

# Peter Artedi's *Catalogue of the fishes of the Baltic Sea*: an English translation with an introduction and commentary

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A manuscript catalogue of the fishes of the Baltic Sea, and of the rivers and lakes of Sweden, the only known original work of the Swedish ichthyologist Peter Artedi (1705–35) by his own hand, is translated into English for the first time, and its contents assessed in light of Artedi's contribution to the development and philosophy of Linnaean systematics. Appended accounts of Swedish cetaceans and terrestrial mammals are also discussed, as well as Artedi's 'principles of ichthyology', the methodology later employed in his *magnum opus*, the *Ichthyologia* of 1738. Evidence that Artedi presented the manuscript to Sir Hans Sloane as a way to introduce himself during his visit to London in 1734 is also provided.

ADDITIONAL KEYWORDS: Cetaceans – Hans Sloane – Linnaeus – mammals – manuscript – natural history – principles of ichthyology – Sweden.

## INTRODUCTION

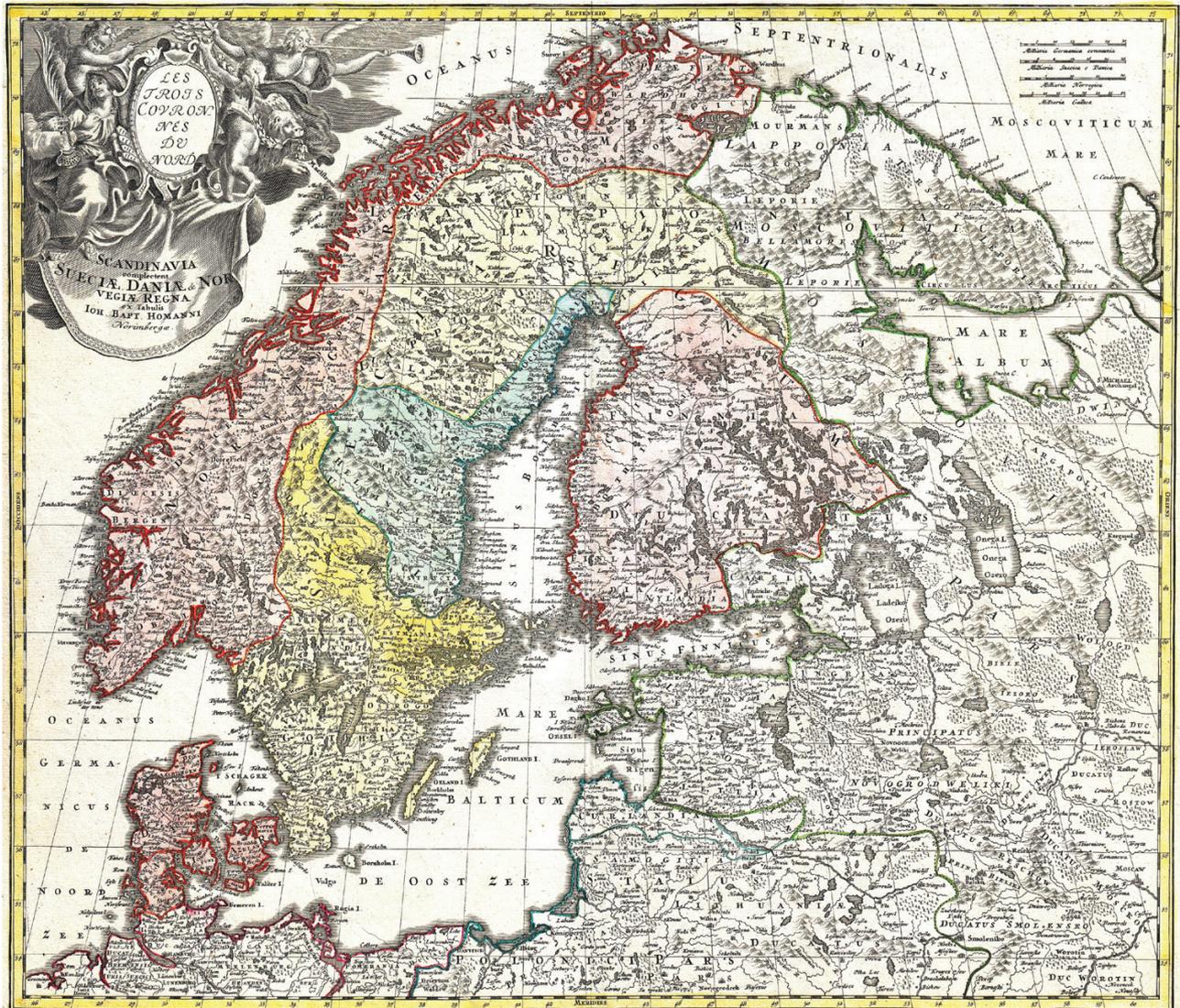
What little is known about Peter Artedi has now been documented as well as can be expected, given the scant evidence that has survived (Lönnberg, 1905: 23–24; Merriman, 1938: 36; 1941: 65; Wheeler, 1961: xvi; 1979: 158–160; 1987: 6–7; Pietsch, 2010; Pietsch & Aili, 2014: 39–84). Most of the facts and chronology of his life and untimely death were provided by his friend and colleague Carl Linnaeus (1707–78), who included a brief biography in Artedi's *Ichthyologia sive Opera omnia de piscibus*, the latter edited and published posthumously by Linnaeus in 1738.

Peter Artedi was born in Anundsjö, in the province of Ångermanland, northern Sweden, on 27 February 1705 (Old Style [O.S.], 10 March, New Style [N.S.]). In October 1716, his father, Olaus Petri Arctaedius (1670–1728), moved the family to Nordmaling, on the Gulf of Bothnia, Baltic Sea (Fig. 1), where he took up the position of pastor of the local vicarage (which he had inherited from

his father) and where Peter, intending to eventually become a clergyman, enrolled in the grammar school at Härnösand, some 164 km south of Nordmaling. On 30 October 1724, having graduated with honours, Peter entered Uppsala University, where in late March 1729 he met Linnaeus for the first time. Over the next few years, the two formed a lasting friendship and, sharing similar aspirations, they together made elaborate plans to classify plants and animals in ways that would later be described as revolutionary. Artedi, being more interested in zoology, took on the fishes, amphibians, and reptiles – as well as the plant family Umbelliferae (Apiaceae) (Linnaeus, 1738: [vii]; Linnaeus, 1805: 519), while Linnaeus, who was already by this time working on his sexual system for plants, took all the remaining vegetable kingdom, the insects and birds. Both agreed to work independently on minerals and mammals (Lönnberg, 1905: 11).

After taking a degree in Medicine at the University of Uppsala on 17 July 1734, and receiving his academic certificate later that month, Artedi made plans to travel abroad, departing Uppsala for London in early

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**Figure 1.** Map of Scandinavia, depicting Denmark, Norway, Sweden, Finland, and the Baltic states of Livonia, Latvia, and Curlandia, and noting fortified cities, villages, roads, bridges, forests, castles and topography, by German geographer and cartographer Johann Baptist Homann (1664–1724), about 1730. After [Homann \(1752\)](#); courtesy of Wikimedia Commons.

September. There, on 15 May 1735, he met with Hans Sloane (1660–1753), to whom Artedi presented the manuscript of his *Catalogue Piscium Maris Balthici* for Sloane's approval. It is possible, or even likely, that Orvar Nybelin's (1934: 44, 140) surmise is correct, viz. that Artedi, lacking a sponsor in England, had composed this *Catalogue* as a means of introducing himself to Sloane and gaining his friendship.

Having left England sometime in late June, Artedi and Linnaeus met unexpectedly in Leiden on 8 July 1735, and learning that Artedi was penniless and badly in need of employment, [Linnaeus \(1738\)](#) stated, on 17 July, in his *Vita Artedi*, that he 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 the Netherlands. Artedi himself, in a letter to his mother (Walde, 1951), stated that he sought Seba's acquaintance on his own initiative, having heard that Seba was preparing a major work on natural history. Seba, who had in turn heard about Artedi and needing help to complete the text for the third volume of his *Locupletissimus rerum naturalium thesaurus* (published posthumously in Amsterdam in 1759), hired Artedi to describe the fishes. It is not known whether Seba ever paid Artedi or his heirs for this labour. 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. Although Artedi is recognized by some as the Father of Ichthyology – having introduced, for the first time, a precise terminology, dividing fishes into orders, orders into genera and genera into species; and having provided full and pertinent diagnoses of all taxa, developed standard methods for making counts and measurements of anatomical features, and used uninominal generic names throughout his *Ichthyologia* (Gill, 1872: 28; Jordan, 1902: 430; Wheeler, 1961: vii; 1987: 3; Broberg, 1987: 11; Romero, 2012: 23) – he has been largely forgotten, despite many suggestions and some convincing evidence that he made significant contributions to Linnaeus's thinking about biosystematics (Lönnberg, 1919: 2, 35; Merriman, 1938: 39; 1941: 69; Wheeler, 1961: xx; Blunt, 2001: 7, 29–30, 102–103; Broberg, 1983: 168; Eriksson, 1983: 71; Lindroth, 1983: 36; Koerner, 1999: 34; Stearn, 2001: 6–9). It seems, therefore, certain that Peter Artedi deserves a more prominent place in the history of science.

#### THE CATALOGUE AS PART OF ARTEDI'S SCIENTIFIC PRODUCTION

In addition to *Ichthyologia, sive Opera omnia piscibus*, edited and published by Linnaeus in 1738, Artedi left a number of unpublished manuscripts. Four in number, they are described as follows.

*Kårt förteckning på de träen, buskar åg örter, såmm wäxa sponte wid Nordmalings prästebrod äller i närmaste byar där åmmkring* ('A short list of the trees, bushes and plants that are indigenous to the glebe-lands in Nordmaling and villages lying within its immediate vicinity'), 24 numbered folios, dated 27 February 1729, preserved in the Uppsala University Library (see Lundgren & Fries, 1985). 'It is of considerable historical interest since it shows plainly the influence of the celebrated botanist, Tournefort, and records the Nordmaling flora of the time' (Merriman, 1938: 38; see also Lönnberg, 1905: 9).

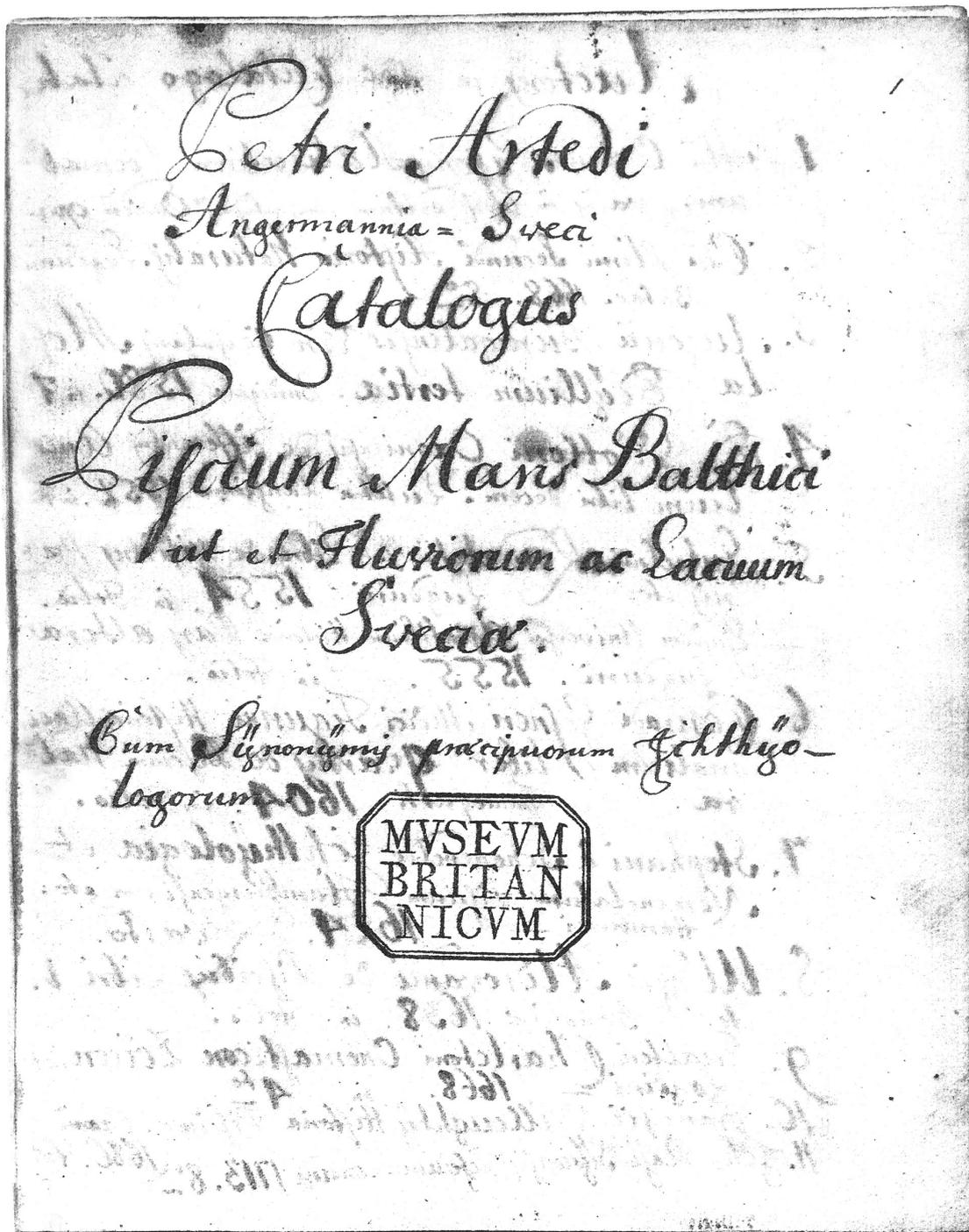
*Idea institutionum trichozoologiae* ('Outline of principles of the zoology of hairy animals'), Bergianska biblioteket, Stockholm University Library (H. VII: 8.1.n.4), described by Nybelin (1934: 37ff.) as a copy from a now lost original belonging to Linnaeus and held in his personal library. The copy was made in 1746 by Petrus Löfling (1729–56), one of Linnaeus's disciples, and is in the shape of a small notebook (15.5 by 9.0 cm) of 58 pages, bound in paper with a back in leather. Nybelin observed that Löfling's copy seems faithful to the original, repeating its sometimes spacious, sometimes cramped writing, and copying additions and corrections without entering them into the body text. On the inside page of the first cover there is a note: *ante annum 1735 scripsit hoc autor* ('the

author wrote this before the year 1735'), and Nybelin assumed that the work dates from Artedi's years of study at Uppsala University (1724–34) and was finished before his voyage to England in September 1734. However, notes on pages 48 and 49 were written in England. Nybelin also observed that Artedi named the subjects of his work *Trichozoon* (hairy animals), while Linnaeus originally focused on their four legs (*Tetrapodon*) and later classed them as *Mammalia*.

*Manuscriptum ichthyologicum quod Petrus Artedi elaboravit in usum Thesauri Sebani* ('Ichthyological manuscript compiled by Peter Artedi for the use of Seba's *Thesaurus*'), described by Merriman (1941) as leather bound, with gold-tooled covers and raised bands on the spine, measuring 9.75 by 7.50, 85 pages, in excellent condition. A note on the front fly-leaf indicates that it is a manuscript copy made by one Rob. Wilh. van Homrigh, and given away by him in 1773. Various other notes on the fly-leaf show that it eventually came to the hand of English book-collector Richard Heber (1773–1833), probably at the Henry Philip Hope sale of 18 February 1813, and that it was bought from him for two shillings in a lot of 400 rare books at Sotheby, on 30 May 1836, by Sir Thomas Phillipps (1792–1872), an English antiquary and book collector who amassed the largest collection of manuscript material in the 19<sup>th</sup> century. It became listed among the accessions of the library of the Bureau of Fisheries on 15 August 1899, but is now in the Library of Congress (QL618.15. A78 1735). A copy of the original notes made by Peter Artedi on Seba's collection, it provides a direct clue as to exactly what part of the work in volume 3 of the *Thesaurus* (1759) belongs to Artedi.

The fourth surviving Artedi manuscript, *Catalogue Piscium Maris Balthici ut et Fluviorum et Lacuum Sueciae, Cum Synonymis Praecipuorum Ichthyologorum* (hereafter referred to as the *Catalogue*) perhaps stands as most prominent. Presently residing in the British Library (BL) and listed in the BL catalogue as 'Sloane MS 3870', its Latin text has now been translated into English from Orvar Nybelin's Latin transcription of 1934, and is provided here in full. This is the first known translation of the Latin text into any modern vernacular. For the original Latin, the reader is referred to Nybelin's edition, which stands up to the most careful scrutiny against the original manuscript.

Orvar Nybelin's (1934: 35, 44) introduction to his edition contains a number of valuable observations and theories, not only that referred to above, but on the genesis of his printed transcription. The manuscript consists of a leather-bound volume, measuring approximately 16 by 19 cm, with a title page (Fig. 2), followed by 18 numbered folios (36 pages), all in excellent condition. The hand is almost certainly Artedi's own. As Nybelin (1934: 45) stated,



**Figure 2.** Title page of Artedi’s *Catalogue of the Fishes of the Baltic Sea*. British Library Board, Sloane MS 3870, folio 1. Used with permission.

it is identical with his signature, and his very state of penury forbade the use of scribal assistance. Hence, this is the only known original work by Artedi’s own hand. Nybelin creditably dated the manuscript to the autumn of 1734. Its way from Artedi to the British Library is not known for certain, but a likely

assumption is that Artedi handed it over to Sir Hans Sloane and that it reached the BL as a part of his collection. Nybelin’s hypothesis offers an explanation to the question as to why the *Catalogue* was never printed. Indeed, its fate appears to be highly similar to that of a later manuscript also directed to Sir

Hans Sloane, viz. Jacob Theodor Klein's *Petri Artedi operum brevis recensio* of 1738, published by Pietsch & Aili (2014). This text, too, survives only in a manuscript at the British Library (BL, Sloan, 4020, ff. 194–197).

The manuscript was found in the British Library by the Swedish librarian Johan Markus Hulth (1865–1928) of Uppsala University Library. He is best known for his *Bibliographia Linnaeana* (1907), which was never published in the conventional sense. Hulth copied the manuscript and prepared a printed edition that never proceeded further than to a first galley-proof dating from 1907. The work was then interrupted, only to be resumed a quarter of a century later, by Orvar Nybelin, who also gained access to a photostat copy of the original manuscript in the British Library. This latter source naturally took precedence for the printed edition, but the credit for the excellent state of the Latin text must be given equally to Hulth and Nybelin.

Artedi's handwriting, as will appear from the figures, is spacious and easy to follow, except that the thinness of the paper used, makes the writing shine through from one page to the other side of the same leaf. This sometimes impedes the reading of the text. There are few deletions or corrections by any hand. The only real difficulty is caused by the rather careless formation of the ligature, æ, where the -e is weakly marked (see *Secundum Genus Lampetræ* in Fig. 3, line 9 from the bottom, as compared to *Lampetra* on the following line).

The English translation of the *Catalogue* follows. In addition to Artedi's accounts of fishes and cetaceans, we have included his appended descriptions of Swedish terrestrial mammals, as well as a summary of his 'Principles of Ichthyology' (see below). To each species account, we have added, within brackets and in smaller typeface, information on the currently accepted scientific and common names of the species (following Kullander *et al.*, 2011, 2012).

Peter Artedi of Ångermanland, Sweden  
*Catalogue of the Fishes of the Baltic Sea*  
 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*, third book of *Edyllia*. Bordeaux 1580, in fol.
4. Edward Wotton of Oxford, *De differentiis animalium libri decem*. Paris 1552, in fol.

5. Guillaume Rondelet M.D., *Libri de piscibus marinis*, etc. Lyon 1554, in folio.  
 – the same author's *Universae aquatilium historiae*, second part. Lyon 1555, in folio.
6. Konrad Gesner, Medicus of Zürich, *Historiae animalium liber quartus de piscium natura*. Frankfurt 1604, in folio.
7. Stephanus a Schonevelde, *Ichthyologia et nomenclatura piscium Hamburgensium*, etc. Hamburg 1624, in quarto.
8. Ulysse Aldrovandi, *De piscibus libri V*, etc. Bologna 1638, in folio.
9. Walter Charleton, *Onomasticon Zoicon*, etc. London 1668, in 4°.
10. Francis Willughby, *Historia piscium*, Oxford 1686, fol.
11. John Ray, *Synopsis piscium*, London 1713, 8°.

I. *Osteopterygii* fishes, generally called *Spinosi*.

First genus: *Acus*.

Species 1. *Acus Aristotelis* congener *Pisciculus* (small fish related to Aristotle's *Acus*), by boys in Cornwall called the 'Sea Adder,' i.e., *Vipera marina*. – Willughby p. 160.

*Acus lumbriciformis* seu *Ophidion Lumbriciforme* (*Acus* shaped like an intestinal worm, i.e., *Ophidion lumbriciforme*), Ray *Synopsis* p. 47.

'Hafnål' ['Sea Needle'] in Sweden. Found in abundance in the Baltic Sea.

[*Nerophis lumbriciformis* (Jenyns, 1835), worm pipefish.]

2. *Acus Aristotelis species altera, major* (Aristotle's *Acus*, second species, larger). Willughby p. 159 – Ray p. 46.

'Hafnål' identically in Sweden.

\* The middle body is heptagonal.

[*Syngnathus acus* Linnaeus, 1758, greater pipefish.]

3. *Acus Aristotelis seu Acus secunda species* (Aristotle's *Acus*, i.e., second species of *Acus*). Willughby 158 – Ray p. 46.

\* The middle body appears as hexagonal.

[*Syngnathus typhle* Linnaeus, 1758, broadnosed pipefish.]

Second genus: *Cobitis*.

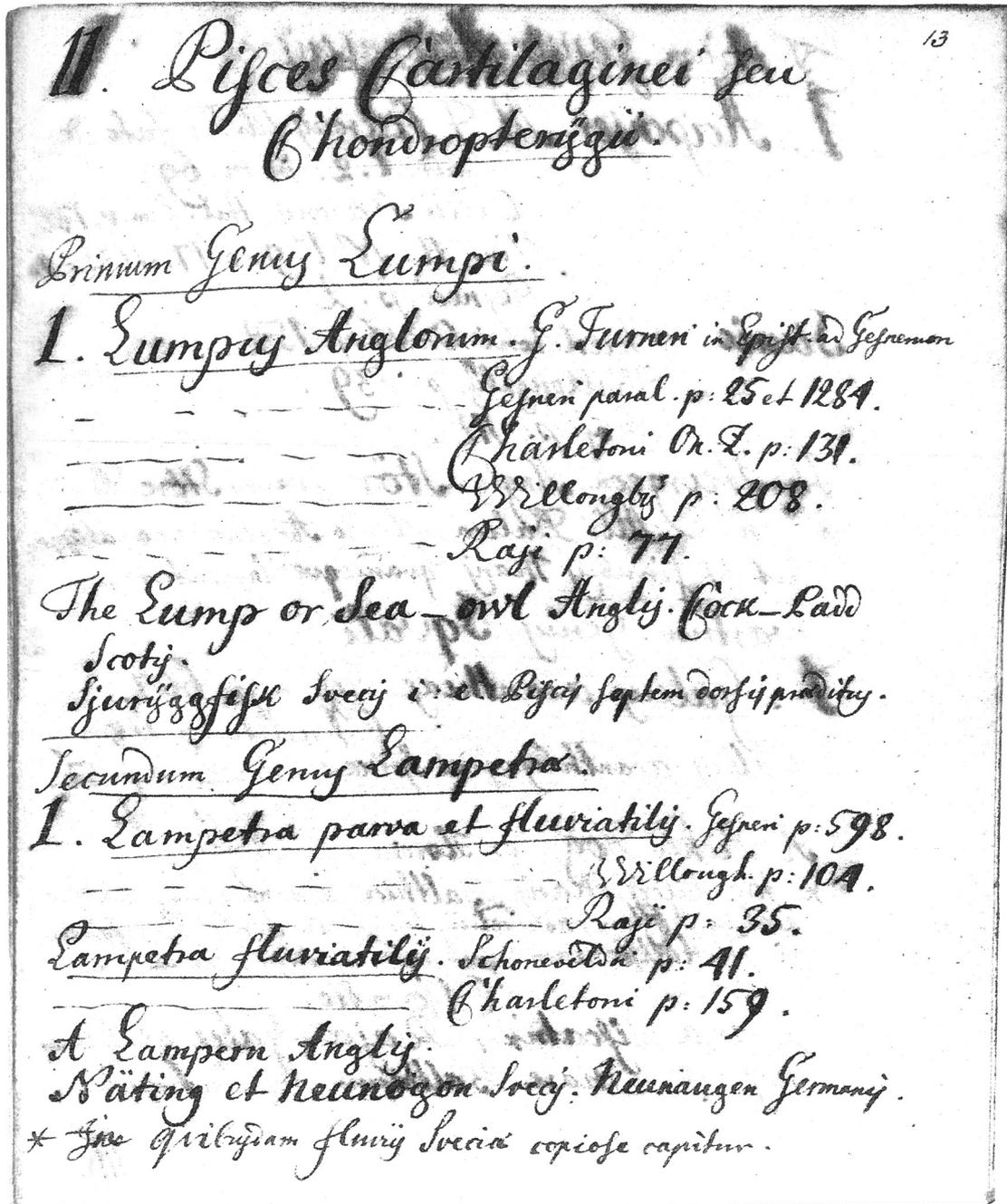
1. *Cobitis barbatula, aculeata* (*Cobitis* with small barbel, thorny). Willughby p. 265

– Ray p. 124.

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

'Tånglake,' so called, near Upsala on Lake Mälaren.

[*Cobitis taenia* Linnaeus, 1758, spined loach.]



**Figure 3.** A page from Artedi's *Catalogue of the Fishes of the Baltic Sea*. British Library Board, Sloane MS 3870, folio 13. Used with permission.

Third genus: *Cyprinus*.

1. *Rutilus sive Rubellus fluviatilis* (*Rutilus*, i.e., River-Rubellus). Gesner p. 820 – Willughby p. 262 – Ray p. 122.  
'A Roche or Roach' in England. 'Mört' in Sweden.  
\* Found in large quantities in almost every Swedish lake.  
[*Rutilus rutilus* (Linnaeus, 1758), roach.]

2. *Rootaug*, i.e., Ἐρυθροφθαλμος [Red-Eye] by its German name, related to *Bramis*. Willughby p. 249 – Ray p. 116.  
'Sarv' or 'Sarf' in Sweden.  
[*Scardinius erythrophthalmus* (Linnaeus, 1758), common rudd.]
3. *Carassius simpliciter dictus, sive Carassii tertium genus* (*Carassius* simply named,

- i.e., third of the genus of *Carassius*). Gesner *Paralipomena*, p. 1275 -- Ray p. 116.  
*Cyprinus latus alius, Gorais Ratisbonae* Willughby p. 249.  
 'Ruda' in Sweden. 'Karass' or 'Karausche' in Germany.  
 [*Carassius carassius* (Linnaeus, 1758), crucian carp.]
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.  
 [*Tinca tinca* (Linnaeus, 1758), tench.]
5. *Rutilus latior vel Rubellio fluviatilis* (*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.' 'Vinderfisch' in Antwerp.  
 [*Leuciscus idus* (Linnaeus, 1758), ide or orfe.]
6. *Cyprinus latus sive Brama* (*Cyprinus*, wide, i.e., 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.  
 [*Abramis brama* (Linnaeus, 1758), common bream or carp bream.]
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.'  
 [*Alburnus alburnus* (Linnaeus, 1758), bleak.]
8. *Cyprinus spithalma minor; ossiculis viginti quinque in Pinna Ani* (*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 the famous Willughby, Ray and others.  
 [*Blicca bjoerkna* (Linnaeus, 1758), white bream.]
9. *Cyprinus iride flava et Pinna Ani ossiculorum triginta septem* (*Cyprinus* with yellow Iris and thirty-seven small bones in the Anal Fin).  
 'Faren' in Sweden. Only found, as far as I know, in Lake Mälaren, primarily in the Manor of Bjelkestad [now Bjelkesta] belonging to Countess [Anna Maria] Soop [1660–1735].  
 Not described by the famous Willughby.  
 [*Abramis ballerus* (Linnaeus, 1758), zope or blue bream.]
10. *Cyprinus spithalmis, oblongus, maxilla superiore paulo longiore* (*Cyprinus*, one palm, oblong, upper maxilla 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.  
 [*Leuciscus leuciscus* (Linnaeus, 1758), common dace.]
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).  
 1. Snout is prominent and Nasiform but differs very much from the Snout 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.  
 [*Vimba vimba* (Linnaeus, 1758), vimba or vimba bream.]
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). 'Asp' in Sweden.  
 Localities: Lake Mälaren in Upland and other places; not known in the more northern regions of Sweden.  
 Not described by the famous Willughby, but appears to be:  
*Capito fluviatilis, rapax* (River-Capito, rapacious), Gesner fol. 169 and 170, German Edition, but owing to defective description no certainty can be established, for Willughby, the chief ichthyologist in describing species, neither saw nor described this fish.  
 [*Leuciscus aspicius* (Linnaeus, 1758), asp.]
13. *Cyprinus Pinna Ani ossiculorum quadraginta* (*Cyprinus* with 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 the most famous Willughby, but appears to be:  
*Ballerus*, Rondelet Part 2, ch. 8, p. 154 -- Schonevelde p. 28.  
 [*Abramis ballerus* (Linnaeus, 1758), zope or blue bream.]
14. *Cyprinus biuncialis, iridibus rubris et Pinna Ani ossiculorum novem* (*Cyprinus*, two inches, with red irises and Anal Fin of nine small bones).

It has various names in different localities in Sweden.

Localities: Bays of the Baltic Sea and harbours; 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 *Aphyra*, although *Aphyra* of the Ancients is an entirely different fish.

#### Observation

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, i.e., 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.

[*Rutilus rutilus* (Linnaeus, 1758), roach.]

#### 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, i.e., 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 fish are in no way 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 number, although, through eight years of observations, I have made the certain experience that these differ in number in all Species of one particular Genus.

[*Clupea harengus* Linnaeus, 1758, Atlantic herring.]

#### Fifth genus: *Albula*.

1. *Albula nobilis*. Gesner p. 33 – – Schonevelde p. 12 – – Willughby p. 185 – – Ray p. 60.

'Sik' in Sweden. 'Snebbel' and 'Helte' in Denmark. 'Snepel' in the Elbe. 'Schelley' in Cumberland, England.

\* Found in large numbers in all of Sweden, in lakes as well as in the Sea.

[*Coregonus oxyrinchus* (Linnaeus, 1758), houting.]

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.

[*Coregonus albula* (Linnaeus, 1758), vendace or European cisco.]

3. *Thymallus*. Aldrovandi bk. 5, ch. 14, p. 594 – – Charleton p. 155 – – Willughby p. 182 – – Ray p. 62. *Thymalus*. Wotton bk. 8, ch. 190, fol. 170a.

'A Grayling' in England. 'Harr' in Sweden. 'Äsch' in Germany.

[*Thymallus thymallus* (Linnaeus, 1758), grayling.]

#### Sixth genus: *Eperlanus*.

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 'Slom' by some.

[*Osmerus eperlanus* (Linnaeus, 1758), smelt or European smelt.]

#### Seventh genus: *Salmo*.

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.

\* The fishing of this fish is copious in almost all of Sweden but chiefly in the Gulf of Bothnia.

[*Salmo salar* Linnaeus, 1758, Atlantic salmon.]

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.

[*Salmo trutta* Linnaeus, 1758, brown trout.]

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.

[*Salmo trutta* Linnaeus, 1758, brown trout.]

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.

[*Salmo trutta* Linnaeus, 1758, brown trout.]

Eighth genus: *Lucius*.

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. 'Snook' in Holland. 'Brochet' in France.  
\* Found in all lakes and rivers in Sweden. [*Esox lucius* Linnaeus, 1758, pike or northern pike.]
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. It is also found but much more rarely in the more southern part of the Baltic Sea that flows near to Sweden. In the Bay of Bothnia, it is almost unknown.

[*Belone belone* (Linnaeus, 1760), garfish or garpike.]

Ninth genus: *Rhombus*.

1. *Passer* Gesner p. 664 and 670 – Willughby p. 96 – Ray p. 31. *Passer laevis* Aldrovandi bk. 2, p. 243. 'A Plaise' in England. 'Schickpleder' in Denmark. 'Flundra' in Sweden in general but among others 'Risbätten.'  
[*Pleuronectes platessa* Linnaeus, 1758, European plaice.]
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. [*Platichthys flesus* (Linnaeus, 1758), European flounder.]

Tenth genus: *Scomber*.

1. *Scomber*, Ovidius Naso, Poem *Halieutica* verse 94 – Gesner p. 841 and 1012 – Willughby p. 181 – Ray p. 58. 'The Mackrell' in England. 'Makrill' in Sweden.

Observation

It is caught in the Danish Sound, i.e., Öresund, by the Isle of Bornholm and other locations of the more southerly Baltic Sea, in the summer, along

with the Herrings, but it is unknown in the more northern part of the Baltic Sea and the Bay of Bothnia.

[*Scomber scombrus* Linnaeus, 1758, Atlantic mackerel.]

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.; it is unknown everywhere else in the entire Baltic Sea.

[*Trachurus trachurus* (Linnaeus, 1758), Atlantic horse mackerel or scad.]

3. *Thunnus seu Thynnus* Gesner p. 957 – Willughby p. 176 – Ray p. 57. *Thunnus* Charleton p. 174.

Observation

This fish is a guest in the Baltic Sea, and is, properly speaking, not to be found, but according to an observation by Cl. 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.

[*Thunnus thynnus* (Linnaeus, 1758), Atlantic bluefin tuna.]

Eleventh genus: *Xiphias*.

1. *Xiphias* Ovidius Naso, verse 97 – Plinius *Historia Naturalis* bk. 32, ch. 2 and 11 – Wotton bk. 8, ch. 189, fol. 167b – Charleton p. 124. *Xiphias piscis*, *Latinus Gladius* Willughby p. 161 – Ray p. 52. 'The Sword-fish' in England. 'Svärdfisk' 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[er]. Christ[oph]. Schelhamerus [1649–1716], Professor of Medicine at the Academy of Kiel, described and depicted it in a unique treatise [see [Schelhammer, 1707](#)].

[*Xiphias gladius* Linnaeus, 1758, swordfish.]

Twelfth genus: *Perca*.

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.  
[*Perca fluviatilis* Linnaeus, 1758, European perch.]
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 the most famous Willughby.  
[*Sander lucioperca* (Linnaeus, 1758), zander.]
3. *Cernua fluviatilis* Gesner p. 191, 192 – – Willughby p. 334 – – Ray p. 144.  
*Cernua fluviatilis, alias Perca minor* Charleton p. 158.  
'A Ruffe' or, more correctly, 'Rough' in England. – – 'Gjers' in Sweden. 'Kaulbarss,' 'Stuerbarss' and 'Stuer' in Germany.  
[*Gymnocephalus cernua* (Linnaeus, 1758), Eurasian ruffe.]

Thirteenth genus: *Trachinus*.

1. *Draco marinus* Wotton bk. 8, ch. 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.

## Observation

This fish does not penetrate far into the Baltic Sea but is found only in its more southerly regions by the Danish Sound.  
[*Trachinus draco* Linnaeus 1758, greater weever.]

Fourteenth genus: *Mullus*.

1. *Mullus* Ovidius Naso, verse 123 – – Wotton bk. 8, ch. 169, fol. 151b – – Schonevelde p. 47 – – Willughby p. 285 – – Ray p. 90.  
\* This fish is unknown in the Baltic Sea as a whole, 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, however, it is called 'Schmerbüttén' and 'Baguntken' according to an observation by Cl. Schonevelde.

[*Mullus barbatus* Linnaeus, 1758, red mullet.]

Fifteenth genus: *Gasterosteus*.

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 stings on its back.  
[*Gasterosteus aculeatus* Linnaeus, 1758, three-spined stickleback.]
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 stings on its back.

## Observation

*Mugil, Lupus marinus* i.e. *Labrax, Sudis* i.e. *Sphyraena, Sparus, Salpa, Turdus, Faber* i.e. *Zeus, Cuculus* and *Lyra, Scorpaena, Umbra, Glaucus* and *Amia* of the Authors, do not enter the Baltic Sea.  
[*Pungitius pungitius* (Linnaeus, 1758), ninespine stickleback.]

Sixteenth genus: *Cottus*.

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.  
[*Cottus gobio* Linnaeus, 1758, European bullhead.]
2. *Scorpaena* Belon p. 201 [242, 244], Edit. Gall. *similis*, Willughby p. 138 – – Ray p. 145.  
'Father-Lasher' in Cornwall. In Sweden it has different names in different localities.  
[*Myoxocephalus scorpius* (Linnaeus, 1758), shorthorn sculpin.]
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).  
'Simpa' in Swedish.  
It is well known on those shores of the Baltic that wash Sweden, chiefly in the autumn season.

\* This fish has as yet not been described, either by the famous Willughby or by any other Ichthyologist.  
[*Myoxocephalus quadricornis* (Linnaeus, 1758), fourhorn sculpin.]

Seventeenth genus: *Gadus*.

1. *Asellus varius vel striatus* Schonevelde p. 19 – Willughby p. 172 – Ray p. 54.

'Små Tårsk' in Sweden.

This fish is quite common in the Baltic Sea, chiefly in its more southerly parts.

[*Gadus morhua* Linnaeus, 1758, Atlantic cod.]

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.

[*Merlangius merlangus* (Linnaeus, 1758), whiting or merling.]

3. *Callarias, Galerida, et Galaxia, piscis capitosus* Charleton *Onomasticon Zoicon* p. 18.

*Asellus minor* Schonevelde p. 18.

*Onos sive Asinus antiquorum* [William] Turner [1508–1568] in a Letter to Gesner [1604] – Ray p. 55.

'The Hadock' in England. 'Källja' and 'Källjor' in Sweden. 'Koll' in Denmark.

\* Localities: It is only found in the more southerly part of the Baltic Sea by Denmark, Holstein, etc., it is unknown elsewhere in the entire Baltic Sea.

In the Bay of Kiel it is called 'Wijdtogen.'

[*Melanogrammus aeglefinus* (Linnaeus, 1758), haddock.]

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.

[*Lota lota* (Linnaeus, 1758), burbot.]

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 of the 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.'

[*Ciliata mustela* (Linnaeus, 1758), fivebeard rockling.]

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.

[*Zoarces viviparus* (Linnaeus, 1758), viviparous eelpout or European eelpout.]

Eighteenth genus: *Silurus*.

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 famous Willughby. '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*.

[*Silurus glanis* Linnaeus, 1758, sheatfish or wels catfish.]

Nineteenth genus: *Conger*, i.e., *Anguilla*.

1. *Anguilla*, Plinius *Historia naturalis* bk. 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.

[*Anguilla anguilla* (Linnaeus, 1758), European eel.]

II. Cartilaginous, i.e., Chondropteryginous Fishes.

First genus: *Lumpus*.

1. *Lumpus Anglorum* G[uillaume, i.e., William] Turner in a Letter to Gesner [1604] – 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. 'Sjurryggfisk' in Sweden, i.e., a fish furnished with seven [knobby ridges on its] back.

[*Cyclopterus lumpus* Linnaeus, 1758, lump sucker or lumpfish.]

Second genus: *Lampetra*.

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. [*Lampetra fluviatilis* (Linnaeus, 1758), European river lamprey.]

Third genus: *Acipenser*.

1. *Acipenser*. M. T. Cicero, *De Fato, De Finibus* bk. 2, p.m. 69 – – Ovidius Naso poem *Halieutica* verse 132 – – Plinius *Historia Naturalis* bk. 9, ch. 17, and bk. 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, Ångermanälven, and in other rivers as well as in bays of the Sea.  
[*Acipenser oxyrinchus* Mitchill, 1815, Atlantic sturgeon.]

Fourth genus: *Squalus*.

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 guest 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.

[*Squalus acanthias* Linnaeus, 1758, spiny dogfish.]  
III. *Plagiurus*, or generally *Cetaceous* fishes.

One genus only: *Delphinus*.

1. *Phocaena* Wotton bk. 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 is only rarely caught.  
[*Phocoena phocoena* (Linnaeus, 1758), harbour porpoise.]

The Number of unique Fishes, i.e., 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 another, unknown to me, may be found in the Baltic Sea, but during eight years of study in various localities I have not been able to observe more than these.

## Appendix

Containing some Four-Legged Animals and Amphibians of Sweden

1. *Fiber*. Gesner, German Edition fol. 21, 22.  
*Castor*. Charleton *Onomasticon Zoicon* p. 17.  
*Castor sive Fiber*. Ray [1693] *Synopsis Quadrupedum* p. 209.  
'The Beaver' in England. 'Bäwer' in Sweden.  
\* Not found in the more southerly part of Sweden, as in Scania, etc., but in the more northerly parts, as in Medelpad, Ångermanland, and chiefly Västerbotten, it is found most abundantly. In Sweden the main food of these Animals is the bark of *Populus tremula* [European aspen] C. B. P. [a reference to the *Pinax* of Swiss botanist Caspar Bauhin (1560–1624), published in several editions, 1596, 1620, 1623] 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*, i.e., the smell-producing follicles of these Animals, merchants of Västerbotten make no mean profit in Stockholm.  
[*Castor fiber* Linnaeus, 1758, Eurasian beaver or European beaver.]
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.  
[*Lutra lutra* (Linnaeus, 1758), Eurasian otter or European otter.]  
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3. *Phoca quadricubitalis, cana* (*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 newborn bull-calf.
4. It very often kills the offspring of the next species of Seal 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 hairier 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.

[*Phoca vitulina* Linnaeus, 1758, common seal or harbour seal.]

4. *Phoca tricubitalis, pilis brevibus, nigrescentibus* (Phoca, three cubits, with short blackish hair).

'Wikare' and 'Wikare-Själ' in Sweden.

1. This Species never reaches the same size as the preceding one 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 with us this very often occurs on ice.

With its very hot breath it makes holes in the ice, breathing its hot breath 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. 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, some fishermen of Österbotten and Åbo enumerate four or five others, the name of which being

1. 'Swin-själ,' i.e., *Phoca porcina* (Pig-Seal)

2. 'Brok-själ,' i.e., *Phoca versicolor* (Party-Coloured Seal)

3. 'Små-själ,' i.e., *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.

[*Phoca vitulina* Linnaeus, 1758, common seal or harbour seal.]

### Petrus Artedi, *Principles of Ichthyology*

in which are contained

Beside the Literary History of Ichthyologists and the *Prolegomena*, the Natural Method of Fishes: the Natural Genera of Fishes with their Characters; the Distinct Species of the Genera; New Names of Species; Synonyms of Species gathered from almost all Authorities and, finally, Descriptions of each Species.

#### Explanation of the Titles

1. In *Historia literaria Ichthyologorum* (The Literary History of Ichthyologists), I reviewed in an analytical fashion the main writings and fates, from the oldest times, of the Ichthyologists, in order that my benevolent Reader should have the entire Title of every single book, its number of Sheets, its Divisions, and a short overview of the entire work.

2. In the *Prolegomena*, I first described all parts of Fishes and their differences according to their numbers, shapes, and proportions.

Second, I discussed the Classes or rather the Natural Orders of Fishes.

Third, I treated of the distinct, that is, natural Genera of Fishes, where at the same time I demonstrated from which parts of fishes the genuine Characters of the Genera should be assumed.

Fourth, I examined the very names of the Genera and demonstrated that these should mainly be of Latin origins, etc.

Fifth, finally, I treated of the Species of the Genera and so-called Varieties of the Species, where I made public which Names of Species are spurious and which are genuine, and, finally, from which parts the Characters of the Species, that is, the genuine differences between the Species, should be assumed.

3. 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.

4. Third, I subjected to each single Species, that is, to each Specific Name, all their proper Synonyms that I could find among the Authorities of Ichthyology, something that robbed me of very much time that I spent in reading through so many Authors and comparing their descriptions.
5. Fourth, I diligently described the single Species according to all their parts, and their descriptions, that is, the Science of Fishes, I divided into numbered sections, in order that everything should be clearer and easier to read.

#### SOURCES OF ARTEDI'S KNOWLEDGE OF BALTIC FISHES

All 58 species accounts of fishes and cetaceans (as well as the appended accounts of the four terrestrial mammals) included in the *Catalogue* are accompanied by one or more citations. It, therefore, seems obvious that Artedi made a concerted effort to identify his fishes using the published literature available to him. In doing so, he relied on 12 publications – as listed on the opening page of the *Catalogue* – by naturalists that he considered 'primary' and that provide accounts of fishes of northern European waters. Three of these are works of antiquity by the Roman authors Ovid, Pliny and Ausonius, each first available in published form in 1471, 1499 and 1580, respectively. Three others, those of Wotton and Rondelet, were books published in the mid-16<sup>th</sup> century. Five were 17<sup>th</sup>-century publications spanning the years 1604 to 1686 – books that in Artedi's time were already 50 years old. Only John Ray's *Synopsis methodica piscium* of 1713 was relatively current, the point being that little contemporary information was available to Artedi, emphasizing once again that he was a solitary worker without the benefit of adequate reference material.

#### PUBLIUS OVIDIUS NASO

Publius Ovidius Naso, better known in the English-speaking world as Ovid, was a Roman poet who lived during the reign of Augustus. He was born in Sulmo, Italy, Roman Republic, on 20 March 43 BC and died in exile, in Tomis, Scythia Minor, modern-day Constanța, Romania, on the Black Sea coast of the Roman Empire, in AD 17 or 18. He was a contemporary of Virgil (70–19 BC) and Horace (65–8 BC), with whom he is often ranked as one of the three canonical poets of Latin literature. Although he is best known today for his *Metamorphoses*, a 15-book retelling of Greek and

Roman legends and myths, arranged chronologically from the creation of the world to the deification of Julius Caesar, it is his *Halieutica* ('On Fishing') that is of interest here (Baehrens, 1879–83; Richmond, 1962). A fragmentary didactic poem, attributed to Ovid by Pliny the Elder, but often dismissed as spurious, preserved in 132 hexameter lines (some defective), the poem began by describing how every animal possesses the ability to protect itself and how fishes use artifice to help themselves. The poem went on to list the places best for fishing, and which types of fish to catch. It named 53 fishes in all and provided interesting details on the habits of some of them (Cuvier, 1828: 30–31; 1995: 28). Artedi cited Ovid four times.

#### GAIUS PLINIUS SECUNDUS

Gaius Plinius Secundus, better known as Pliny the Elder, was a Roman naturalist, natural philosopher, and naval and army commander of the early Roman Empire, born in Verona in AD 23 and famously died in AD 79 during the eruption of Mount Vesuvius. He is author of *Naturalis Historia*, the only work of Pliny that has survived. It is divided into 37 books, covering a wide range of topics, including astronomy, mathematics, geography, ethnography, anthropology, human physiology, zoology, botany, agriculture, horticulture, pharmacology, mining, mineralogy, sculpture, painting, and precious stones. Book 9 is especially devoted to fishes and their natural history and in Book 13, chapter 11, Pliny provided a list of names of aquatic animals that amounts to 174; but after excluding mollusks, cetaceans and other animals that are not true fishes, the number comes to only 95 or 96, among which there may still be some duplication (Cuvier, 1828: 31; 1995: 28). Although the *Naturalis Historia* was first printed in Venice in 1469, Artedi cited the 1668 Leiden and Rotterdam edition (Pliny, 1668; see also Rackham, 1984). He mentioned Pliny only three times.

#### DECIMUS MAGNUS AUSONIUS

Decimus or Decimius Magnus Ausonius was a Roman poet and teacher of rhetoric from Burdigala in Aquitaine, modern-day Bordeaux, France. His dates of birth and death are roughly AD 310 and 394. For a time, he served as tutor to the future emperor Gratian (AD 359–383, reigned AD 367–375), who later, among other honorary titles, made him Praetorian Prefect of Gaul (AD 378). Among Ausonius's numerous works in verse and prose, *Mosella*, a panegyric on the river Moselle, is of interest here (Sivan, 1993; Shanzer, 1998). It is unique for its time in that Ausonius described the fishes of the Moselle not as a compiler, but from his own observations made during a journey from Bingen

to Trier, and he described them not only as a poet, but also as a naturalist (Cuvier, 1828: 38–39; 1995: 31). He named 14 species, all recognizable from what he wrote about them, including a number of species mentioned for the first time. The first edition appeared in Venice in 1472, but Artedi consulted the version published at Bordeaux in 1580 (Ausonius, 1580) and cited Ausonius five times.

#### EDWARD WOTTON

Edward Wotton was an English physician and naturalist, born in Oxford in 1492 and died on 5 October 1555. He is often credited with founding the modern study of zoology, by separating out much of the fanciful and folkloric additions that had been added over time to the body of zoological knowledge. Although he was responsible in part for *Insectorum, sive, Minimorum animalium theatrum* ('Theatre of Insects'), edited by Thomas Muffet (1553–1604) and published posthumously in 1634, Wotton's body of work was brought together in *De differentiis animalium libri decem*, published in Paris in 1552 (Wotton, 1552). According to Cuvier, Wotton borrowed nearly everything from the ancients and although 'he put things in order and wrote in a uniform style, he failed to cite his sources, or does so only here and there; his Book 8 is on fishes, but it seems to contain nothing new' (Cuvier, 1828: 48; 1995: 42). In the *Catalogue*, Artedi mentioned Wotton seven times.

#### GUILLAUME RONDELET

Guillaume Rondelet, the son of a pharmacist, born at Montpellier in 1507, was named professor in that town in 1545. He travelled with Cardinal François de Tournon (1490–1568) in France, Italy and the Netherlands, but returned to Montpellier in 1551 and died there in 1566 (Gudger, 1934: 28–30; Oppenheimer, 1936: 817; Cole, 1949: 62–72). He is author of two major works on fishes, both listed as sources by Artedi: *Libri de piscibus marinis* (1554) and *Universae aquatilium historiae* (1555), produced with the assistance of Guillaume Pellicier (1490–1568), Bishop of Montpellier. Nearly always bound together in the same volume, but bearing no title common to both, these two works are generally considered to be parts one and two of the same publication. Both were produced in folio at Lyon by Matthias Bonhomme. *Libri de piscibus marinis* is divided into 18 books: the first four treat generalities; the fifth through the 15<sup>th</sup> describe the different kinds of fishes; the 16<sup>th</sup> deals with cetaceans, turtles and seals; the 17<sup>th</sup>, molluscs; and the 18<sup>th</sup>, crustaceans. The second part, *Universae aquatilium historiae*, comprises two books on testaceous species, one book on worms (vers) and zoophytes, three books on freshwater fishes

and one on amphibians. There is an abridged French translation of this two-part work, published at Lyon, in 1558, in quarto, under the common title *L'Histoire entière des poissons*. Together, the two parts contain 197 accounts and drawings of marine fishes and 47 of fresh water, not counting cetaceans, reptiles and mollusks. According to Cuvier (1828: 51–52; 1995: 43):

Rondelet is superior to the other two [Renaissance] authors [Belon and Salviani] in the number of fishes he knew, and even though his drawings, which are wood engravings, do not compare with Salviani's for beauty, they have greater accuracy, and are especially remarkable for their characteristic details. . . . He also often provided observations on their anatomy, which we have been able to verify. Without exactly having a method in the accepted sense of the word today, it can be seen that he had a true sense of genera; he grouped several species with fair accuracy . . . in such a way that Willughby, and Artedi and Linnaeus after him, had little difficulty in making true genera of them.

The *Catalogue* contains nine references to Rondelet, two to *Libri de piscibus marinis* and seven to *Universae aquatilium historiae*.

#### CONRAD GESSNER

Conrad Gessner, the most knowledgeable naturalist of the 16<sup>th</sup> century (Cuvier, 1828: 53; 1995: 50–51), was born in Zurich in 1516 and died there in 1565. Although he published several dozen books on virtually all aspects of human knowledge, his fame as an early naturalist rests primarily on his monumental *Historiae animalium* (1551–87), printed in Zurich in five books in folio, but usually bound in three separate volumes (Gessner, 1551–87). According to Adler (1989: 7), Gessner's *Historiae animalium*:

. . . laid the foundation for standardization of scientific terminology by listing the equivalent names of animals in a dozen languages. Gessner combed the classical and medieval literature for information, added his own observations and those of correspondents, and then organized the whole in a very precise manner: synonymy, distribution, physical characteristics, and habits, use as food and medicine, etc. By adding numerous woodcuts, he produced the first illustrated work covering the entire animal kingdom, the influence of which was to continue for two centuries through numerous reprintings and translations.

The fourth and largest of the books of *Historiae animalium*, 'De piscium et aquatilium animantium natura,' first appeared in 1558. It contains more than

700 illustrations, but this number includes cetaceans, mollusks and in general everything that lives in water. There is no attempt at classification; everything is in alphabetical order. Nevertheless, during the rest of the 16<sup>th</sup> and 17<sup>th</sup> centuries, and even part of the 18<sup>th</sup> century, Gessner was the chief authority on all vertebrate animals (Gudger, 1934: 32–36; Allen, 1951: 402–403; Wellisch, 1975: 151; Adler, 1989: 7–8).

One of the most important of Artedi's sources, he references '*De piscium et aquatiliu[m] animantium natura*' 28 times, citing the second edition of this work, which was produced at Frankfurt in 1604 (Gessner, 1604).

#### STEPHAN VON SCHONEVELDE

Stephan von Schonevelde, whose date and place of birth are unknown, was the son of a physician and surgeon of the same name, who, following his father's profession, maintained a thriving practice in Hamburg. Producing good results, he soon gained a reputation as a skilled physician (Beneke, 1891: 286; Kuhlmann, 1994: 354–355). In 1603, Johann Adolf (1575–1616), Duke of Schleswig-Holstein-Gottorf (1590–1616), appointed him personal physician and charged him with studying the fishes of the region. Returning to Hamburg after the death of the Duke, Schonevelde continued his studies, frequenting the Hamburg fish markets and preparing the manuscript for his *Ichthyologia et nomenclatura animalium marinarum, fluviatiliu[m], lacustriu[m]*, which resulted in a small book, consisting of only 87 pages and seven engraved plates, first published at Hamburg in 1624 (Schonevelde, 1624). Schonevelde worked partly with already existing sources, but also contributed several original descriptions. He even removed the cetaceans from the fishes and allied them with the mammals, predating the 'official' realignment by Linnaeus by 132 years (credit for first including cetaceans among the mammals is generally given to Linnaeus who made the claim in the ninth edition of his *Systema natura*, published in 1756; see Romero, 2012: 23; DeCou, 2018: 29). Altogether he described a total of 425 species of aquatic animals. Schonevelde died on 11 March 1632. Making good use of Schonevelde's work in the *Catalogue*, Artedi cited him 12 times.

#### ULYSSE ALDROVANDI

Ulysse Aldrovandi, an Italian naturalist, born in Bologna on 11 September 1522 of a noble family that still survives, spent his life and fortune in assembling the materials for his great natural history, in 13 folio volumes published in Bologna between 1599 and 1688. Only four volumes were published during his lifetime, namely, three on birds (1599–1603) and one on insects

(1602). He died in Bologna on 4 May 1605, at the age of 83. The volume on fishes and cetaceans, *De piscibus libri V, et de cetis liber unus* (Aldrovandi, 1638), drawn up in part from his notes by his successor at Bologna, Johannes Cornelius Uterverius (1592–1619), was not published until 1613, but it was reprinted at Frankfurt in 1623, 1629 and 1640, and at Bologna in 1638 and 1644 (see: Gudger, 1934: 36–38; Allen, 1951: 403–405). Cuvier (1828: 51–52; 1995: 43) described the work as 'hardly anything more than an abridgement of the work of Gessner', the author and his editor 'reducing it to their own plan, and adding to the illustrations they took from it, a certain number of new ones, among which are, in fact, several made after nature that still have some value, although roughly engraved in wood. Most of the species came from Italian seas, but there are also some from distant countries that were becoming better known.' Artedi consulted the 1638 Bologna edition of *De piscibus*, citing it only three times.

#### WALTER CHARLETON

Walter Charleton, was a natural philosopher and prolific author of works on theology, medicine, natural history and antiquities. He was born in Shepton Mallett in the Mendip District of Somerset, England, on 2 February 1619. He received his early education from his father, and when 16 entered Magdalen Hall, Oxford. At the early age of 22, he received the degree of M.D. and in the same year (1641) was appointed physician to Charles I, who was then at Oxford. In 1650, Charleton settled in London, where, while maintaining a successful medical practice, he turned his attention to writing and publishing. In 1663, he became one of the first elected fellows of the Royal Society. In 1676 he was made a fellow of the Royal College of Physicians and served as its president in 1689 and 1691, but soon thereafter his fortunes declined and he died destitute in London on 24 April 1707 (Moore, 1887: 116–119; Cousin, 1910: 80; Booth, 2005).

Charleton published two books dealing with animal classification: *Onomasticon zoicon* (1668) and *Exercitationes de Differentiis & Nominibus Animalium* (1677), works that listed the names of all known animals (including some fossils) in the western world in several languages, with remarks about habits and habitats, as well as some anatomical descriptions based on dissections. His work showed him to be more of a compiler than an innovator. His major contribution to science was the discovery that tadpoles turn into frogs. Artedi cited Charleton's *Onomasticon zoicon* 29 times.

#### FRANCIS WILLUGHBY

Francis Willughby was an English naturalist, born of an ancient lineage (the several branches of which

have had, or still have, peerages) at Middleton Hall, Warwickshire, on 22 November 1635. He studied at Bishop Vesey's Grammar School in Sutton Coldfield and later, in 1652, at Trinity College, Cambridge, where he was tutored by the mathematician and naturalist John Ray, who became a lifetime friend and colleague (Allen, 1951: 417–426; Welch, 1972; Raven, 1986). He completed the requirements for his bachelor's degree in January 1656, and a master's degree in July 1660. In 1661, then aged 27, he was elected a Fellow of the Royal Society. Having worked together on several projects at Trinity, the two continued to collaborate, travelling within Britain and abroad in the mid-1660s, making observations and large collections of plants and animals, and planning to publish books that would initiate a new approach to natural history, uncluttered by anecdote and hearsay. They started with birds and planned to continue with insects and fishes but progress was curtailed by Willughby's untimely death on 3 July 1672, at the age 36. However, Ray managed to complete the work on birds, published first in Latin in 1676, and then in English in 1678, under the title *The Ornithology of Francis Willughby* by John Ray. The work on fishes followed in 1686, titled *De historia piscium libri quatuor*, with engraving expenses met by the members of the Royal Society of London (see Kusukawa, 2000). Although the book bears only Willughby's name on the title page, it was by all accounts a joint effort. Praising the work as a 'happy epoch in the history of ichthyology,' Cuvier (1828: 79; 1995: 73), wrote further:

Willughby and Ray had the honor of being the first to write an ichthyology in which the fishes were clearly described according to nature, and classified based on characteristics drawn only from their structure, and in which their natural history was finally rid of all passages from ancient writings – accounts repeated so arbitrarily about the various species by authors in the sixteenth century, so many of which are patently unlikely or unintelligible.

The authors assembled not only the species they observed and described from nature, but also those of preceding authors, whose descriptions they intercalated with their own. Amounting to a total of 420, the species are arranged by families within classes, based first on the cartilaginous or bony nature of the skeleton, and then on the general shape, the teeth, the presence or absence of pelvic fins, the type of fin rays, soft or spiny, and finally the number of dorsal fins. Following the text, is an appendix titled *Ichthyographia*, composed entirely of plates, presenting copies of almost all the illustrations of their predecessors, Salviani, Rondelet, Marcgrave, Clusius, Nieuhof and other ichthyologists. As one of Artedi's most significant sources, Willughby's

work was referenced 50 times, second in importance only to Ray's *Synopsis*.

#### JOHN RAY

John Ray, an influential philosopher and theologian, and one of the most eminent naturalists of his time, was born in the village of Black Notley, Essex, England, on 29 November 1627. Entering Cambridge University in 1644, he rapidly became expert in languages, mathematics and the natural sciences. He became a Fellow in 1649, a Lecturer in 1651 and a Junior Dean in 1658. In 1660 he was ordained a priest in the Anglican Church. Between 1660 and 1671 he travelled throughout England, and made at least one visit to Europe, to collect plants, animals and minerals. His work received so much renown that he was inducted into the newly formed Royal Society of London, one of the first scientific societies in the world, in 1667. Poor health eventually restricted his travels, and he spent the last decades of his life corresponding with the leading scientists of his time and publishing books on languages, theology and natural history. He died at Black Notley on 17 January 1705 (Allen, 1951: 417–426; Baldwin, 1986; Raven, 1986).

In addition to his collaboration with Francis Willughby, described above, Ray produced *Synopsis methodica avium & piscium*, a two-part work, generally bound together in a single volume, published posthumously in London in 1713. Despite Cuvier's assessment that it is 'scarcely more than an abridgment of the *Ichthyographia*', the *Synopsis* was Artedi's most important source, cited in the *Catalogue* 54 times

#### TERRESTRIAL MAMMALS

In addition to his accounts of fishes and cetaceans, Artedi appended descriptions of four terrestrial mammals, the Eurasian or European beaver (*Castor fiber* Linnaeus, 1758), the Eurasian or European otter (*Lutra lutra* Linnaeus, 1758) and what he considered to be two kinds of seals (both probably the common or harbour seal, *Phoca vitulina* Linnaeus, 1758), which he grouped under the subheading 'Four-Legged Animals and Amphibians of Sweden'. The information about each taxon appears to have been taken in part and in abbreviated form from Artedi's earlier work on mammals, as presented in his *Idea institutionum trichozoologiae* (see Nybelin, 1934: 66, 69, 77). In content and format, the accounts are similar to those of the fishes and cetaceans; each is variously provided with Latinized names, English and Swedish vernaculars, and relevant citations to the publications of Gessner, Charleton and Ray. But unlike those of

the fishes and cetaceans, Artedi's comments go well beyond the latter in providing interesting behavioural and ecological information that is, by all indications, based on first-hand observations, rather than taken indiscriminately from the published literature. It is more than likely that Artedi made these observations in his early youth, when rambling about in the woodlands of Ångermanland. In and around Uppsala, the wildlife was relatively sparse and distant, even in Artedi's time. It is rather doubtful there were any beavers or otters in the Fyrisån (a river in the Swedish province of Uppland, which passes through the city of Uppsala and drains into Lake Mälaren), but seals were probably to be seen in the neighbourhood, because the town then stood on the edge of a bay of the Baltic Sea.

About the beaver, Artedi said he had 'very often seen quite thick trunks of [the European aspen, *Populus tremula* L.] cut off by beavers and dragged from land into a river, and it thereafter feeds off their bark' – he was seemingly unaware of their habit of building dams and freely admitted that he does not know how they build their nests. As for the otter, we are told that it feeds primarily on fishes. For the seals, Artedi provided information on coloration, size, reproduction (time of the year, fecundity, infanticide), herding behaviour, sound production, aggression and dispersal, but he lapses into disbelief when he stated they use their 'very hot breath' to melt ice, and described something incomprehensible about producing light. But, for the most part, in this brief narrative, Artedi demonstrated an unusual curiosity and a reliance on what he had witnessed for himself, rather than what others have reported in the past.

#### ARTEDI'S 'PRINCIPLES OF ICHTHYOLOGY'

Artedi ends the *Catalogue* with an explanation of the methods that he used in his nearly completed study of fishes – the work then in manuscript, interrupted by his untimely death and later brought to publication by Linnaeus in 1738 as the *Ichthyologia*. At first thought, the 'Principles' seems out of place, attached to a list of Baltic fishes, but if it is recognized that the *Catalogue* as a whole was intended to demonstrate Artedi's competence to Sir Hans Sloan, it then reads like a bit of self-advertising, announcing his forthcoming publication to a potential benefactor – the kind of blurb that is printed on the back cover of a new book. However, the 'Principles' as presented here are important, because they represent the first time that Artedi wrote about his methods, which we can assume constituted his approach to systematic work in general, not just to fishes. The only known, earlier hint of Artedi's concern for 'methods' is found in 'Nordmalings Flora' (dated 27 February 1729,

just before his first meeting with Linnaeus in late March 1729; described above) in which he writes as follows (translated from the Swedish as presented by Lundgren & Fries, 1985: 24):

The best way to learn plants is through demonstration by an experienced Botanist; but since memory is fickle and weak, the most recent Methodical Botanists have been compelled to put all plants into certain Classes and Divisions, so that anyone who understands the technical terms in the Lore of Plants [*Termini artis Botanicae*], once he has come to know some Plants, will be able to refer all unknown Plants to their proper Class and Division. That each and every Plant bears the Name of an Author is for greater certainty and clarity, as otherwise there would be a terrible confusion within Botany. The Plants thus bear the name, either of him who first made a correct cut or copperplate, or else of him who gave a certain Plant, a Bush, or a Tree such a specific name that will express its shape or qualities; to make a drawing of those Plants that have many species would be impossible.

#### METHODUS DEMONSTRANDI ANIMALIA, VEGETABILIA, AUT LAPIDES

On the whole, Artedi's approach is paralleled by that of *Methodus demonstrandi animalia, vegetabilia, aut lapides* ('Demonstration of the methods to be applied to animals, plants and minerals') – the rules to follow in preparing descriptions of natural objects. Originally titled *Methodus juxta quam physiologus accurate et feliciter concinnare potest historiam cujuscunque naturalis subjecti, sequentibus hisce paragraphis comprehensa* (1736), this single-page publication is usually, but not always, bound in with the first edition of the *Systema naturae* (1735). With a shortened title, *Methodus demonstrandi animalia, vegetabilia, aut lapides*, and slight modifications of the text, it appears at the back of all subsequent editions of the *Systema naturae* up through the ninth (1756), after which it was dropped, probably having become by this time sufficiently well known (Schmidt, 1952: 369)

The *Methodus* was likely formulated jointly by Artedi and Linnaeus during the early days spent together in Uppsala (1729–34), but published alone by Linnaeus in 1736 (Fig. 4). But the methods were first applied by Artedi in the manuscript of the *Ichthyologia*, as revealed by the *Catalogue* – prepared in the early autumn of 1734, while Artedi was in London and Linnaeus was still in Uppsala, well before the two friends met again on 8 July 1735 in Leiden – in which Artedi spoke confidently about the contents of his forthcoming

# CAROLI LINNÆI, SVECICI, METHODUS

Juxta quam Physiologus accurate & feliciter concinnare potest  
Historiam cujuscunque Naturalis Subjecti, sequentibus  
hinc Paragraphis comprehensa.

## I. NOMINA.

1. *Nomen Selectum*, genericum & specificum Authoris cujusdam, si quod tale, vel proprium.
2. *Synonyma* Systematicorum primariorum omnia.
3. . . . Authorum, si possit, omnium Veterum & Recentiorum.
4. . . . Nomen vernaculum, latino etiam idiomate translatum.
5. . . . Gentium variarum nomina: Græca præcipue.
6. *Etymologia* Nominum genericorum omnium (1-5).

## II. THEORIA.

7. *Classes & Ordines* secundum Systemata selecta omnia.
8. *Genera* ad quæ, à variis & diversis Systematicis (7) relatum fuit Subjectum propositum.

## III. GENUS.

9. *Character Naturalis*, omnes notas characteristicas possibiles exhibens.
10. . . . *Essentialis* notam generi maxime propriam tradens.
11. . . . *Artificialis*, genera in Systematibus (7) conjuncta distinguens.
12. *Hallucinationes* Authorum circa genus (8) ex dictis (9).
13. *Genus Naturale* demonstrabit. (9)
14. *Nomen Generis* (13) selectum (11) confirmabit, & cur alia rejiciat, indicet.

## IV. SPECIES.

15. *Descriptio* perfectissima Subjecti tradatur, secundum omnes ejus partes externas.
16. *Species* generis propositi (13) omnes inventas recenset.
17. *Differentias* omnes inter speciem propositam (1) & rotas (16) exhibeat (15).
18. . . . primarias inde retineat, reliquas rejiciat.
19. . . . specificam Subjecti sui componat, & rationem facti quoad omne vocabulum (1) reddat.
20. *Variationes* speciei propositæ omnes apud Autores datas proponat.
21. . . . has sub naturali specie redigat cum ratione facti (15).

## V. ATTRIBUTA.

22. *Tempus* productionis, incrementi, vigoris, copulæ, partus, decrementi, interitus.
23. *Locus natalis*. Regio, provincia.
24. . . . Longitudo & latitudo Loci.
25. . . . Clima, Solum.
26. *Vita*. Diæta, mores, affectus.
27. *Corporis* Anatomia, præsertim curiosa; & inspectio Microscopica.

## VI. USUS.

28. *Usus æconomicus* actualis, possibilis, apud gentes varias.
29. . . . *Dieteticus*, cum effectu, in corpore humano.
30. . . . *Physicus*, cum agendi modo & principiis constitutivis.
31. . . . *Chemicus* secundum principia constitutiva, igne separata.
32. . . . *Medicus* in quibus morbis præcipue & verè, demonstratus ratione vel experientia.
33. . . . *Officinalis*; quæ partes, præparata, compositiones.
34. . . . exhibendi methodus optima, dosis, cautela.

## VII. LITERARIA.

35. *Inventor* cum loco & tempore.
36. *Historicæ Traditiones* de Subjecto variæ, jucundæ & gratæ.
37. *Superstitiosa* vana rejicienda.
38. *Poetica* egregia illustrantia.

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LUGDUNI BATAVORUM,  
Apud ANGELOM SYLVIVM. MDCCLXXVI

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**Figure 4.** The *Methodus demonstrandi animalia, vegetabilia, aut lapides*, published by Linnaeus in 1736 to accompany the first edition of his *Systema naturæ* (1735).

major work. After Artedi's demise in late September 1735, it was left to Linnaeus to publish the 'Principles' as part of the *Methodus* in 1736 (for a chronology of events affecting Artedi and Linnaeus, as well as can be reconstructed, see [Pietsch, 2010](#): 187–189).

The instructions given in the *Methodus* represent, to a surprising degree, good modern taxonomic practice (see [Schmidt, 1952](#): 369). Following a brief introductory sentence – 'The Method of Carl Linnaeus, the Swede, by which the naturalist can

accurately and successfully put together the history of each and every natural object, which method is contained in the following paragraphs' – the rules follow a logical progression from names and naming (including synonyms used by previous authors) to 'theory' (i.e. classification or placement as to classes and orders), the 'genus' (i.e. the defining characters) and the 'species' (description, variation, and similarities and differences between related species). While these instructions had already been assiduously followed, and in the same order, by Artedi in his *Ichthyologia* (which was essentially ready for the press by September 1735 and apparently not altered substantially by Linnaeus prior to publication in 1738), the question remains, how much of the *Methodus* belongs to Linnaeus and how much can be attributed to Artedi.

#### NOTES ON THE TRANSLATION AND GREEK FISH AND MAMMAL NAMES

The Latinized names of modern authorities are given by Artedi in the genitive case, so, for example, under the genus *Acus* (see p. 5), the exact translation of Willoughbij and Raji, etc., is 'Willughby's *Acus* Aristotelis,' 'Ray's *Acus* Aristotelis,' etc. This particular trait has been ignored throughout the present translation.

Dashes, one or more in succession (---), were used by Artedi as repetition signs, indicating that the name given by the first authority was also used by the later ones. Authorities' names are written in columns at the extreme right of the page with the appropriate number of repetition signs (two, three, four or more) filling out the empty space before them (see Fig. 3). The system used here is a space-saver adopted from Nybelin's (1934) transcription.

The curious use of the Latin adjective *latus* 'wide' or 'broad' (e.g. under the genus *Cyprinus*), and the noun *latitudo* 'breadth,' to denote the vertical dimension (i.e. the height or depth of a fish), employed by Willughby (1686) and Artedi (often in his *Ichthyologia*, 1738), 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.

Artedi used *maxilla* and *mandibula* indiscriminately for either part of the jaw (e.g. under the genus *Cyprinus*, p. 6); for precision, he added the adjectives *superior* and *inferior*, 'upper' and 'lower'.

The etymology of Greek names of genera follows Strömberg (1943) and Liddell & Scott (1996):

*Clupea*: Gr. Κλουπαῖα. Strömberg (1943: 9) considers this as a borrowing into Greek from some unidentified language.

*Cobitis*: Gr. Κοβίτις 'like the Gudgeon' (Liddell & Scott, 1996).

*Cottus*: Gr. Κόττος 'Cock,' 'Rooster.'

*Cyprinus*: Gr. Κυπρίνος 'Coppery.' Strömberg (1943: 41) notes that a large number of fish names are formed with the adjective-forming suffix -ῖνος, among them Κυπρίνος.

*Delphinus*: Gr. Δελφίς, δελφῖνος (adjective) 'Pig-like,' as it emits grunting sounds; Strömberg (1943: 77).

*Gadus*: Gr. Γάδος 'Donkey.' Thus, Strömberg (1943: 131), not Liddell & Scott (1996).

*Perca*: Gr. Πέρκη 'many-coloured.'

*Plagiurus*: Composition of Gr. adj. πλάγιος 'placed sideways' and οὐρά 'tail.'

*Rhombus*: Gr. Ῥόμβος 'Rhomb' (geometrical figure).

*Scomber*: Gr. Σκόμβρος 'Grunt' (noun).

*Silurus*: Gr. Σίλουρος. Strömberg (1943: 48) offers no full etymology beyond the comment that it belongs to a number of fish names ending in -ουρος (-tail, see p. 22). The first element, σιλ-, is not explained either by Strömberg (1943) or Liddell & Scott (1996).

*Thymallus*: Gr. Θύμαλλος. According to Strömberg (1943: 60f) the name refers to the thyme-like smell of the fish.

*Trachis*: Gr. Τραχίς, -ῖνος 'of Trachis.' Not analysed by Strömberg (1943). Trachis was a region and a town in Ancient Greece.

*Xiphias*: Gr. Ξιφίας 'Sword.'

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