalis, nigrescens, pilis longis obsita, quam interdum sursum atollit. Pili longi superne in collo, jubam fere efficientibus.
5. Pedes non longi. Digni (4.) quatuor unguiculati<sup>483</sup> in singulis.
6. Bestia crudelis est et homines dilaniat ac devorat. Estque admodum falsa, voces varias imitatur et sonum satis magnum edit et interdum cachinnos quasi edit.
7. Locus Barbaria in Africa.

Hæc omnia sunt secundum libellum manuscriptum P. Artedi exscripta a Petro Löffling.

---

<sup>483</sup> unguiculati *scripsi Nybelin secutus*: unguiculatis *ms.*

3. Body colour almost tawny.
4. It was a little smaller than the so-called Leopard at the same place.

LEOPARD *at the same location.*

1. It was slightly larger, of the same colour but had spots on its back, smaller than those on the Panthera, black, somewhat rounded, irregular, cruciform etc.

TIGERS, *both at Moorefield.*<sup>521</sup>

1. They had black zones or lines, transverse, continuous, not very round, mainly on the hind part of the body.
2. Colour pale tawny.
3. Body was, in its proportions, longer and slimmer than in Lion and Panther.

HYAENA *at Morefield.*<sup>522</sup>

1. Size as that of the larger Butchers' Dog. Body is more cathetoplateous than plagioplateous.
2. Colour of body a dull tawny with some spots, black, irregular, but rare.
3. Head not round but somewhat oblong, not thick.
4. Tail short, nearly a foot long, blackish, covered with long hairs, which it sometimes raises up. Long hairs on top of neck, nearly forming a mane.
5. Feet not long. Toes, four (4) with claws on each foot.
6. This beast is cruel and tears men to pieces and devours them. It is very deceitful, imitates various voices and gives off a very large sound and sometimes laughs, as it were.
7. Locality: Barbary in Africa.

[Note at the bottom of p. 49:]

All this was copied by Petrus Löffling from p. Artedi's little manuscript book.

---

<sup>521</sup> 'Moorfields was an open space, partly in the City of London, lying adjacent to its northern wall, near the eponymous Moorgate [...] In the early 18th century, Moorfields was the site of sporadic open-air markets, shows, and vendors/auctions.' Wikipedia (en.), Moorfields, accessed 15 December 2019.

<sup>522</sup> Moorefield *sic*: Artedi's English spelling is erratic.



## Peter Artedi, *Outline of the Science of Hairy Animals*

English translation from a new Latin edition, by Hans Aili.

The *Editio princeps*, that is, the first edition, of *Trichozoologia* was published without translation by Orvar Nybelin, ‘Tvenne opublicerade Artedimanuskript, inför 200-årsminnet meddelade’ (*Svenska Linnésällskapets Årsskrift*, årg. XVII, 1934, 58–77). Artedi’s original manuscript, according to Nybelin (p. 38), may have been written during Artedi’s years at Uppsala University, as there is a note on the inside first cover stating: *ante annum 1735 scripsit hoc autor* (‘The author wrote this before the year 1735’), at least before his departure for England in the autumn of 1734. The two final pages contain material added in London, as Artedi expressly states. The manuscript may therefore have been one of those recovered by Linnaeus from Artedi’s landlord after his demise in September 1735; it certainly belonged to Linnaeus’s library and was copied there by Löfning. This copy is now in the collections of the Stockholm University Library (Berg. Bibl. H. VII: 8.1. n.4). Nybelin (p. 37) offered the hypothesis that the original might still be in those parts of Linnaeus’s library that were still not catalogued in 1934; however, no such text is to be found today at Uppsala University Library.

NB 1: Artedi’s copious literary references for each species, given in full in the Latin edition above, are abbreviated in the translation. Artedi’s comments, mostly marked by an asterisk (\*) or added to a reference, are always translated.

NB 2: ‘P.A.’ indicates a claim that Peter Artedi was the original namegiver; this information was added to the manuscript text by a second hand and therefore of uncertain authenticity.

## Commentary on Peter Artedi's *Idea institutionum Trichozoologiae* ('An Outline of the Principles of the Science of Hairy Animals')<sup>523</sup>

By Theodore W. Pietsch

During their student days in Uppsala, Linnaeus and Artedi, first meeting each other there in late March 1729, made elaborate plans to classify plants and animals in ways that would, in our time, be widely recognised as revolutionary. To avoid 'evil rivalry' (*'invida aemulatio'*), and perhaps thinking also that the work would be too much for one person, a decision was made to divide the natural world between the two of them (Pietsch and Aili 2014, 39). As explained by Linnaeus:<sup>524</sup>

Botany, which I daily cultivated, was studied with less ardour than formerly by him, as if he had changed his plans. We both undertook to cultivate different parts of Natural History, until one of us saw himself defeated by the other, and then one at once desisted from that subject and recognised the other as his superior. Both of us struggled to gain a victory in Ichthyology, until I, after nocturnal labours, was obliged to raise my hands to him in defeat and thereafter committed the study of this subject entirely to him, also the knowledge of Amphibians. On the other hand, he willingly conceded to me the primacy in the knowledge of Birds and Insects. In Lithology and the Science of Quadrupeds we strode over their most arcane fields with equally long steps, and our ardour for this labour remained fully equal between us.

The decision to collaborate or to go their separate ways when it came to the quadrupeds—Trichozoa, or 'hairy animals' as Artedi called them, now universally recognized as the Mammalia, a name established by Linnaeus in the 10th edition of *Systema naturae* (1758)—begs the question: to what extent was Linnaeus influenced by Artedi's classification of the quadrupeds in preparing his accounts for the first (1735) and future editions of *Systema naturae*? Linnaeus was certainly aware of Artedi's *Idea institutionum Trichozoologiae* ('An Outline of the Principles of the Science of Hairy Animals'); either he had access to the manuscript itself or, perhaps more likely, he learned of its contents through direct conversation with Artedi. Confirmation is in fact given by Linnaeus himself in the first edition of *Systema naturae* (1735) in which he added to his

<sup>523</sup> Based on an earlier publication that appeared in the *Journal of Natural History* 57 (17–20), 2023b, 1066–79: T. W. Pietsch and H. Aili, 'Peter Artedi's *Idea institutionum Trichozoologiae* and the classification of mammals'; used with permission of the Taylor & Francis Group, <https://www.tandfonline.com/journals/tnah20>.

<sup>524</sup> 'Vita Petri Artedi', p. [iv], in *Ichthyologia* (1738).

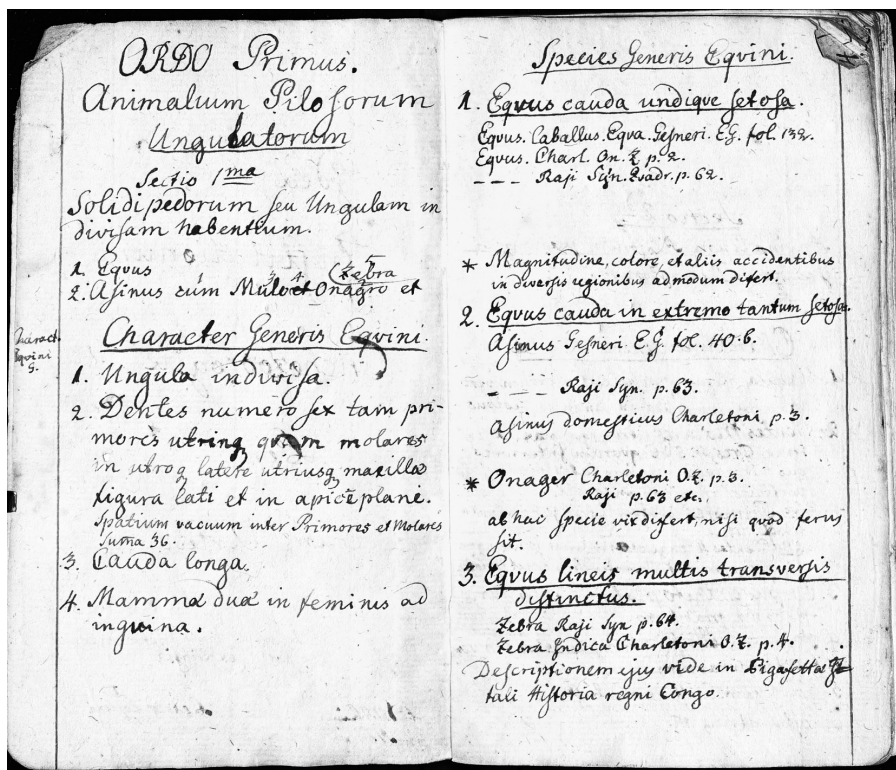
brief description of the hyena: ‘*Vivam Londini nuper vidit & descripsit Artedi*’ (‘Artedi has recently seen and described a living individual in London’; Pietsch and Aili 2023c). This information could only have come from *Trichozoologia*, in which Artedi mentions seeing a panther, leopard, two tigers, and a hyena on display in London in November 1734. Furthermore, there is every reason to conclude that the manuscript came to Linnaeus along with other surviving Artedi manuscripts<sup>525</sup> following Artedi’s untimely death in late September 1735 (Pietsch 2010, 2023; Pietsch and Aili 2022). So what impact, if any, did it have on Linnaeus’s way of thinking about this branch of zoology?

*Trichozoologia* (Figure 21) survives today only as a handwritten copy of Artedi’s original work—50 pages (some blank), prepared for some unknown reason by Pehr Löfling (1729–1756), a Swedish botanist and apostle of Linnaeus (see Nybelin 1934). Dated November 1746, it was drafted some 11 years after Artedi’s death. Assuming Löfling’s copy is a true reflection of the original manuscript, it clearly represents unfinished work, a preliminary study, yet it employs the same hierarchical approach as seen in Artedi’s mature work, so well described above by Professor Aili. However, in contrast to *Ichthyologia*, which represents a three-tier hierarchy composed of orders, genera, and species, *Trichozoologia* consists of four layers: two orders, each comprised of five sections (‘sectio’, which equates to ‘family’ in modern zoological nomenclature), with a total of 32 genera and approximately 122 species. The date of Artedi’s original copy of *Trichozoologia* is unknown, but his use of an elaborate, layered system is evidence that it was not an early effort as might be assumed but a later work, nearly contemporary with *Ichthyologia* (1735) in which the hierarchical approach is highly developed.<sup>526</sup> In contrast, Artedi’s earliest surviving work, *Nordmalings flora* (originally written in Swedish; held by the Uppsala University Library, Carolina Rediviva, D 82 a), dated February 1729, divided plants into classes (‘classen’) and divisions (‘delningen’) but the breakdown goes no further (see Lundgren and Fries 1985).

To a large extent, Artedi’s classification of the trichozoans (hereafter quadrupeds, narrowly defined as viviparous and hairy, to exclude

<sup>525</sup> The original manuscript was listed by Amsterdam public notary Salomon Dorper among other surviving documents in the inventory of Artedi’s estate (Stadsarchief Amsterdam, Notariële Arch. 10695, 30 September 1735, Nr. 91; see Engel 1951, 56–60).

<sup>526</sup> Notwithstanding Artedi’s comment on the first page of the manuscript: *ante annum 1735 scripsit hoc autor* (‘The author wrote this before the year 1735’).



**Figure 21.** Peter Artedi's *Ordo primus, animalium pilosorum unguulatorum*, extracted from *Idea institutionum Trichozoologiae*. Original manuscript in the Stockholm University Library, *Bergianska Biblioteket*, part of the Library of the Royal Swedish Academy of Sciences, H. VII: 8.I. n. 4, pp. 2–3. Used with permission.

egg-laying, hairless amphibians and reptiles) follows that proposed by English naturalist John Ray (1627–1705) in his *Synopsis methodica animalium quadrupedum et serpenti generis* (1693; Figure 22), in which hairy quadrupeds<sup>527</sup> are divided initially into two groups defined by differences in the morphology of the feet, those with hooves and those with claws (Gregory 1910, 20; Raven 1950, 379; Broberg 1983, 164, 168).<sup>528</sup>

<sup>527</sup> Instead of Artedi's 'Trichozoans', Ray refers to hairy quadrupeds as 'animalia pilosa'. Unlike Artedi, who never hesitated to translate a Greek word into Latin, Ray appears to have preferred either to use the Greek word unchanged or to translate it into Latin (*animal pilosum* is a literal translation of Τριχοζώον).

<sup>528</sup> Ungulata (animals in which the toes are covered with horny hooves) versus unguiculata (animals in which the toes are bare but carry nails), two terms introduced by Ray (1693, 56): 'Give me leave to invent these names for the sake of brevity and exposition' (see Raven 1950, 379).

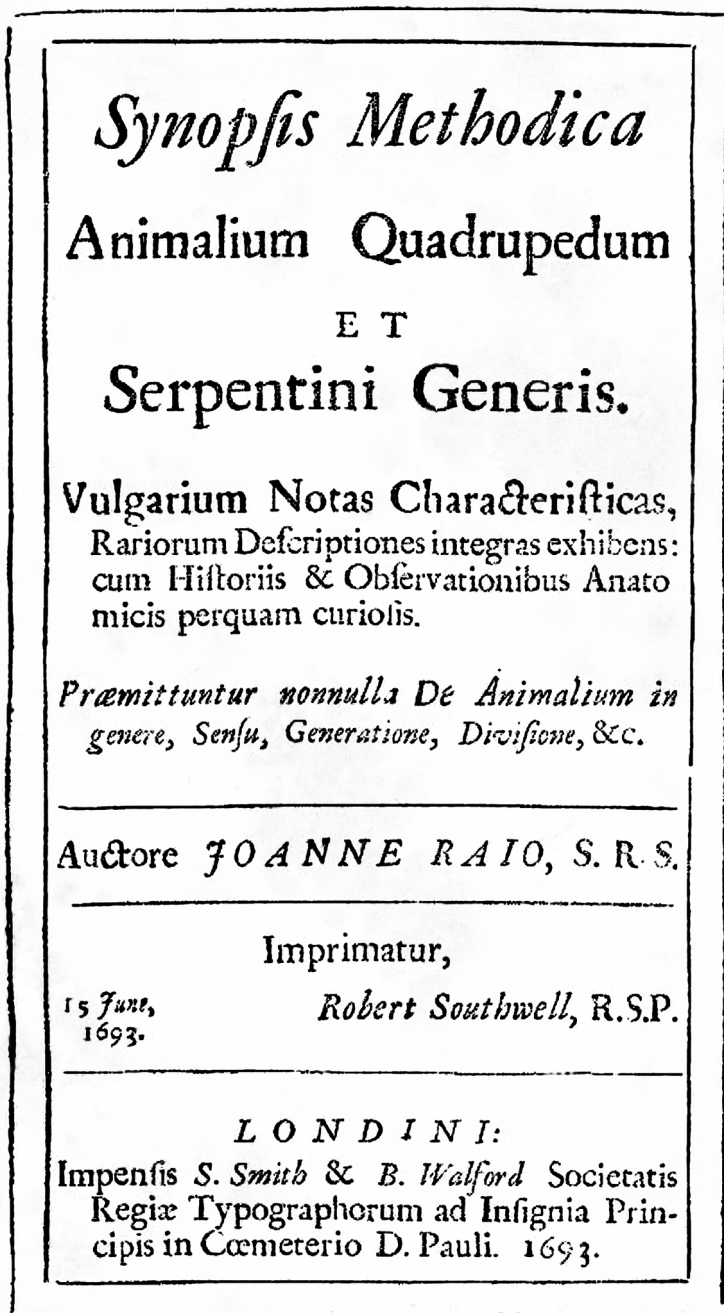


Figure 22. The title page of John Ray's (1693) *Synopsis methodica animalium quadrupedum et serpentine generis*.

Recognizing Ray's dichotomy, Artedi ranked the two groups as orders and identified each with a polynomial: *Ordo primus animalium pilosorum unguulatorum* and *Ordo secundus animalium pilosorum unguiculatum*, respectively. Within his first order, Artedi recognized five sections (also identified by polynomials) defined by differences in the structure of the hooves and the presence, absence, or retention of horns: (1) hooves solid, undivided (*solidipedorum seu unguulam indivisam habentium*), as in the horse, donkey, mule, and zebra (genus *Equus*); (2) hooves usually bifurcate, horns absent (*plerumque bisulcorum, acerastorum*), the pig (*Sus*); (3) hooves bifurcate, horns present, permanent, never shed (*bisulcorum, cornubus perpetuis praeditorum*), the cow (*Bos*), sheep (*Ovis*), and goat (*Capra*); (4) hooves bifurcate, horns absent or deciduous (*bisulcorum, vel acerastorum vel cornubus deciduis praeditorum*), the camel (*Camelus*) and deer (*Cervus*); (5) hooves in four parts (*ungulis quadrifidis praeditorum*), the hippopotamus (*Hippopotamus*), rhinoceros (*Rhinoceros*), and elephant (*Elephas*).

It is immediately apparent that Artedi's approach is problematic—the characters chosen do not in all cases differentiate the sections. For example, the qualifier *plerumque* ('usually') in the definition of Section 2 indicates that a quadruped with undivided hooves and a lack of horns could just as well fall into Section 1 or 2.<sup>529</sup> Similarly, following the definition of Section 4, a quadruped with hooves bifurcated and without horns could just as easily fall into Sections 2 or 4. A lack of accurate anatomical considerations when interpreting Section 5 is also a problem: the hippopotamus does have four digits on each foot but they are more like nails or claws than hooves, the rhinoceros has three separate digits on each foot, while the elephant has five forward-pointing toes and one 'false toe' that points toward the heel.<sup>530</sup>

In differentiating the genera within the sections of his first order, Artedi introduced a variety of characters that includes additional details of the structure of the hooves; the number, shape, and position of the teeth; the length of the tail; the number and position of the

<sup>529</sup> Artedi was probably accounting for the fact that the hooves of pigs are usually bifurcate but sometimes solid.

<sup>530</sup> Artedi provided additional details of the anatomy of the hippopotamus and elephant (especially of the teeth but also brief mention of additional selected external features); those of the rhinoceros, however, are missing due to a lacuna in the manuscript (a blank space remains on the lower half of page 15), clearly indicating once again the provisional nature of the work as a whole.

mammary glands ('*mammae*'; on the chest, the belly, by the hind legs, in the groin); the length of the ears; and the size of the eyes and mouth.

Within Artedi's second order, the five sections are defined by anatomical details of the claws and teeth, and by the hairiness of the body: (1) claws, wide, long, either blunt or pointed (*unguibus latiusculis, longis, vel obtusis vel acutis praeditorum*), as in the bat (*Vespertilio*), shrew (*Mus araneus*), mole (*Talpa*), and hedgehog (*Erinaceus*); (2) claws hooked and pointed, mostly straight and blunt, and two front teeth on each side (*ungues aduncos acutosque, jam vero subrectos et obtusos, et praeterea binos utrinque dentes primores habentium*), the beaver (*Castor*), porcupine (*Histrix*), rabbit (*Lepus*), mouse (*Mus*), and squirrel (*Sciurus*); (3) claws dull and only slightly hooked (*ungues obtusos et parum aduncos habentium*), the badger (*Meles*), seal (*Phoca*), otter (*Lutra*), wolf (*Lupus*), fox (*Vulpes*), and *Canis* (dog); (4) claws hooked and sharp (*unguibus aduncis et acutis praeditorum*), the weasel (*Mustela*), sable (*Zobela*), marten (*Martes*), cat (*Felis*), lynx (*Lynx*), wolverine (*Gulo*), lion (*Leo*), tiger (*Tigris*), panther (*Pardalis*), and bear (*Ursus*); (5) animals more or less hairy, claws very broad (*animalium plus minus pilosorum, ungues latiores habentium*), apes (*Simia*) and humans (*Homo*). As with Artedi's first order, problems are obvious here as well. Without the animal in hand it would be nearly impossible to sort out the seemingly small and undefined differences in the morphology of the claws. The nature of the teeth, while described in Section 2, is not mentioned for the other sections; likewise, the degree of hairiness helps to define Section 5 but this feature is not described for the other sections.

The characters used to differentiate the genera within the sections of the second order roughly follow in parallel with those introduced for the first order: additional anatomical details of the claws; the number, shape, and position of the teeth; the hairiness of the body; the presence or absence, length, and hairiness of the tail; the length and shape of the ears; size of the eyes; number and position of the mammary glands; and presence or absence of a penis bone; but also, for the first time, internal features of the stomach, intestinal tract, and organs such as the kidneys; the presence or absence of a cleithrum and the number of vertebrae.

Turning now to the question of Artedi's influence on the classification of quadrupeds presented by Linnaeus in *Systema naturae*, we know that the manuscript of the first edition was sent to the press on 30 June 1735<sup>531</sup> and that Artedi's manuscripts, those on the parts of

<sup>531</sup> According to Linnaeus's Almanac for 1735, the printing of the first edition of *Systema naturæ* started on 30 June and was completed on 9 December; Linnaeus

*Ichthyologia* as well as *Trichozoologia*, were not made available to Linnaeus until sometime in mid-November of that year. Thus, a direct examination of Artedi's work would not have been likely. But, as mentioned above, it is highly probable that Linnaeus was aware of his colleague's thoughts about quadrupeds (Engel 1951, 58; Broberg 1983, 168). In any case, Linnaeus took a decidedly different approach, employing a three-tier hierarchy of five orders (each identified by a single Latin term), 33 genera (with names nearly the same as those of Artedi), and about 90 species (Figure 23).

Instead of starting with the horse, donkey, and zebra and ending with apes and humans, Linnaeus, with his *Anthropomorpha*,<sup>532</sup> gives human-kind precedence over all other quadrupeds listing it first. Also, rather than differentiating orders based primarily on the structure of the feet, Linnaeus chose to emphasize differences in dentition: (1) *Anthropomorpha* (human-kind): primary teeth 4, on each side; or none (*dentes primores 4, utrinque; vel nulli*), humans (*Homo*), apes (*Simia*), and sloths (*Bradypus*);<sup>533</sup> (2) *Ferae* (wild-kind): primary teeth 6, on each side, widely spaced, all sharp; feet multifid, clawed (*dentes primores 6, utrinque, intermedii longiores, omnes acuti; pedes multifidi, unguiculati*), the bear (*Ursus*), lion (*Leo*), tiger (*Tigris*), cat (*Felis*), weasel (*Mustela*), opossum (*Didelphis*), otter (*Lutra*), walrus (*Odoboenus*), seal (*Phoca*), hyena (*Hyaena*), dog (*Canis*), badger (*Meles*), mole (*Talpa*), hedgehog (*Erinaceus*), and bat (*Vespertilio*); (3) *Glires* (dormice, i.e., rodents and lagomorphs): primary teeth 2, on each side; feet multifidi (*dentes primores 2, utrinque; pedes multifidi*), the porcupine (*Histrich*), squirrel (*Sciurus*), beaver (*Castor*), mouse (*Mus*), rabbit (*Lepus*), and shrew (*Sorex*); (4) *Jumenta* (beasts of burden): primary teeth uncertain, obtuse, canines strong, projecting (*dentes primores incerti, obtusi, canini exerti, validi*), the horse (*Equus*), hippopotamus (*Hippopotamus*), elephant (*Elephas*), and pig (*Sus*); (5) *Pecora* (cattle): lower primary teeth only, superior to none; feet hoofed (*dentes primores inferiores*

---

received the first copies on 13 December 1735 (see Bryk 1919, 217–31; Uggla 1935, 134–48).

<sup>532</sup> 'Anthropomorpha' is often said to have been established by Linnaeus in 1735, but it was John Ray (1693, 60) who was the first to apply the term (although written in Greek, Ἀνθρωπόμορφος) to denote 'nail bearing' or 'anthropoid' animals, although he excluded humans from this category because of his belief in the sacredness of humanity (Broberg 1983, 169; Brown 2017, 32).

<sup>533</sup> For a review of early concepts of the *Anthropomorpha*, including extracts from *Dissertatio Academica in qua Anthropomorpha* (Linnaeus 1760a), see O'Malley and Magoun (1962, especially pp. 53–54).





*circa classes quadrupedum et amphibiorum in celebris domini Caroli Linnaei systemate naturae* ('Most of the Doubts about the Classes of Four-Footed and Amphibious Animals in the System of Nature of the Celebrated Carolus Linnaeus'), published in 1743, asked, with barely disguised contempt, how humans could be called 'human-like' when in fact they are human? (see Pietsch and Aili 2014, 54–56). But Artedi nevertheless concurred with Linnaeus as shown in *Trichozoologia*. Artedi diagnosed the genus *Homo* with a suite of characters: 'the human race is known by itself' (*genus humanum per se innotescit*) and otherwise by the following anatomical details:

1. Fingers, five long ones on hands as well as on feet, nails flat, wide, and almost straight. Innermost toe on the feet is the largest.
2. Teeth, only 32 in number, of which the five interior ones on each side in each jaw are called molars, the others are front teeth, and two on each side are canines. Of the molars, the three innermost ones are largest.
3. No tail. Walk is performed by means of the hind feet only.
4. Two breasts and the same number of nipples, on men as, primarily, on women.
5. It rules by speech, which Apes lack.

Linnaeus, on the other hand, cut to the chase by citing only a single short phrase, the ancient Delphic maxim Γνῶθι σεαυτόν, given in Latin: *Nosce te ipsum* ('know thyself'). He then divided the human species by continent and skin colour into four types or 'varieties' as he called them in Latin: *Homo Europaeus albus*, European white; *Homo Americanus rubescens*, American reddish; *Homo Asiaticus fuscus*, Asian tawny; and *Homo Africanus niger*, African black (Linnaeus 1760a).<sup>535</sup>

Whether Artedi had similar thoughts along these same lines is unlikely. He recognized multiple species with a list of characters for most of his genera (17 species alone for the apes, genus *Simia*), but only one, without variation, for his genus *Humanum* (manuscript p. 45). Moreover, following the diagnosis of *Humanum* transcribed above, the remaining space on the page was left blank, as was the following page

<sup>535</sup> Often cited as perhaps the earliest explicit example of scientific racism, a topic of serious debate in recent years (for example, see Brittany Kenyon-Flatt 2021, 'How Scientific Taxonomy Constructed the Myth of Race', *Op-Ed Mindsets*, available at <https://www.sapiens.org/biology/race-scientific-taxonomy>; accessed 29 August 2022).



**Figure 24.** Varieties of human-kind, *Homo troglodytus*, *Homo luciferus*, *Homo satyrus*, and *Homo pygmaeus*, from *Anthropomorpha* (Linnaeus 1760a), a dissertation defended by Christianus Emmanuel Hoppius (1736–?) in Uppsala on 6 September 1760.

in full, indicating that the account at that point was finished. What follows (page 47) are the brief descriptions mentioned above of the exotic animals observed by Artedi in London in November 1734, which he no doubt added well after the manuscript had been written.

Linnaeus differentiated the remaining genera of his *Anthropomorpha* (*Simia* and *Bradypus*, apes and sloths), as well as members of the orders *Ferae* and *Glires*, primarily by the number of digits (fingers and toes) on both the fore and hind feet and secondarily by the number and position of the mammary glands and the shape and length of the tail. In differentiating the genera of the *Jumenta* he relied again on the number and position of the mammary glands and secondarily on the structure of the tail. Those of the order *Pecora* were defined by the presence or absence and structure of horns.

Applying a similar analysis to the remaining editions of *Systema naturae* to trace Linnaeus's thinking about quadrupeds might seem like a daunting task considering there are 13 but, in reality, after the first (1735), only four were written by Linnaeus himself and are therefore of consequence: the second (1740a), sixth (1748a), tenth (1758), and twelfth (1766–1768). It turns out that the third edition (1740b) is a reprinting of the first, somewhat rearranged, with a new preface; the fourth (1744) and fifth (1747) are reprintings of the second, with

Swedish names replaced by French and German equivalents, respectively; the seventh (1748b) is a reprinting of the sixth, with Swedish names replaced by German equivalents; the eighth (1753) includes only the vegetable kingdom; the ninth (1756) is a reprinting of the seventh, with German names replaced by French; the tenth edition (published in two volumes, animals in the first and plants in the second, 1758–1759) is universally recognized as the starting point of zoological nomenclature and therefore of greatest importance; the eleventh (1760b) is a reprinting of the tenth; and the thirteenth (in seven parts, usually bound in three volumes, 1788–1792) is a heavily edited and augmented version of the twelfth edition published well after Linnaeus's death (1778) by German naturalist Johann Friedrich Gmelin (1748–1804) and is therefore of little more than historical interest.

In the second edition of *Systema naturae* (1740a), Linnaeus abandoned the tabulated format that characterizes the first edition (see Figure 23) for a standard paragraph format but the contents of the classification are essentially unchanged from the first edition: the same five orders are recognized, but a new genus, *Myrmecophaga* (anteater), has been added to the order Anthropomorpha, *Sorex* (shrew) has been removed from the order Glires and reallocated to the Jumenta, *Odoboenus* (walrus) has been synonymized with *Phoca* (seal), and *Hyaena* (hyena) has been eliminated, for a total of 32 genera and about 107 species.

The sixth edition (1748a) again shows little change, although a new order has been proposed, the Agriæ (beasts of the land, diagnosed as quadrupeds without teeth, and a very long cylindrical tongue), to accommodate *Myrmecophaga* (anteater) and a new genus, *Manis* (pangolin); *Dasypus* (armadillo) has been added to the Ferae, *Rhinoceros* to the Jumenta, and a new genus, *Moschus* (musk deer), to the Pecora. In addition to details of dentition and the structure of the feet, diagnostic characters now include the degree of hairiness (i.e., face hairless, face hairy, the presence of eyelashes to differentiate the genus *Simia*, the monkeys and apes), the presence or absence of a penis bone, the position of the ears, etc.

The tenth edition of *Systema naturae* (1758) contains much that is new. Dentition and the structure of the feet appear again as primary characters, but features not used before have been added, including modes of locomotion (e.g., inept, heavy, hopping, climbing trees) and differences in diet and mode of ingestion (e.g., ravenously snatching prey, ingesting succulent roots and worms, gnawing bark and roots,

pulling up plants and chewing the cud). *Quadrupedia* has now been replaced with *Mammalia*—thus recognizing the fundamental importance of mammary glands as a diagnostic character,<sup>536</sup> while excluding four-legged amphibians and reptiles—to contain eight orders, 39 genera, and 189 species.

*Anthropomorpha* has been replaced with *Primates*, now containing four genera, *Homo*, *Simia*, *Lemur*, and *Vespertilio*. The binomial *Homo sapiens* has been introduced for the first time, and a number of new human species are recognized (later described as ‘varieties’ by Linnaeus 1760a; see above): *Homo ferus* (wild man), *Homo americanus*, *Homo europaeus*, *Homo asiaticus*, *Homo afer*, and *Homo monstrosus*, the latter including groups that were allegedly shaped by their environment (see Charmantier 2020). In little agreement with earlier proposals, the elephant, manatee, sloth, anteater, and pangolin are now brought together in a new order, the *Bruta* (brutes); the pig, armadillo, hedgehog, mole, shrew, and opossum are placed together in another new order, the *Bestiae* (beasts); the horse and hippopotamus are allocated to a third new order, the *Belluae* (large beasts); and marine mammals, the narwhal, whales, and dolphins finally get their own order, the *Cete* (whales). The characters used to differentiate the orders and genera are the same as those employed in earlier editions, including the first edition—most important by far are differences in dentition, followed by the structure of the feet (hooves versus claws, and the number of digits), and finally the presence or absence, and shape of horns.

In the twelfth edition of *Systema naturae* (1766–1768), Linnaeus again identified his orders primarily by characters of dentition (i.e., differences in the number, shape, and position of the primary teeth or incisors), but also by differences in the feet, modes of locomotion, and differences in diet and mode of ingestion. The number of orders has been reduced from eight to seven. Thus, the *Bestiae* is no more, its members reallocated to other orders: the opossum, mole, shrew, and hedgehog (*Didelphis*, *Talpa*, *Sorex*, and *Erinaceus*) to the *Ferae*; the armadillo (*Dasypus*) to the *Bruta*; and the pig (*Sus*) to the *Belluae*. The bats are inexplicitly split between the orders *Primates* (*Vespertilio*) and *Glires* (*Noctilio*). The genus *Rhinoceros* has been removed from the *Glires* and placed within the *Belluae* next to the horse, hippopotamus, and pig.

<sup>536</sup> The definition given for quadrupeds in the sixth edition: *Quadrupedia, corpus pilosum, pedes, quatuor, feminae viviparæ, lactiferæ* (‘Quadrupedal, with body hairy, feet four, viviparous, females lactiferous’) also indicates the importance of mammary glands but the term ‘*Mammalia*’ does not yet appear.

Otherwise the classification is the same, the introduction of *Noctilio* now bringing the total number of genera to 40.

As with Artedi's classification, the multiple attempts by Linnaeus to construct a meaningful arrangement of the hairy quadrupeds were fraught with problems as evidenced by the constant jumbling of characters and the often inexplicable redistribution of taxa among orders. The difficulty of the task is, of course, due to the lack of an underlying methodology. A truly natural system of classification made possible by an understanding of natural selection was still a century away.

In conclusion, it may seem that Artedi, in borrowing to a large extent the classification of Ray, lacked the originality of Linnaeus. But Linnaeus relied heavily on Ray as well; and Ray, in turn, was certainly not the first to emphasize the importance of feet and teeth in differentiating the hairy quadrupeds (see Simpson 1945, 163–64). The ultimate credit for the traditional criteria of ordinal classification of the mammals (i.e., characters of the extremities, whether hoofed or clawed, divided or undivided, number of the digits, and number of the front teeth) must, in fact, go to Aristotle, who wrote:<sup>537</sup>

Of blooded and viviparous quadrupeds some have the foot cloven into many parts, as is the case with the hands and feet of man (for some animals are many-toed, as the lion, the dog, and the leopard); others have feet cloven in two, and instead of nails have hooves, as the sheep, the goat, the deer, and the hippopotamus; others are uncloven, such for instance as the solid-hooved animals, the horse and the mule. Swine may be either cloven-footed or uncloven-footed.

Again, in respect to the teeth, animals differ greatly both from one another and from man. All animals that are quadrupedal, blooded, and viviparous, are furnished with teeth; but, to begin with, some have teeth in both jaws, and some do not. For instance, horned quadrupeds do not; for they have not got the front teeth in the upper jaw; and some hornless animals, also, do not have teeth in both jaws, as the camel. Some animals have tusks, like the boar, and some have not. Further, some have serrated teeth, such as the lion, the leopard, and the dog; and some have teeth that do not interlock, as the horse and the ox. No animal possesses both tusks and horns, nor yet do either of these exist in any animal possessed of serrated teeth. The front teeth are usually sharp, and the back ones flat.

Furthermore, of animals some are horned, and some are not so. The great majority of the horned animals are cloven-footed by nature, as the ox, the

<sup>537</sup> Aristotle (1984), *History of animals*, bk. II, chap. 1, 499b, lines 6–19; 501a, lines 9–22.

stag, the goat; and a solid-hooved animal with a pair of horns has never yet been met with. But a few animals are known to be single-horned and single-hooved, as the Indian ass; and the oryx is single-horned and cloven-hooved.

In his monograph on 'The Orders of Mammals', William King Gregory (1910, 11–12) wrote that these passages 'evidently directed the attention of later writers to the importance of [feet, teeth, as well as horns] as a means of distinguishing and hence of classifying mammals, and [...] that Ray, and later Linnaeus and others, were quick to avail themselves of the suggestion'. Gregory further wrote, with regard to feet, that Ray and later writers undoubtedly had Aristotle's account in mind when they used the descriptive terms 'multifidus', 'bifidus', 'solidungula', 'ungulata', 'unguiculata', and 'fissipedes'.<sup>538</sup>

Finally, in further fairness to Artedi, it should be emphasized that *Trichozoologia*, as expressed by its very title, was an 'idea', not much more than an outline of a scientific treatment of the hairy animals. That it remained unfinished, with gaps and omissions throughout, not to mention pages missing, is additional evidence of its preliminary nature. We might even conclude that Artedi meant it as a trial production, inviting the criticism of his peers, and not as a definitive statement. The big difference between his ichthyological works and *Trichozoologia* is that, thanks to his careful dissections, he knew the anatomical details of fishes much more intimately than those of the hairy animals, which he had probably only been able to observe superficially. His fundamental approach was to classify the orders, sections, genera, and species of hairy animals by means of those diagnostic features that could be observed directly; he managed to do that even though some of his observations were not as unique as he might have thought.

---

<sup>538</sup> Of those between Aristotle and Linnæus who contributed the most to mammalian classification and who employed characters of the feet, teeth, and horns, Edward Wotton (1492–1555) in his *De differentiis animalium libri decem* (1552) is probably the most important, while Ulisse Aldrovandi (1522–1605), in *Quadrupedum omnium bisulcorum historia* (1621), should also be acknowledged. Jacob Theodor Klein, in *Quadrupedum dispositio brevisque historia naturalis* (1751), and Mathurin Jacques Brisson (1723–1806), in *Le règne animal divisé en IX classes* (1756), although both contemporaneous with Linnæus but coming well before the 10th edition of *Systema naturae*, should also be recognized.

## 7. Bibliography

Abbreviations: KVÅ = *Kungl. Vetenskapsakademiens årsbok*. SLÅ: *Svenska Linnésällskapets årsbok*.

### 1. Manuscript sources

Artedi, Petrus. 1905. Autograph, *Letter to Mother and Sister*, 'Brev till modern och systemn' 1735, ed. Walde, pp. 49–50.

Artedi, Petrus. 1934. *Catalogus piscium maris Balthici*, Latin ed. Nybelin.

Artedi, Petrus. 1934. *Idea constitutionum trichozoologiae*, Latin ed. Nybelin.

Artedi, Petrus. *Manuscriptum ichthyologicum quod Petrus Artedi elaboravit in usum Thesauri Sebani*. Library of Congress MS. 22634.

Artedi, Petrus. 1985. *Nordmalings flora*, Swedish ed. in Fries, Sigurd (ed.), *Peter Artedi och Nordmalings flora jämte en levnadsteckning och en utredning om släkten Arctaedius*. Umeå.

Bryk, Felix, ed. 1919. *Linnæi minnesbok*. Stockholm.

Kiellman, Tiburtius. *Diary* (autograph ms.) Uppsala University Library ms. X 386 Kiellmaniana.

Linné, Carl, 1935. *Almanach 1735*, ed. Uggla.

Roberg, Lars. *Anteckningar om svenska läkare*. Uppsala University Library MS X 232:a.

### 2. Literature

Aili, H. and T. W. Pietsch. 2020. 'Peter Artedi's Catalogue of the Fishes of the Baltic Sea with an English Translation and commentary.' *Zoological Journal of the Linnaean Society* 189, no. 3 (July): 975ff.

Aldrovandi, U. 1621. *Quadrupedum omnium bisulcorum historia*. Bologna: Sebastianus Bonomius.

Alter, J.-M. 2004. 'Payne, Thomas (1752–1831).' In *Dictionary of National Biography*. Oxford. <https://doi.org/10.1093/ref:odnb/21656>. Accessed 24 February 2022.



- Anonymous. 1837. *Catalogus librorum Manuscriptorum in Bibliotheca D. Thomae Phillipps, Bart., A.D. 1837*. [https://www.google.com/books/edition/Catalogus\\_librorum\\_manuscriptorum\\_in\\_bib/QFleAAAAcAAJ?hl=en&gbpv=1&bsq=artedi](https://www.google.com/books/edition/Catalogus_librorum_manuscriptorum_in_bib/QFleAAAAcAAJ?hl=en&gbpv=1&bsq=artedi). Accessed 16 January 2022.
- Anonymous. 1885. 'William Wesley, Publisher and Bookseller.' *The Bookmark*, 1 May 1885.
- Anonymous. 1891. 'William Wesley.' *The Publishers' Circular*, 1298 (16 May): 518.
- Anonymous. 1896. 'Phillipps, Thomas.' In *Dictionary of National Biography*, vol. 45, 192–95. Oxford. <https://doi.org/10.1093/odnb/9780192683120.013.22143>. Accessed 15 January 2022.
- Anonymous. 1899. *Expenditures in the Department of Agriculture . . . a detailed statement of the expenditures of all appropriations for the fiscal year ending June 30, 1899*. House of Representatives Document No. 173, p. 9. [https://www.google.com/books/edition/Serial\\_set\\_no\\_3501\\_4000/hHs3AQAAIAAJ?hl=en&gbpv=1&dq=%22expenditures+in+the+department+of+agriculture%22+ending+June+30+1899&pg=RA1-PA1&printsec=frontcover](https://www.google.com/books/edition/Serial_set_no_3501_4000/hHs3AQAAIAAJ?hl=en&gbpv=1&dq=%22expenditures+in+the+department+of+agriculture%22+ending+June+30+1899&pg=RA1-PA1&printsec=frontcover). Accessed 2 June 2022.
- Aristotle. 1984. *History of Animals*, vol. 1.' In *The Complete Works of Aristotle*, edited by J. Barnes. Princeton, NJ: Revised Oxford Translation.
- Artedi, P. 1738. *Ichthyologia, sive Opera omnia piscibus scilicet: Bibliotheca ichthyologica, Philosophia ichthyologica, Genera piscium, Synonymia specierum, Descriptiones specierum. Omnia in hoc genere perfection, quam antea ulla. Posthuma vindicavit, recognovit, coaptavit et edidit Carolus Linnaeus, Med. Doct. et Ac. Leiden: Imper. N. C. Wishoff.*
- Basbanes, N. A. 1999. *A Gentle Madness: Bibliophiles, Bibliomanes, and the Eternal Passion for Books*. Durham, North Carolina.
- Bell, A. 2021. 'Phillipps, Sir Thomas (1792–1872).' In *Dictionary of National Biography*. Oxford. <https://doi.org/10.1093/ref:odnb/22143>. Accessed 15 January 2022.
- Bernström, J. 1956–1978. 'Valar.' In *Kulturhistoriskt lexikon för nordisk medeltid*, edited by I. Andersson and J. Granlund, 439–54. Malmö, Oslo, Copenhagen.
- Blunt, W. 2001. *Linnaeus, the Compleat Naturalist*. Princeton, NJ, and Oxford: Princeton University Press.
- Boeseman, M. 1970. 'The Vicissitudes and Dispersal of Albertus Seba's Zoological Specimens.' *Zoologische Mededelingen* 44 (13): 177–206.
- Brisson, M. J. 1756. *Le règne animal divisé en IX classes, ou Méthode contenant la division générale des animaux en IX classes, & la division particuliere*

- des deux premieres classes, sçavoir de celle des quadrupedes & de celle des cetacées, en ordres, sections, genres & espèces.* Paris: Joannem-Baptistam Bauche.
- Broberg, G. 1983. 'Homo sapiens: Linnaeus's Classification of Man.' In *Linnaeus, the Man and His Work*, edited by T. Frängsmyr, 156–194. Berkeley, CA, Los Angeles, CA, and London: University of California Press.
- Broberg, G. 1987. 'Petrus Artedi in His Swedish Context.' In *Proceedings of the Fifth Congress of European Ichthyologists*, edited by S. O. Kullander and B. Fernholm, 11–15. Stockholm: Swedish Museum of Natural History.
- Brown, L. 2017. *Homeless Dogs and Melancholy Apes: Humans and Other Animals in the Modern Literary Imagination*. Ithaca, NY: Cornell University Press.
- Brown, Patrick. 1757. *The Civil and Natural History of Jamaica*. London.
- Bryk, Felix. 1919. *Linnaeus im Auslande: Linnés gesammelte Jugendschriften autobiographischen Inhaltes aus den Jahren 1732–1738*. Stockholm: In Eigenem Verlage.
- Burrows, T. 2017. 'Manuscripts of Sir Thomas Phillipps in North American Institutions.' *Manuscript Studies, A Journal of the Schoenberg Institute for Manuscript Studies* 1 (2): 307–27.
- Burrows, T. 2018. 'There Never Was Such a Collector Since the World Began: A New Look at Sir Thomas Phillipps.' In *Collecting the Past: British Collectors and Their Collections from the Eighteenth to the Twentieth Centuries*, edited by T. Burrows and C. Johnston, 45–62. London: Routledge.
- Cappelli, Adriano. 1983. *Cronologia e Calendario Perpetuo*. Milan: Quinta edizione aggiornata.
- Carne, W. L. 1927. 'A Sketch of the History of the High Court of Chancery from Its Origin to the Chancellorship of Wolsey.' *Virginia Law Review* 13 (7): 391–421.
- Catesby, Mark. 1729–1732. *Natural History of Carolina, Florida and the Bahama Islands*.
- Charmantier, I. 2020. 'Linnaeus and Race.' *The Linnean Society of London*. <https://www.linnean.org/learning/who-was-linnaeus/linnaeus-and-race>. Accessed 15 June 2023.
- Chisholm, H. 1911. 'Heber, Richard.' In *Encyclopedia Britannica*. Eleventh edition. Cambridge.
- Courtney, W. P. 1895. 'Payne, Thomas, the Younger.' In *Dictionary of National Biography, 1885–1900*, 123. Oxford. <https://doi.org/10.1093/odnb/9780192683120.013.21656>. Accessed 17 January 2022.

- Eaker, Birgit. 2009. 'Artedis *Ichthyologia* som källa för svenska fiskbenämningar.' In *Svenska landsmål och svenskt folkliv*, 9ff.
- Engel, Helmut. 1937. 'The Life of Albertus Seba.' *Svenska Linnésällskapets Årsskrift* 20: 75–100.
- Engel, Helmut. 1951. 'Some Artedi Documents in the Amsterdam Archives.' In *Svenska Linnésällskapets Årsskrift* 34: 51–66.
- Engel, Helmut. 1961. 'The Sale-Catalogue of the Cabinets of Natural History of Albertus Seba (1752). A Curious Document from the Period of the *Naturae Curiosae*.' *Bulletin of the Research Council of Israel* 10B: 119–31.
- Eremita Suburbanus. 1688. CLIII *Aphorismi chemici ad quos quidquid est Scientiae chemicae commode referrri potest, concinnati opera et studio Eremitae Suburbani*. Upsaliae denuo editi 1733. ES's Latin translation of Christopher Packe, *One Hundred and Fifty Three Chymical Aphorisms*. London.
- Eriksson, G. 1969. *Botanikens historia i Sverige intill år 1800*. Uppsala.
- Eriksson, G. 1983. 'Linnaeus the Botanist.' In *Linnaeus, the Man and His Work*, edited by T. Frängsmyr, 63–109. Berkeley, CA, Los Angeles, CA, and London: University of California Press.
- Evans, R. H. 1836. *Bibliotheca Heberiana*. Catalogue of the Library of the Late Richard Heber, Esq. Part the Eleventh. Manuscripts. London. <https://babel.hathitrust.org/cgi/pt?id=uc1.a40011778081&view=1up&seq=129&skin=2021>. Accessed 23 January 2022.
- Fries, Sigurd, ed. 1985. 'Peter Artedi och Nordmalings flora jämte en levnadsteckning och en utredning om släkten *Arctaeidius*.' In *Skrifter utgivna av Johan Nordlander-sällskapet*, nr. 8. Umeå.
- Frostling, Gun. 2010. *Peter Artedi, Helenas son, en roman om Peter Artedi och hans vänskap med Carl von Linné*. Visby.
- Ganias, Kostas, Charikleia Mezarli and Elenei Voultziadou. 2017. 'Aristotle as an Ichthyologist: Exploring Aegean Fish Diversity 2,400 Years Ago.' *Fish and Fisheries* 18 (1): 1–18. <https://doi.org/10.1111/faf.12223>.
- Gibbon, P., and J. V. Someren. 1801. 'Roeland Willem van Homrigh.' *Amsterdamsche Courant* 1801 (15) (3 February): 4. <https://resolver.kb.nl/resolve?urn=MMSAA06:165541015:mpeg21:pdf>. Accessed 21 January 2022.
- Gill, T. N. 1872. *Arrangement of the Families of Fishes, or Classes Pisces, Marsipobranchii, and Leptocardii*. Smithsonian Miscellaneous Collections 247, Washington, DC.
- Gill, Theodore Nicholas. 1872. *Arrangement of the Families of Fishes, or Classes Pisces, Marsipobranchii, and Leptocardii*. Smithsonian Miscellaneous Collections, 247, Washington, DC.

- Gmelin, J. F. 1788–1792. *Caroli a Linné systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. Thirteenth edition. Leipzig.
- Gregory, W. K. 1910. The Orders of Mammals: Part I. Typical Stages in the History of the Ordinal Classification of Mammals. *Bulletin of the American Museum of Natural History* 27: 1–102.
- Günther, A. C. L. G. 1880. ‘History and Literature.’ In *Introduction to the Study of Fishes*, 2–34. Edinburgh: Adam and Charles Black.
- Hamburgische Berichte* XXXVIII, 11 May 1736, pp. 341–42. Obituary in German, anonymous.
- Hamburgische Berichte* XVI, 25 February 1738, pp. 111–12. Review in German (referring to preceding), anonymous.
- Helander, Hans. 2004. *Neo-Latin Literature in Sweden in the Period 1620–1720*. Uppsala: Stylistics, Vocabulary and Characteristic Ideas.
- Hill, John. 1751. ‘An Ichthyological Dissertation upon a Dry’d Whiting.’ In *The Adventures of Mr George Edwards, a Creole*, Ch. II, pp. 18off. London.
- Hill, John. 1752. *An History of Animals*, 201–317: Part III, *Fishes*. London.
- Holthuis, Lipke B. 1969. ‘Albertus Seba’s “Locupletissimi rerum naturalium thesauri ...” (1734–1765) and the “Planches de Seba (1827–1831)”.’ *Zoologische Mededelingen* 43, no. 19: 239–52.
- Hunt, A. 1993. ‘A Study in Bibliomania: Charles Henry Hartshorne and Richard Heber.’ *The Book Collector* 42: 25–43, 185–212.
- Hunt, A. 2001. ‘The Sale of Richard Heber’s library.’ In Myers, R., Harris, M., & Mandelbrote, G. (editors), *Under the Hammer: Book Auctions Since the Seventeenth Century*, edited by R. Myers, M. Harris and G. Mandelbrote, 143–65. London: Oak Knoll Press.
- ICZN. 1999. *International Commission on Zoological Nomenclature*, adopted by the International Union of Biological Sciences, fourth edition. International Trust for Zoological Nomenclature, London.
- ICZN. 2012. *International Commission on Zoological Nomenclature*, adopted by the International Union of Biological Sciences. International Trust for Zoological Nomenclature, London [updates to the Code that deal chiefly with issues related to electronic publishing]. <https://www.iczn.org/the-code/the-code-online>.
- Jordan, David Starr. 1902. ‘The History of Ichthyology, an Address by David Starr Jordan.’ In *Proceedings of the American Association for the Advancement of Science*, vol. 51, 427ff.

- Kenyon-Flatt, B. 2021. 'How Scientific Taxonomy Constructed the Myth of Race.' *Op-Ed Mindsets*. <https://www.sapiens.org/biology/race-scientific-taxonomy>. Accessed 29 August 2022.
- Klein, J. T. 1743. *Summa dubiorum circa classes quadrupedum et amphibiorum in celebris domini Caroli Linnaei systemate naturae*. Leipzig: Johann Friedrich Gleiditsch.
- Klein, J. T. 1751. *Quadrupedum dispositio brevisque historia naturalis*. Leipzig.
- Klein, Jacob Theodor. 1738. *Petri Artedi operum brevis recensio*, autograph manuscript in British Library, Sloane MS 4020. Edited and translated by Hans Aili in Theodore W. Pietsch and Hans Aili. 2014. 'Jacob Theodor Klein's Critique of Peter Artedi's *Ichthyologia*, 1738.' *Svenska Linnésällskapets Årsskrift* 2014: 39–84.
- Koerner, L. 1999. *Linnaeus: Nature and Nation*. Cambridge, MA, and London: Harvard University Press.
- Kurin, R. 2006. *Hope Diamond: The Legendary History of a Cursed Gem*. Washington, DC: Smithsonian Books.
- Leigh and Sotheby. 1813. *A Catalogue of the Very Extensive and Valuable Library of Henry p. Hope, Esq.* London. <https://babel.hathitrust.org/cgi/pt?id=mdp.35112105138889&view=1up&seq=1&skin=2021>. Accessed 28 January 2022.
- Lindroth, Sten. 1975. *Svensk lärdomshistoria*, Vol. 1 'Stormaktstiden'; Vol. 2 'Frihetstiden'. Stockholm.
- Lindroth, Sten. 1983. 'The Two Faces of Linnaeus.' In *Linnaeus, the Man and His Work*, edited by T. Frängsmyr, 1–62. Berkeley, CA, Los Angeles, CA, and London: University of California Press.
- Linnaeus, C. 1735. *Systema naturae, sive Regna tria naturae systematice proposita per classes, ordines, genera, et species*. First edition. Leiden: Theodor Haak.
- Linnaeus, C. 1736. *Methodus*. Leiden.
- Linnaeus, C. 1736. *Fundamenta botanica*. Amsterdam.
- Linnaeus, C. 1738. 'Vita Petri Artedi descripta a Carolo Linnaeo.' In *Petri Artedi sueci, medici, Ichthyologia, sive Opera omnia piscibus, Posthuma vindicavit, recognovit, coaptavit & edidit Carolus Linnaeus, Med. Doct. & Ac*, iii–xiii. Leiden: N. C. Wishoff.
- Linnaeus, C. 1740a. *Systema naturae in quo naturae regna tria secundum classes, ordines, genera, species, systematice proponuntur*. Second edition. Stockholm: Gottfr. Kiesewetter.

- Linnaeus, C. 1740b. *Systema naturae, sive Regna tria naturae systematice proposita per classes, ordines, genera et species* [with German subtitle]. Third edition. Halle: Gedruckt mit Gebauerischen Schriften.
- Linnaeus, C. 1744. *Systema naturae in quo proponuntur naturae regna tria secundum classes, ordines, genera et species*. Fourth edition. Paris: Michaelis-Antonii David.
- Linnaeus, C. 1747. *Systema naturae in quo naturae regna tria, secundum classes, ordines, genera, species, systematice proponuntur. Recusum et societatis, quae impensas contulit, usui accommodatum curante Mich. Gotti. Agnethlero Saxone Transilvano*. Fifth edition. Halle: Hala Magdeburgica.
- Linnaeus, C. 1748a. *Systema naturae, sistens regna tria naturae, in classes et ordines genera et species redacta, tabulisque aeneis illustrata*. Sixth edition. Stockholm: Godofr. Kiesewetter.
- Linnaeus, C. 1748b. *Systema naturae sistens regna tria naturae in classes et ordines genera et species redacta tabulisque aeneis illustrata*. Seventh edition. Leipzig: Godofr. Kiesewetter.
- Linnaeus, C. 1753. *Herr Archiaterns och riddarens D. Caroli Linnaei indelning i Ört-Riket, efter Systema naturae, på Swenska öfwersatt af Johan J. Haartman*. Eighth edition. Stockholm: Lars Salvius.
- Linnaeus, C. 1756. *Systema naturae sistens regna tria naturae in classes et ordines genera et species redacta, tabulisque aeneis illustrata. Accedunt vocabula Gallica*. Ninth edition. Leiden: Theodor Haak.
- Linnaeus, C. 1758. *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. Tenth edition, vol. 1. Stockholm: Laurentius Salvius.
- Linnaeus, C. 1760a. *Dissertatio Academica in qua Anthropomorpha, Consens. Experient. Facult. Medic. in Reg. Academ Upsalensi, Praeside viro nobilissimo atque experientissimo Dn. Doct. Carolo Linnaeo* [Linnaean dissertation no. 105, defended 6 September 1760 by Christianus Emmanuel Hoppius]. Uppsala.
- Linnaeus, C. 1760b. *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. Eleventh edition. Halle.
- Linnaeus, C. 1766–1768. *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. Twelfth edition. Stockholm.
- Linnaeus, C. 1805. 'The Diary of Linnaeus, Written by Himself.' In *A General View of the Writings of Linnaeus, Second Edition, With Corrections,*

*Considerable Additions, and Memoirs of the Author, by W. G. Maton, to Which is Annexed the Diary of Linnaeus, written by Himself, and Now Translated into English, from the Swedish Manuscript in the Possession of the Editor*, edited by R. Pulteney, 509–78. London.

Lönnerberg, Einar. 1905. *Peter Artedi, a Bicentenary Memoir Written on Behalf of the Swedish Royal Academy of Science*, translated by W. E. Harlock. Uppsala and Stockholm.

Lönnerberg, Einar. 1919. 'Linné och Artedi.' *SLÅ* 2: 30–43.

Lundgren, M., and S. Fries. 1985. *Peter Artedi och Nordmalings Flora: jämte en levnadsteckning och en utredning om släkten Arctaedius*. Umeå: Nordmalings hembygdsförening.

Margócsy, D. 2014. *Commercial Visions: Science, Trade, and Visual Culture in the Dutch Golden Age*. Chicago, IL, and London: The University of Chicago Press.

Merriman, D. 1938. 'Peter Artedi—Systematist and Ichthyologist.' *Copeia* 1938: 33–39.

Merriman, D. 1941. 'A Rare Manuscript Adding to Our Knowledge of the Work of Peter Artedi.' *Copeia* 1941, no. 2 (8 July): 64–69.

Munby, A. N. L., ed. 1968. *The Phillipps Manuscripts: Catalogus librorum manuscriptorum in bibliotheca D. Thomae Phillipps*. London.

Munby, A. N. L. 1951. 'The Catalogues of Manuscripts & Printed Books of Sir Thomas Phillipps, Their Composition and Distribution.' *Phillipps Studies* no. 1. Cambridge.

Munby, A. N. L. 1954. 'The Formation of the Phillipps Library up to the Year 1840.' *Phillipps Studies* no. 3. Cambridge.

Munby, A. N. L. 1956. 'The Formation of the Phillipps Library from 1841 to 1872.' *Phillipps Studies* no. 4. Cambridge.

Munby, A. N. L. 1960. 'The Dispersal of the Phillipps Library.' *Phillipps Studies* no. 5. Cambridge.

Munby, A. N. L. (editor). 1968. *The Phillipps manuscripts: Catalogus librorum manuscriptorum in bibliotheca D. Thomae Phillipps*. London.

*Neue Zeitungen von gelehrten Sachen aus das Jahr 1738*, no. XXXIX. Leipzig, 15 May 1738. Review in German, anonymous.

*Nova Acta Eruditorum*. November 1741, 633ff. Review in German, anonymous.

*Nouveau dictionnaire historique et critique, pour servir de supplement ou de continuation au Dictionnaire historique et critique de Mr. Pierre Bayle, par*

- Jaques George de Chauffepié*. 1750. Amsterdam & La Haye. Dictionary article and review in French, anonymous, on *Artedus, Pierre*.
- Nybelin, Orvar. 1934. 'Tvenne opublicerade Artedi—manuskript, inför tvåhundraårsminnet meddelade.' *Svenska Linnésällskapets Årsskrift* 17: 35–90.
- Nybelin, Orvar. 1954. 'Strödda bidrag till Artedis biografi.' *Svenska Linnésällskapets Årsskrift* 27–28: 85–96.
- Nybelin, Orvar. 1966. 'Kring Petrus Artedis vistelse i England 1734–35.' *Svenska Linnésällskapets Årsskrift* 1966: 9–24.
- O'Malley, C. D., and H. W. Magoun. 1962. 'Early Concepts of the Anthropomorpha.' *Rivista di Storia della Scienza* 4 (1): 39–64.
- Odelstierna, Ingrid. 1966. 'Carl Linnaeus: Petrus Artedis liv.' *Svenska Linnésällskapets Årsskrift* 49: 1–8.
- Pietsch, Theodore W. 2010. *The Curious Death of Peter Artedi. A Mystery in the History of Science*. New York: Scott & Nix.
- Pietsch, Theodore W. 2023. *Hur dog Peter Artedis: en vetenskapshistorisk gåta*, translated from the English by H. Aili. Lund: Ekström & Garay.
- Pietsch, Theodore W., and Hans Aili. 2014. 'Jacob Theodor Klein's Critique of Peter Artedi's *Ichthyologia*, 1738.' *Svenska Linnésällskapets Årsskrift* 2014: 39–84.
- Pietsch, Theodore W., and Hans Aili. 2022. 'Swedish Naturalist Peter Artedi (1705–1735) and His Place in the History of Biosystematics as Exemplified by His *Ichthyologia sive opera omnia de piscibus* of 1738.' *Zootaxa* 5169 (6): 589–98. <https://doi.org/10.11646/zootaxa.5169.6.5>.
- Pietsch, Theodore W., and Hans Aili. 2023a. 'Peter Artedi's *Manuscriptum ichthyologicum*, a source for Albertus Seba's *Locupletissimi rerum naturalium thesauri accurata descriptio* (1759).' *Archives of Natural History* 50 (1): 118–132.
- Pietsch, Theodore W., and Hans Aili. 2023b. 'Peter Artedi's "Idea institutionum Trichozoologiae" and the classification of mammals.' *Journal of Natural History* 57 (17–20): 1066–79.
- Pietsch, Theodore W., and Hans Aili. 2023c. 'Exotic Mammals Observed by Swedish Naturalist Peter Artedi in London, 1734–1735.' *Archives of Natural History* 50 (2).
- Pietsch, Theodore W., and Hans Aili. 2023d. 'Sir John Hill (1714–1775) and 'His' Classification of Fishes: An Example of Eighteenth-Century Plagiarism.' *Zootaxa* 5231 (3): 289–301. <https://doi.org/10.11646/zootaxa.5231.3.4>.



- Raven, C. E. 1950. *John Ray, Naturalist: His Life and Works*. Cambridge: Cambridge University Press.
- Ray, J. 1693. *Synopsis methodica animalium quadrupedum et serpentini generis: vulgarium notas characteristicas, rariorum descriptiones integras exhibens: cum historiis & observationibus anatomicis perquam curiosis: praemittuntur nonnulla De animalium in genere, sensu, generatione, divisione, &c.* London.
- Ray, John. 1713. *Synopsis methodica avium et piscium: opus posthumum*. London.
- Reynolds, L. D., and N. G. Wilson. 1974. *Scribes and Scholars. A Guide to the Transmission of Greek and Latin Literature*. Second edition. Oxford.
- Roberg, Lars. 1727. *Dissertatio medico—physico de piscibus quam (...) praeside Laurentio Roberg (...) submittit Johannes Gabriel Geringius*. Uppsala.
- Romero, Aldemaro. 2012. 'When Whales Became Mammals: The Scientific Journey of Cetaceans from Fish to Mammals in the History of Science.' In *New Approaches to the Study of Marine Mammals*, edited by Romero and Keith, 3–30. Rijeka: InTech.
- Ruysch, Hendrik. 1718. *Theatrum universale omnium animalium piscium, avium, quadrupedum, exanguium, aquaticorum, insectorum, et angium, CCLX, Cura H. Ruysch*. Amsterdam: R. & G. Wetstein.
- Sawinski, C. 2015. *Questions of Provenance—Doubting Thomas by Adriaen van der Werff*, Part 2. <https://blog.mam.org/2015/12/29/questions-of-provenance-doubting-thomas-by-adriaen-van-der-werff-part-2>. Accessed 2 June 2022.
- Schmidt, Karl P. 1952. 'The "Methodus" of Linnaeus, 1736.' *Journal of the Society for the Bibliography of Natural History* 2: 369–411.
- Schneider, J. G. 1789. *Synonymia piscium Graeca et Latina emendata, aucta atque illustrata: Sive Historia piscium naturalis et literaria ab Aristotelis usque aevo ad seculum XIII deducta duce Synonymia piscium Petri Artedi*. Leipzig: Impensis Officinae Librariae Weidmannianae.
- Scopoli, G. A. 1777. *Introductio ad historiam naturalem, sistens genera lapidum, plantarum et animalium hactenus detecta, characteribus essentialibus donata, in tribus divisa, subinde ad leges naturae*. Prague.
- Seba, A. 1734. *Locupletissimi rerum naturalium thesauri accurata descriptio, et iconibus artificiosissimis expressio, per universam physices historiam. Opus, cui, in hoc rerum genere, nullum par exstitit. Ex toto terrarum orbe collegit, digessit, descripsit, et depingendum curavit*, vol. 1. Amsterdam.
- Seba, A. 1735. *Locupletissimi rerum naturalium thesauri accurata descriptio, et iconibus artificiosissimis expressio, per universam physices historiam*.

- Opus, cui, in hoc rerum genere, nullum par exstitit. Ex toto terrarum orbe collegit, digessit, descripsit, et depingendum curavit*, vol. 2. Amsterdam.
- Seba, A. 1759. *Locupletissimi rerum naturalium thesauri accurata descriptio, et iconibus artificiosissimis expressio, per universam physices historiam. Opus, cui, in hoc rerum genere, nullum par exstitit. Ex toto terrarum orbe collegit, digessit, descripsit, et depingendum curavit*, vol. 3. Amsterdam: Janssonius van Waesberge.
- Seba, A. 1765. *Locupletissimi rerum naturalium thesauri accurata descriptio, et iconibus artificiosissimis expressio, per universam physices historiam. Opus, cui, in hoc rerum genere, nullum par exstitit. Ex toto terrarum orbe collegit, digessit, descripsit, et depingendum curavit*, vol. 4. Amsterdam.
- Sherbo, A. 2015. 'Heber, Richard (1774–1833), Book Collector.' In *Dictionary of National Biography*. Oxford. <https://doi.org/10.1093/ref:odnb/12854>. Accessed 17 January 2022.
- Simpson, George Gaylord. 1945. 'The Principles of Classification and a Classification of Mammals.' *Bulletin American Museum of Natural History* 85: i–xvi, 1–350.
- Sotheby, Wilkinson & Hodge. 1899. *Bibliotheca Phillipica: Catalogue of a Further Portion of the Famous Collection of . . . the Late Sir Thomas Phillipps, Bart. F.R.S. &c. of Middle Hill, Worcestershire, and Thirlestaine House, Cheltenham, . . . Which Will Be Sold by Auction by Messrs. Sotheby, Wilkinson & Hodge . . . on the 5th of June 1899 and Five Following Days*. London.
- Stearn, W. T. 2001. 'Introduction.' In *Linnaeus, the Compleat Naturalist. With an introduction by William T. Stearns*, edited by W. Blunt, 6–9. Princeton, NJ, and Oxford: Princeton University Press.
- Ström, Annika. 1994. *Lachrymae Catharinae. Five Collections of Funeral Poetry from 1628. Edited with Studies on the Theoretical Background and the Social Context of the Genre*. Stockholm: Studia Latina Stockholmiensia 38, Almqvist & Wiksell International.
- Strömberg, Reinhold. 1943. 'Studien zur Etymologie und Bildung der griechischen Fischnamen.' *Göteborgs högskolas årsskrift* XLIX.
- Swann, H. K. 1991. 'A Brief History of Wheldon & Wesley Ltd.' *Antiquarian Book Monthly Review* 18 (2): 70–76.
- Tedder, H. R. 1891. 'Heber, Richard (1773–1833).' In *Dictionary of National Biography, 1885–1900*, 357–59. Oxford. <https://doi.org/10.1093/odnb/19780192683120.013.12854>. Accessed 17 January 2022.

- Uggla, Arvid Hj. 1935. *Linnés almanacksanteckningar för år 1735. Med inledning och förklaringar*, 134ff. Uppsala.
- Valentijn, François. 1724. *Beschryving van Amboina, (...) Ceram, Boero, Amboina, Honimoa, Noessa-Laoet, Oma, Manipa,, Bonoa, Kelang, en meer andere eylanden, in het werk voorkomende*. Dordrecht.
- Walde, Otto. 1951. 'Nya bidrag till Artedis biografi.' *SLÅ* 23–24: 49–50.
- Wheeler, A. C. 1961. 'The Life and Work of Peter Artedi.' In *Petri Artedi Ichthyologia Historiae Naturalis Classica*, edited by A. C. Wheeler (ed.), vii–xxiii. Weinheim: J. Cramer.
- Wheeler, A. C. 1979. 'The Sources of Linnaeus's Knowledge of Fishes.' *SLÅ* 1979: 156–211.
- Wheeler, A. C. 1987. 'Peter Artedi, Founder of Modern Ichthyology.' In *Proceedings of the Fifth Congress of European Ichthyologists*, 3–4. Stockholm.
- Willughby, Sir Francis. 1686. *Historia piscium*, book I, 21. London.
- Wotton, E. 1552. *De differentiis animalium libri decem*. Paris.

## Addendum

Artedi, Petrus, 2022, *Ichthyologia*. Det vill säga alla verk om fiskarna. I översättning från latinet av Hans Aili och under redaktion av Jakob Christensson samt med bidrag av Sven Kullander och Clas-Ove Strandberg. Stockholm.

## 8. Appendices

### 1. Peter Artedi's *Praefatio Authoris*, 1735, in *Ichthyologia*, 1738

English translation by Hans Aili

Petrus Artedi to his illustrious and benevolent reader: Greetings!

Nobody is ignorant of the fact that men's talents and dispositions differ, as much in choosing his form of life as in selecting the nature of his studies; hence the Poet's wise saying:

Every man is drawn by his very own pleasure.<sup>539</sup>

Moved by this natural inclination, I have been from my earliest youth a lover of Zoology, and primarily a lover of Fishes. But when I began, eight years and more ago, to describe indigenous fishes and then to compare my observations with those of the Authorities, it was from the outset very difficult for me to make my fishes conform with the species as described by the Authorities, and to find true synonyms, and this was clearly caused by the imperfect descriptions that the Authorities provided, until I happened to light upon the most noble Willughby, who is superior to everybody else in his descriptions of the species.

I then observed that no-one among the Ichthyologists had as yet defined the separate genera and their characters and species; therefore, I began with great effort to examine all the body-parts of the fishes in order to see which parts agreed most in number, shape, and site, and which were most in disagreement, primarily among fishes that agreed in outer shape. From this the *Characters of the Genera* and the *Genera* themselves were born, as my famous Reader can see in *Philosophia*.

I noticed, furthermore, that most *Generic Names* were not Latin but barbaric, hence I cleansed Ichthyology of precisely these exotic designations, an action that was more easily done as the *Generic Names* of Fishes are present in sufficiently large numbers among Latin and Greek Authorities. New *Genera* of Fishes, or such as were not yet possessed of any suitable name, I distinguished with new *Generic Names*,

---

<sup>539</sup> Virgil, *Ecloga* 2: 65: *trahit sua quemque uoluptas*.

but in such a way that the meaning of that new name was so general that it would in some respect fit all the Species of one single Genus. Moreover, I rooted out those generic fish-names that also belong to Hairy Quadrupeds, Amphibians, Birds, Insects, and other things, on account of the confusion they might cause.

After that I settled which were the separate Species of the Genera, and which were the *Variations of the Species*; and in the *Reformatio specierum* I moreover demonstrated which Names of Species were False and which were True, and at the same time I revealed from which body-parts the Characters, that is, the True Differences between the Species, ought to be selected.

In *Philosophia*, I briefly treated of the Classes, or more correctly the *Orders*, of the Fishes, and, most importantly, I urged that Orders of this kind ought to be Natural; for very many and diverse Orders can, without great labour, be fashioned from the Number, Shape, and Site of the Parts, but such Orders ought not to be tolerated, because Fishes of the same Genus become falsely separated, and different fishes often united into one genus, and, indeed, squares are mixed up with circles and the highest with the lowest.

In *Philosophia* I did, moreover, treat of all the *body-parts of Fishes, external as well as internal*, and this according to their differences in Number, Shape, Site, and Proportions et cetera, and here my Benevolent Reader will find various observations, hitherto unknown. As a flourish I finally annexed to this *Philosophia* some problems for the purpose of restoring the Fishes mentioned to their proper Orders, Genera, and Species. I have also added an explication of technical terms often used in Ichthyology.

I put the *Literary History of Ichthyology* in front of this *Philosophia* in order that the principal fortunes of Ichthyology, and its progress, should be visible at a glance, so to speak, and this cost me no small amount of time, namely in the complete perusal of so many Authorities.

In the Work Itself I first established some Natural Orders of Fishes, as far as this was possible; after that I collected the Genera, separated each into its Order, with their Characters—genuine, as I hope; I then distinguished the individual Species of each and every Genus by new differences, that is, Specific Names; the laborious building of these names was not so simple as some might think at first glance.

Next, I collected the *Synonymous Names of the Species* from nearly all the Authorities and added them to my new Specific Names; this caused me a great labour, beyond the other parts of this Work; very

much time and an untiring mind is required in order to give reports of so many Authorities on almost every single Species, particularly as so very few Synonyms had hitherto been collected, and those not being cited from their proper locations.

I hope, however, that whoever desires to know the main Synonyms of any fish in the Authorities shall in future be able to use as a Catalogue these few things that I have collected.

Finally, I added to this work *Descriptions* of every single *Species* so that nothing that is proper to Ichthyology should be lacking, and I separated these very Descriptions into numbered groups, in order that everything should be clearer and more distinct.

But should anyone say that I do discourse much on the parts of Fishes, their Genera, Species, and their Characters, on the Names of the Genera and Species and their Synonyms, but that the very number of Fishes, that is Species, described by me is smaller than what is just, he will be given a friendly reply borrowed from Henckel: ‘I have always preferred fragments of truths to systems of figments;’<sup>540</sup> and, moreover, the question is not, ‘How much?’ but, ‘How well?’

Noble Willughby, the greatest of Ichthyologists, travelled through England, Holland, Italy, and part of Germany for the sake of Fishes, and all the same he did not, on his own, find and describe more than about one hundred and seventy-eight Fishes distinguished by Species, to say nothing now of the Fishes that had been described by the most learned Lister, Jonson and others, and were included in this outstanding work; this means that the number of European Fishes distinguished by Species is not so great as some have persuaded themselves.

My observations in *Philosophia, Characteres Generum, Differentiae specierum*, and the descriptions belonging to these sections have been drawn forth from Nature’s very own images, the consequence being that I have written nothing but what Nature’s image has supplied, and thus I am only acting as Nature’s interpreter; because of this I hope that nobody will justly taunt me with that vulgar saying: ‘nothing is said here that was not said before.’ In this work I have not described any Fish except those that I have myself observed, with the sole exception of the *Cetacei* which hardly any Ichthyologist has seen, except the learned Robert Sibbald; from him I accepted the principal qualities of the *Cetacei*. My motive for so doing is that this, the most dissimilar

---

<sup>540</sup> Johann Friedrich Henckel (1678 to 1744), German physician and scientist studying mineralogy, metallurgy and chemistry.

order of the Fishes, should not be lacking in our Natural Method. Nonetheless I have wished more than once that I should manage to see these Fishes, but not every man's condition, locality, opportunity et cetera will give him an occasion to see fishes of this kind, as they present themselves so seldom and so unexpectedly.

I wrote this in London, 1735.

## 2. *Methodus*: Artedi's methodical procedure

Transcription of the Latin and English translation by Hans Aili

The Latin text of *Methodus* was written on the inside of the front cover of Löffling's copy of *Trichozoologia* (1746) but, although mentioned by Nybelin (1934, 38), was not printed by him. For the sake of completeness, it is therefore here transcribed and translated into English and presented as an independent edition.

*Methodus* probably represents Artedi's conception of the systematic method of examining hitherto unknown animals. The wording suggests that it was to be employed on *Trichozoa*, or hairy animals. It bears a certain resemblance to, but is far shorter than, Linnaeus's *Methodus* that was regularly added to his *Systema naturae* (1735), albeit printed only in 1736.

- |  |   |
|--|---|
| 1. <i>Caput, figura etc.</i>   | 1. Head: shape etc.   |
| 2. <i>Corpus, figura etc.</i>  | 2. Body: shape etc.   |
| 3. <i>Os et maxilla, an barba adest?</i>   | 3. Mouth and jaw: is there a beard?                                 |
| 4. <i>Nares, situs et figura.</i>  | 4. Nostrils: location and shape.                                    |
| 5. <i>Oculus et iris, color, situs.</i>  | 5. Eye and iris: colour and place.                                  |
| 6. <i>Dentes, numerus, figura, situs.</i>  | 6. Teeth: number, shape, and place.                                 |
| 7. <i>Collum, longitudo et figura etc.</i>   | 7. Neck: length and shape etc.                                      |
| 8. <i>Aures, magnitudo, figura, situs.</i>   | 8. Ears: size, shape, and place.                                    |
| 9. <i>Pili et eorundem color.</i>  | 9. Hairs and colour of same.  |
| 10. <i>Pedes, longitudo, figura.</i><br><i>Numerus unguulorum vel unguium in singulo pede.</i> | 10. Feet: length and shape. Number of hooves or claws on each foot. |
| 11. <i>Dimensio corporis et partium.</i>   | 11. Size of body and body parts.                                    |
| 12. <i>Proprietas et vivendi ratio.</i>  | 12. Peculiar nature and manner of living.                           |
| 13. <i>Nomen provinciale etc.</i>  | 13. Local name etc.   |

### 3. Acknowledgements

Special thanks are extended to Toby Burrows, senior honorary research fellow, School of Humanities, University of Western Australia, who provided crucial information on the Phillipps manuscripts. We also thank Michael North and Marianna Stell, Reference and Reader Services, Rare Book and Special Collections Division, Library of Congress, Washington, DC; Scott Ellwood and Meghan Constantinou, the Grolier Club, New York, New York; Karen Attar, curator of rare books and university art, Senate House Library, University of London; Alison Whittlestone, Customer Services, and Elias Mazzucco, Rare Books & Music Reference Team, the British Library; Anne Mouron, senior library assistant, and Jo Maddocks, assistant curator of rare books, Bodleian Libraries, University of Oxford; and Leslie K. Overstreet, Natural-History Rare Books, Pamela M. Henson, History Division, and Tad Bennicoff, archivist, Smithsonian Institution Libraries and Archives. Finally, we thank William D. Anderson, Aaron M. Bauer, Tim M. Berra, Inci A. Bowman, Holger Funk, Caroline Grigson, Eric J. Hilton, James W. Orr, Christopher Plumb, and David G. Smith for critical reviews that helped to improve an early version of parts of the manuscript.





STUDIA LATINA STOCKHOLMIENSIA

*Published by Stockholm University*

Nos. 1-22

Editor: Dag Norberg

1. *Nils-Ola Nilsson*. Metrische Stildifferenzen in den Satiren des Horaz. Stockholm 1952. Pp. VIII+220.
2. *Dag Norberg*. La poésie latine rythmique du haut moyen âge. Stockholm 1953. Pp. 120. Out of print.
3. *Ulla Westerbergh*. Chronicon Salernitanum. A Critical Edition with Studies on Literary and Historical Sources and on Language. Stockholm 1956. Pp. XXXII+362. Out of print.
4. *Ulla Westerbergh*. Beneventan Ninth Century Poetry. Stockholm 1957. Pp. 91. Out of print.
5. *Dag Norberg*. Introduction à l'étude de la versification latine médiévale. Stockholm
6. *Dag Norberg*. Epistulae S. Desiderii Cadurcensis. Stockholm 1961. Pp. 91.
7. *Lars Elfving*. Étude lexicographique sur les séquences limousines. Stockholm 1962. Pp. 283.
8. *Birgitta Thorsberg*. Études sur l'hymnologie mozarabe. Stockholm 1962. Pp. 184. Out of print.
9. *Ulla Westerbergh*. Anastasius Bibliothecarius. Sermo Theodori Studitae de sancto Bartholomeo apostolo. Stockholm 1963. Pp. XIV+214.
10. *Gudrun Lindholm*. Studien zum mittellateinischen Prosarhythmus. Seine Entwicklung und sein Abklingen in der Briefliteratur Italiens. Stockholm 1963. Pp. 204. Out of print.
11. *Katarina Halvarson*. Bernardi Cluniacensis Carmina De trinitate et de fide catholica, De castitate servanda, In libros regum, De octo vitiis. Stockholm 1963. Pp. 161.
12. *Margareta Lokrantz*. L'opera poetica di S. Pier Damiani. Descrizione dei manoscritti, edizione del testo, esame prosodico-metrico, discussione delle questioni d'autenticità. Stockholm 1964. Pp. 258. Out of print.
13. *Tore Janson*. Latin Prose Prefaces. Studies in Literary Conventions. Stockholm 1964. Pp. 180. Out of print.
14. *Jan Öberg*. Serlon de Wilton. Poèmes latins. Texte critique avec une introduction et des tables. Stockholm 1965. Pp. 240. Out of print.

15. *Ritva Jonsson*. *Historia. Études sur la genèse des offices versifiés*. Stockholm 1968. Pp. 259.
16. Jan Öberg. *Notice et extraits du Manuscrit Q 19 (XVI<sup>e</sup> S.) de Strängnäs*. Stockholm 1968. Pp. 91.
17. *Gustaf Holmér*. *Le sermon sur Esaü. Discours allégorique sur la chasse de Pierre de Marini. Édition critique*. Stockholm 1968. Pp. 133.
18. Herbert Adolfsson. *Liber epistularum Guidonis de Basochis*. Stockholm 1969. Pp. VIII+317.
19. *Hedda Roll*. *Hans Brask. Latinsk korrespondens 1523*. Stockholm 1973. Pp. 187.
20. *Tore Janson*. *Prose Rhythm in Medieval Latin from the 9th to the 13th Century*. Stockholm 1975. Pp. 133.
21. *Ritva Jonsson*. *Corpus Troporum I. Tropes du propre de la messe. 1 Cycle de Noël*. Stockholm 1975. Pp. 361; 31 pl.
22. *Olof Marcusson*. *Corpus Troporum II. Prosules de la messe. 1 Tropes de l'alleluia*. Stockholm 1976. Pp. 161; 4 pl.

#### STUDIA LATINA STOCKHOLMIENSIA

*Published by Stockholm University*

Nos. 23–46

Editor: Jan Öberg

23. *Tore Janson*. *Mechanisms of Language Change in Latin*. Stockholm 1979. Pp. 133.
24. *Hans Aili*. *The Prose Rhythm of Sallust and Livy*. Stockholm 1979. Pp. 151.
25. *Gunilla Björkvall, Gunilla Iversen, Ritva Jonsson*. *Corpus Troporum III. Tropes du propre de la messe. 2 Cycle de Pâques*. Stockholm 1982. Pp. 377; 32 pl.
26. *Gunilla Iversen*. *Corpus Troporum IV. Tropes de l'Agnus Dei*. Stockholm 1980. Pp. 349; 32 pl.
27. *Alf Uddholm*. *Johannes Ulvichius. De liberalitate urbis Gevaliae oratio et carmen. Kritische Ausgabe mit Kommentar*. Stockholm 1980. Pp. 93.
28. *Monika Asztalos*. *Petrus de Dacia. De gratia naturam ditante sive De virtutibus Christinae Stumbelesensis. Édition critique avec une introduction*. Stockholm 1982. Pp. 215.
29. *Ritva Jacobsson*, ed. *Pax et Sapientia. Studies in Text and Music of Liturgical Tropes and Sequences, in Memory of Gordon Anderson*. Stockholm 1986. Pp. 114.
30. *Monika Asztalos*, ed. *The Editing of Theological and Philosophical Texts from the Middle Ages*. Stockholm 1986. Pp. 314.

31. *Eva Odelman*. Corpus Troporum VI. Prosules de la messe. 2 Les prosules limousines de Wolfenbüttel. Stockholm 1986. Pp. 181.
32. *Gunilla Björkvall*. Corpus Troporum V. Les deux tropaires d'Apt. Stockholm 1986. Pp. 442.
33. *Claes Gejrot*. Diarium Vadstenense. The Memorial Book of Vadstena Abbey. A Critical Edition with an Introduction. Stockholm 1988. Pp. 395.
34. *Gunilla Iversen*. Corpus Troporum VII. Tropes de l'ordinaire de la messe. Tropes du Sanctus. Introduction et édition critique. Stockholm 1990. Pp. 432; 32 pl.
35. *Ella Heuman, Jan Öberg*. Ericus Olai. Chronica regni Gothorum. Textkritische Ausgabe. Stockholm 1993. Pp. 222.
36. *Wulf Arlt, Gunilla Björkvall*, ed. Recherches nouvelles sur les tropes liturgiques. Recueil d'études. Stockholm 1993. Pp. 480.
37. *Claes Gejrot*. Diplomata Novevallensia. The Nydala Charters 1172–1280. A Critical Edition with an Introduction, a Commentary and Indices. Stockholm 1994. Pp. 237.
38. *Annika Ström*. Lachrymae Catharinae. Five Collections of Funeral Poetry from 1628. Edited with Studies on the Theoretical Background and the Social Context of the Genre. Stockholm 1994. Pp. 307.
39. *Jan Öberg*. Ericus Olai. Chronica regni Gothorum. II. Prolegomena und Indizes. Stockholm 1995. Pp. 85.
40. *Jan Öberg*. Formularia Lincopensia. Zwei spätmittelalterliche Briefsteller aus dem Bistum Linköping (Cod. Upsal. C 204). Textkritische Gesamtausgabe mit Einleitung und Register. Stockholm 1997. Pp. 96.
41. *Peter Ståhl*. Johannes Hildebrandi. Liber epistularis (Cod. Upsal. C 6). I. Lettres nos 1–109. Édition critique avec des analyses et une introduction. Stockholm 1998. Pp. 216.
42. *Jan Öberg*. Petronius. Cena Trimalchionis. A New Critical Edition. Stockholm 1999. Pp. XX+58.
43. *Christina Sandquist Öberg*. Versus Maximiani. Der Elegienzyklus textkritisch herausgegeben, übersetzt und neu interpretiert. Stockholm 1999. Pp. 205.
44. *Claes Gejrot, Annika Ström*. Poems for the Occasion. Three Essays on Neo-Latin Poetry from Seventeenth-Century Sweden. Stockholm 1999. Pp. 199.
45. *Robert Andrews*. Augustinus de Ferraria. Quaestiones super librum Praedicatorum Aristotelis. Stockholm 2000. Pp. XXXIX+309.
46. *Maria Plaza*. Laughter and Derision in Petronius' Satyrca. A Literary Study. Stockholm 2000. Pp. XII+227.

STUDIA LATINA STOCKHOLMIENSIA

*Published by Stockholm University*

Nos. 47–48

Editor: Monika Asztalos

47. *Martin Jacobsson*. Aurelius Augustinus. De musica liber VI. A Critical Edition with a Translation and an Introduction. Stockholm 2002. Pp. CXVIII+144.
48. *Gösta Hedegård*. Liber iuratus Honorii. A Critical Edition of the Latin Version of the Sworn Book of Honorius. Stockholm 2002. Pp. 336.

STUDIA LATINA STOCKHOLMIENSIA

*Published by Stockholm University*

Nos. 49–53

Editor: Hans Aili and Gunilla Iversen

49. *Magnus Karlsson*. Erik XIV. Oratio de iniusto bello regis Daniae anno 1563 contra regem Sueciae Ericum 14 gesto. Edited with introduction, translation and commentary. Stockholm 2003. Pp. 267.
50. *Sara Risberg*. Liber usuum fratrum monasterii Vadstenensis. The Customary of the Vadstena Brothers. A Critical Edition with an Introduction. Stockholm 2003. Pp. 253.
51. *Gunilla Sävborg*. Epistole tardive di Francesco Petrarca. Edizione critica con introduzione e commento. Stockholm 2004. Pp. 262.
52. *Alexander Andrée*. Gilbertus Universalis: Glossa ordinaria in Lamentationes Ieremie prophete. Prothemata et Liber I. A Critical Edition with an Introduction and a Translation. Stockholm 2005. Pp. XIV+323; 3 pl.
53. *Erika Kihlman*. Expositiones Sequentiarum. Medieval Sequence Commentaries and Prologues. Editions with Introductions. Stockholm 2006. Pp. X+356; 12 pl.

STUDIA LATINA STOCKHOLMIENSIA

*Published by Stockholm University*

Nos. 54–58

Editor: Hans Aili

54. *Alexander Andrée, Erika Kihlman*, ed. Hortus troporum. Florilegium in honorem Gunillae Iversen. A Festschrift in Honour of Professor Gunilla Iversen on the Occasion of her Retirement as Chair of Latin at Stockholm University. Stockholm 2008. Pp. XIX+384; 28 pl.

55. *Elin Andersson*. Responsiones Vadstenenses. Perspectives on the Birgittine Rule in Two Texts from Vadstena and Syon Abbey. A Critical Edition with Translation and Introduction. Stockholm 2011. Pp. VIII + 260.
56. *Erika Kihlman, Denis Searby*, ed. Ars Edendi Lecture Series, vol. I. Stockholm 2011. Pp. 130.
57. *Brian Møller Jensen*, The Story of Justina and Cyprian of Antioch, as told in a Medieval Lectionary from Piacenza. Edition with Introduction and Translation. Stockholm 2012. Pp. 171; 4 pl.
58. *Alessandra Bucossi, Erika Kihlman*, ed. Ars Edendi Lecture Series, vol. II. Stockholm 2012. Pp. 172.

## STUDIA LATINA STOCKHOLMIENSIA

*Published by Stockholm University*

Nos. 59–

Editor: Maria Plaza

59. *Eva Odelman, Denis Searby*, ed. Ars Edendi Lecture Series, vol. III. Stockholm 2014. Pp. 130.
60. *Elin Andersson, Erika Kihlman, Maria Plaza*, red. Latinet i tiden. En festskrift till Hans Aili. Stockholm 2014. Pp. 443; 4pl.
61. *Gunilla Iversen*, Corpus troporum XII. Tropes du Gloria, vol 1: Introduction et édition des textes, (428pp.); vol. 2: Aperçu des manuscrits (2438pp.+32 pl.). Stockholm 2014.
62. *Barbara Crostini, Gunilla Iversen, Brian M. Jensen*, ed. Ars Edendi Lecture Series, vol. IV. Stockholm: Stockholm University Press, 2016.
63. *Erika Kihlman, Denis Searby*, ed. Ars Edendi Lecture Series, vol. V. Stockholm: Stockholm University Press, 2020.
64. *Aili, Hans, Pietsch, Theodore*, Peter Artedi: Reformer of 18th-century Zoology vol. I, Peter Artedi's Life and Works. Stockholm: Stockholm University Press, 2024.

## CORPUS TROPORUM

*Studia Latina Stockholmiensia (SLS)/Corpus Troporum (CT)*

CORPUS TROPORUM I, Tropes du propre de la messe. 1. Cycle de Noël, éd. Ritva Jonsson. SLS 21. Stockholm 1975.

CORPUS TROPORUM II, Prosules de la messe. 1. Tropes de l'alleluia, éd. Olof Marcusson. SLS 22. Stockholm 1976.

CORPUS TROPORUM III, Tropes du propres de la messe. 2. Cycle de Pâques, éd. Gunilla Björkvall, Gunilla Iversen, Ritva Jonsson. SLS 25. Stockholm 1982.

CORPUS TROPORUM IV, Tropes de l'Agnus Dei. Edition critique suivie d'une étude analytique par Gunilla Iversen. SLS 26. Stockholm 1980.

CORPUS TROPORUM V, Les deux tropaires d'Apt, mss. 17 et 18. Inventaire analytique des mss et édition des textes uniques par Gunilla Björkvall. SLS 32. Stockholm 1986.

CORPUS TROPORUM VI, Prosules de la messe. 2. Les prosules limousines de Wolfenbüttel, Herzog August Bibliothek Cod. Guelf. 79 Gud. lat., par Eva Odelman. SLS 31. Stockholm 1986.

CORPUS TROPORUM VII, Tropes de l'ordinaire de la messe. Tropes du Sanctus. Introduction et édition critique par Gunilla Iversen. SLS 34. Stockholm 1990.

CORPUS TROPORUM IX, Tropes for the Proper of the Mass. 4. The Feasts of the Blessed Virgin Mary. Edited with an Introduction and Commentary by Ann-Katrin Andrews Johansson. CT. Stockholm 1998.

CORPUS TROPORUM X, Tropes du propre de la messe. 5. Fêtes des Saints et de la Croix et de la Transfiguration. A Introduction et commentaires (Pp. 647 + carte + 13 photos). B Édition des textes (Pp. 560). Par Ritva Maria Jacobsson. CT. Stockholm 2011.

CORPUS TROPORUM XI, Prosules de la messe. 3. Prosules de l'offertoire. Édition des textes par Gunilla Björkvall. CT. Stockholm 2009. Pp. X + 254.

CORPUS TROPORUM XII, Tropes du Gloria, vol 1, Introduction et édition des textes, (428pp.), Vol. 2. Aperçu des manuscrits (2438pp.+32 planches), Par Gunilla Iversen, SLS 61, Stockholm 2014.

*Pax et Sapientia*. Studies in Text and Music of Liturgical Tropes and Sequences, in Memory of Gordon Anderson, ed. Ritva Jacobsson. SLS 29. Stockholm 1986.

*Recherches nouvelles sur les tropes liturgiques*. Recueil d'études réunies par Wulf Arlt et Gunilla Björkvall. SLS 36. Stockholm 1993.



**S**WEDISH naturalist Peter Artedi (1705–1735) has been recognized as the father of the modern science of ichthyology but his work has not received the attention it deserves until now. Far from simply a noteworthy curiosity in the history of science, Artedi's contributions, presented here in English for the first time, are of immense significance to ichthyology and of even greater importance to the history of the development of zoology in general.

Professor Emeritus Hans Aili (1947–), a Swedish Latinist, was born in the province of Norrbotten, Sweden, did undergraduate studies at Lund University (M.A. 1971), and received his Ph.D. in Latin at Stockholm University (1979), where he spent most of his academic career, teaching Latin at all academic levels and, after promotion to the Chair of Latin in 1999, headed the Stockholm Latin Seminar until his retirement in 2013. He has published scholarly works on stylistic aspects of Classical Latin, and critical editions of the Revelations of St. Birgitta of Sweden and on the history of the Revelations manuscripts (Medieval Latin). In later years he concentrated on Neo-Latin as the source language of early modern science, Peter Artedi's works being his latest major project.

Professor Emeritus Theodore W. Pietsch (1945–), an American evolutionary biologist, was born in Michigan, U.S.A., and educated at the University of Michigan (B.A. 1967), University of Southern California (M.S. and Ph.D. 1969 and 1972), and Harvard University (Postdoctoral Fellowship, 1973–1975). He has spent most of his career at the University of Washington in Seattle, as a professor teaching undergraduates, mentoring graduate students, and conducting research primarily in marine ichthyology. He has also published extensively on the history of science.

IMAGE CREDIT: Rare Book Division, The New York Public Library. "Scorpaena volitans" from *Ichthyologie, ou Histoire naturelle: générale et particulière des poissons* (1785–1797) by Marcus Elieser Bloch. The New York Public Library Digital Collections. Creative Commons CC0.



**STOCKHOLM**  
UNIVERSITY PRESS

ISBN 978-91-7635-243-4



9 789176 352434