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CHAPTER 21

Distance, Geography, and Anecdote in M.E. Bloch's *Natural History of Fishes*

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Inferring biological information from a dead animal specimen is always a delicate task and both modern scientists and early modern naturalists were aware of this problem. Yet, collections of conserved specimens were the main resources for European naturalists who studied non-European water animals that could not be transported alive from other continents. The results are sometimes still visible in the European names and even in scientific nomenclature: some egg-laying species were erroneously thought to be livebearers and, as a result, still carry the species epithet *viviparus* (live-bearing), such as the African bowstripe barb (*Enteromius viviparus*).[1] Other fishes received their names from erroneous geographical attributions, such as the South American wolf fish, named *Esox malabaricus* by Marcus Elieser Bloch, who assumed its South Indian origin and named it after the Malabar Coast.[2]

To avoid such errors, European naturalists were crucially dependent on the information that came with the specimen they received and then described. Which accounts could be trusted, whose observations counted and under which circumstances were they documented and brought to Europe? Questions like these were critical in all fields of zoology but precise descriptions of fishes were particularly difficult, as not only their behavior but even their body shape and color were often impossible to reconstruct from a conserved specimen. Regardless if a water animal was stored in alcohol or as a dried specimen – which was a rarer technique of preservation – it lost most of its live features and could be used for little more than a count of fin rays and scales and, especially after the first half of the 19th century, for comparative

1 Barnard K.H., "Note on Alleged Viviparity in *Barbus viviparus*, and Description of a New Species of *Beirabarbus*", *Annals and Magazine of Natural History* 8.47 (1941) 469–471. I thank Chris Scharpf for pointing me to this reference.

2 Abdala Dergam Dos Santos J., *Phylogeography and Character Congruence Within the Hoplias Malabaricus Bloch, 1794* (*Erythrinidae, Characiformes, Ostariophysil*) *Species Complex* (Ph.D. Dissertation: Colorado State University 1996) 4. The valid name of Bloch's *Esox malabaricus* is now *Hoplias malabaricus*. In the following, I will first refer to Bloch's original name and then add the currently valid name in brackets.

anatomical research. This chapter focuses on the aforementioned ichthyologist Marcus Elieser Bloch (1723–1799) and his attempts to make sense of the fish specimens he received from his correspondents abroad or from dealers in exotic natural objects, and the accompanying information that came with these conserved animal remains.

Bloch's contribution to ichthyology can hardly be overestimated: his *Oeconomische Naturgeschichte der Fische Deutschlands* (1782–1784) and *Naturgeschichte der ausländischen Fische* (1785–1795) (hereafter *Natural History of the German Fishes* and *Natural History of Foreign Fishes*), published in twelve volumes, was the first major attempt of an overview of known fish species according to the still recent Linnean taxonomic system, and the most extensive one before Bernard Germain de Lacépède's *Histoire naturelle des poissons* (1798–1803).[3] Bloch, who never left Europe, has traditionally been regarded a typical 'compiler', and his project to describe as much fish species as possible crucially depended on secondary information which he could never directly check or confirm.[4] His *Natural History* offers important insights into the ways in which information moved around the globe, how it was exchanged between travelers, colonial agents, missionaries and European naturalists, and how it was interpreted, reviewed and incorporated into larger systems of knowledge and learning. Addressing Bloch as a *reader* and interpreter of circulating and often unverifiable information, this chapter aims to shed light on the mechanisms of evaluation and source criticism in the natural sciences in late 18th-century Europe.

Strategies of managing, verifying and processing information have been addressed in a large body of literature on travel, geography and knowledge production, especially on the early modern period. In the wake of seminal works like Steven Shapin's *Social History of Truth* and Katherine Park's and Lorraine Daston's *Wonders and the Order of Nature*, questions of credibility and the evaluation of truth claims became central topics in the history of knowledge and science.[5] In more recent years, strategies of information management have received more attention and the ways in which scholars and naturalists organized their materials have been explored by Ann Blair, Staffan Müller-Wille,

3 Bloch Marcus Elieser, *Oeconomische Naturgeschichte der Fische Deutschlands* (Berlin, Hesse: 1782–84); *Naturgeschichte der ausländischen Fische*, 3 vols. (Berlin, Morino: 1785–1795).

4 Starr Jordan D., "The History of Ichthyology", *Science* 16.398 (1902) 241–258.

5 Shapin S., *A Social History of Truth. Civility and Science in Seventeenth-Century England* (Chicago: 1994); Daston L. – Park K., *Wonders and the Order of Nature 1150–1750* (New York: 1998), especially 215–225; 246–255; 343–350.

Isabelle Charmantier and others.[6] This important body of literature has seldom been connected to the period after 1750 – as if questions of credibility and the management of information were no longer acute and pressing. This chapter seeks fill this gap by exploring how new observational and taxonomic practices went hand in hand with the critical evaluation of sources, and how systematic knowledge production relied on all these three components. Marcus Elieser Bloch's work provides an insightful case study as it laid the base for a wide number of taxonomic and nomenclatural decisions that shape the field of ichthyology until today. In the first part, I will offer a brief sketch of his background and the social and intellectual milieu in which he operated. After a discussion of his speculations on the geographical origin of his materials, I will then discuss his use of anecdotes from which he tried to infer information about behavior of 'his' fishes and their interactions with their environment. As Bloch's use of second-hand information shows, anecdotal information continued to play an important role in ichthyological knowledge even at a point when anatomical and physiological knowledge, professionalizing research methodologies and taxonomic classification systems had thoroughly transformed ichthyology and established it as a field in its own right.[7]

1 Bloch, the Berlin *Haskalah* and Fieldwork in Prussia

Like many ichthyologists of the 17th and 18th centuries, Bloch's interest in fishes started as a personal "hobby", rather than a result of academic training in this specific field. Born into a Jewish family of modest financial means in the Franconian town of Ansbach, he only had access to academic learning at a relatively late age in his life. Even though his father was a Thora scribe, his access to non-religious literature must have been rather limited. It is often stated that Bloch only learned German and Latin at the age of twenty, a claim that is hard to believe and should probably be understood in the sense that he had not yet learned reading in the Latin alphabet, let alone managed German *Fraktur*

6 Blair A., *Too Much to Know. Managing Scholarly Information before the Modern Age* (New Haven, Connecticut: 2010); Blair A., "Note Taking as an Art of Transmission", *Critical Inquiry* 31 (2004) 85–107; Müller-Wille S. – Charmantier I., "Lists as Research Technologies", *Isis* 103.4 (2012), 743–52; Müller-Wille S. – Scharf S., "Indexing Nature: Carl Linnaeus (1707–1778) and His Fact-Gathering Strategies", *Working Papers on The Nature of Evidence: How Well Do 'Facts' Travel?* 36.8 (2009) 1–46.

7 Trijp D.R. van, *Captured on Paper. Fish Books, Natural History and Questions of Demarcation in Eighteenth-Century Europe* (*ca. 1680–1820*), (Ph.D. Dissertation: Leiden University 2021) 227–232.

script.[8] In 1743, he left Ansbach for Hamburg and became the private tutor to the children of a Jewish surgeon. Little is known about Bloch's life in his twenties and thirties but his time in Hamburg brought him in touch with the medical profession and the world of learning. Following anatomy lessons in Berlin, he pursued a career as a medical doctor but could not receive a doctorate there because of his Jewish background. To obtain an official degree, he had to relocate to Frankfurt an der Oder in the early 1760s, where no regulations withheld Jewish students from graduating.

After his graduation, Bloch practiced medicine in Berlin. One of his patients, the famous philosopher Moses Mendelsohn, became a close friend and through such acquaintances, Bloch entered Jewish learned circles that promoted a reform of Jewish traditions according to Enlightenment ideas, later known as the *Haskalah*.[9] In some respects, Bloch was an exceptional figure in these circles. The interests of his Berlin circle were of a more philosophical nature and concerned questions such as the reconciliation of contemporary German philosophy with Jewish tradition and faith. Despite their interest in the natural sciences, Bloch was the only one who actually dedicated himself to natural historical research.[10] After some shorter publications on various medical topics, he focused more and more on study of fishes. As he remarked in the preface to the first volume of the *Fishes of Germany*, his surprise about the great diversity in fishes and the incongruence between ichthyological literature and his observations in Prussian lakes had inspired his work on this topic.[11]

Compared to his Berlin network of Jewish intellectuals, Bloch's scholarly work shows little traces of typical Haskalah themes or ideas.[12] Aside from a dedication of one of the *Natural History*'s parts to the Danish crown prince Frederick, 'who has made my oppressed Brethren equal to the other inhabitants',

8 Karrer C., "Marcus Elieser Bloch (1723–1799), Sein Leben und die Geschichte seiner Fischsammlung", *Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin* 18 (1978) 129–149, there 130–131; Trijp, *Captured on Paper* 168. The difficulties of reading German *Fraktur* for non-native speakers and readers are explicitly mentioned in Bloch's preface to the *Fishes of Germany*. See Bloch, *Naturgeschichte der Fische Deutschlands*, part 1, 5–6.

9 Schulte C., "Zur Debatte um die Anfänge der jüdischen Aufklärung", *Zeitschrift für Religions- Und Geistesgeschichte* 54.2 (2002) 122–137, there 122; Lesser R., "Dr. Marcus Elieser Bloch. Ein Jude begründet die moderne Ichthyologie", *Das achtzehnte Jahrhundert. Zeitschrift der Deutschen Gesellschaft für die Erforschung des achtzehnten Jahrhunderts* 23.2 (1999 – Special issue *Haskala. Die jüdische Aufklärung in Deutschland 1769–1812*) 238–246.

10 Keller A.G., "Science In The Early 'Haskalah'", *European Judaism* 24.2 (1991) 8–13.

11 Bloch, *Naturgeschichte der Fische Deutschlands*, vol. 1, preface, 3.

12 Schulte, "Anfänge der jüdischen Aufklärung" 135.

there are no specific references to Jewish life or traditions.[13] In fact, Frederick had not fully emancipated Denmark's Jewish inhabitants but only allowed them to learn skilled trades as apprentices, a step that had not yet been taken in Prussia and Berlin. Like Mendelssohn, Bloch's admission to the Prussian Academy of Sciences was refused because of his Jewish background – allegedly also due to the role Frederick II of Prussia who had a final say in the acceptance of new members.[14] However, the great success of the first three parts of his ichthyological work, the *Economical Natural History of the Fishes of Germany*, had founded his reputation as a renowned scholar in Prussia and the wider German-speaking world and he was invited into the Imperial natural history academy *Leopoldina* and he had already been a corresponding member of the learned societies of Berlin, Göttingen, Leipzig, Halle, and many other German cities. As his fame grew, he was also accepted into the societies of Utrecht, Haarlem, Flushing, Zürich and Saint Petersburg.[15]

Even though the *Natural History of the Fishes of Germany* and the *Foreign Fishes* show clear structural parallels, the methodology and the entire approach were fundamentally different. As Bloch recounts, he dedicated his spare time to the study of fishes in small fishing communities in Brandenburg.[16] Talking to local fishers and studying fresh-caught fishes was a method that enabled Bloch to go beyond the scholarly world of books and the descriptions of others, and his surprise about the true diversity of Prussia's and Germany's fish fauna is expressed repeatedly. Comparing his own observations to those of Linnaeus and Artedi allowed for a vast expansion of the rich European fish diversity.[17] Bloch was also able to study live specimens of native fishes in metal tubs and noted important aspects of their behavior.[18] In this respect, the *Natural*

13 Bloch, cited in Paepke H.-J., "Blochs Schlangenkopf- und Labyrinthfische. Ein Beitrag zum 200. Todestag von Marcus Elieser Bloch (1723–1799)", *Der Makropode* 21.1–2 (1999) 2–13, there 3; *Naturgeschichte der ausländischen Fische*, vol. 4, part 7, preface, v–vi.

14 Paepke H.-J., *Bloch's Fish Collection in the Museum für Naturkunde der Humboldt-Universität zu Berlin. An Illustrated Catalog and Historical Account* (Rugell, Liechtenstein: 1999) 15. The role of Frederick II in the Academy's admission policy with regards to Jewish candidates is disputed. In the famous case of Mendelsohn, Frederick did not receive the list in which Mendelsohn's name was mentioned and was therefore probably the decisive factor in his refusal. See Berkemann J., "Die Emanzipation der deutschen Juden und der Begriff der Toleranz", in: Enders C. – Kahlo M. (eds.), *Toleranz als Ordnungsprinzip. Die moderne Bürgergesellschaft zwischen Offenheit und Selbstaufgabe* (Leiden: Brill, 2007) 71–107, there 71.

15 Bloch, *Naturgeschichte der Fische Deutschlands*, part 1, title page; *Naturgeschichte der ausländischen Fische*, part 7, title page.

16 Bloch, *Naturgeschichte der Fische Deutschlands*, part 1, preface, 3.

17 Bloch, *Naturgeschichte der Fische Deutschlands*, part 1, preface, 2–3; 5.

18 Paepke, *Bloch's Fish Collection*, 22.

History of the Fishes of Germany is fundamentally different from the *Foreign Fishes*: in the latter, Bloch was fully dependent on the descriptions of others and he did not have the opportunity to study the animals in a freshly killed or even live state. The need to infer all the information from dead specimens and the accounts from his correspondents abroad or secondary literature made the *Foreign Fishes* a project that required hermeneutical and textual-critical skills in order to make sense of the existing information. While Bloch had little choice to use accounts he could not always fully trust, his work reflects strategies of critical and comparative reading that sometimes allowed for comprehensive theorizations of new and hitherto poorly understood biological phenomena.

2 Origin Unknown – Bloch's Speculative Biogeographies

Even before he published the *Fishes of Germany*, Bloch was already familiar with and interested in the fish faunas of other continents. To provide taxonomic context for his description of European species, he extensively referred to the zoological works of the French friar and naturalist Charles Plumier (1646–1704). Plumier, who had been appointed the French royal botanist by Louis XIV in 1693, had undertaken three research expeditions to Central America and besides his study of plants also described and drawn numerous fish species from the Americas. Bloch was well aware of the differences between American and European species, even though he did not clearly separate similar-looking fishes from different continents into different genera. As his reputation as a renowned naturalist grew – he had received a gold medal for his *Fishes of Germany* from Emperor Joseph II in 1782 – acquaintances and fellow naturalists and collectors sent him more and more conserved fish specimens, also from other parts of the world. By the end of his life, his collection had grown to more than 1.400 specimens of fish, in addition to 400 birds and many other natural objects.[19]

Once his collection had grown, Bloch actively sought to complete it and acquire as many fishes as he could get from dealers in natural object or correspondents in Asia, such as the Protestant missionary Christoph Samuel John and the physician Johann Gerhard König in South India or the botanist Paul Erdmann Isert who had travelled through West Africa and the Caribbean.[20] While Bloch was able to shed light on a number of complex ichthyological

19 Paepke, *Bloch's Fish Collection*, 16.

20 See John Christoph Samuel, "Einige Nachrichten von Trankenbar auf der Küste Koromandel. Aus einem Briefe von dem Missionarius Hrn John an Herrn Doktor Bloch in

problems by comparing different sources, one of the most basic questions proved difficult to answer: what was the fish's origin and natural habitat? The number of Bloch's errors in identifying the place or region of origin are numerous, even though he was aware that he could not always trust his sources, especially dealers in exotic natural objects. The indicated species distribution in his collection and his book project reveals much about how he imagined the geography of the world outside Europe. Besides the aforementioned misidentification of the South American wolf fish (*Hoplias malabaricus*) as a 'Malabarian' species and the confusion between several South American and African cichlids, most of the confusion on the animals' whereabouts concerned Asian fishes.[21]

One significant sequence of mistakes is Bloch's reference to Japan as the origin of his specimens. In 1786 or early 1787 he received a collection of "East Indian" fishes, which were listed and discussed in detail in the third and fourth parts of the *Natural History of Foreign Fishes*.[22] The vagueness of the origin of this collection is reflected in several references throughout the volumes and Bloch sometimes switches between "East Indian" and "Japanese".[23] A closer examination of these "Japanese" fishes reveals that only a part can in fact be found in Japan and the majority is distributed along the coasts of South and South East Asia. At the same time, Bloch described some species as Caribbean, when they were in fact native to East Asia and Japan.[24] Even the fishes that can be found in Japan have a much wider distribution and there is no clear evidence that any of his specimens actually originated from Japan.[25]

Berlin", *Berlinische Monatschrift* 20 (1792) 585–596. On Bloch correspondents in Asia, see also Trijp, *Captured on Paper* 189–191 and Paepke, *Bloch's Fish Collection* 24–25.

21 For more examples of confusions between African and American fishes, see Paepke, *Bloch's Fish Collection* 27.

22 Bloch, *Naturgeschichte der ausländischen Fische*, vol. 1, part 3, preface, fol. A2; 115.

23 Bloch, *Naturgeschichte der ausländischen Fische*, vol. 1, part 3, 115.

24 E.g. *Sparus fasciatus* (*Cheilinus fasciatus*) and *Sparus chlorourus* (*Cheilinus chlorourus*), discussed in the *Natural of Foreign Fishes*, part 5.

25 Bloch, *Naturgeschichte der ausländischen Fische*, vol. 1, part 1: *Squalus varius* (*Stegostoma fasciatum*): Indian Ocean and Pacific (also Japan). Part 2: *Takifugu ocellatus* (*Tetraodon fasciata*): Southeast Asia and Pacific (also Japan); *Muraena pinna* (probably *Muraena conger*): Europe, Atlantic Ocean. Part 3: *Chaetodon imperator* (*Pomacanthus imperator*): Indian Ocean and Pacific (also Japan); *Chaetodon guttatus* (*Siganus guttatus*): Indo-Pacific and Japan: *Chaetodon collare*: Indo-Pacific and Pacific (also Japan); *Chaetodon mesoleucos*: Red Sea, Arab Sea. Part 4: *Cephalopholis boenak* (*Bodianus boenak*): Indian Ocean and Pacific (also Japan); *Bodianus gutatus* (*Cephalopholis argus*): Indian Ocean and Pacific (also Japan); *Holocentrus ongus* (*Epinephelus ongus*): Indian Ocean and Pacific; *Scarus viridis* (*Sparisoma viride*): Caribbean/Atlantic; *Holocentrus quadrilineatus* (*Pelates quadrilineatus*): Indian Ocean and Pacific (also Japan); *Holocentrus calcarifer* (*Lates*

Hans-Joachim Paepke has suggested that Bloch might have confused Japan with Java, a conclusion for which some support can be drawn from a comparison to his posthumous *Systema Ichthyologiae*, where some species, for example *Sparus fasciatus* (*Cheilinus fasciatus*), are identified as a Southeast Asian species ('Habitat in Java'), whereas the *Foreign Fishes* lists them as 'Japanese'.[26] This specific case suggests that Bloch had indeed confused Java and Japan, but it is important to pay attention to the sources that informed his geographical ideas about East and Southeast Asia.

One of Bloch's main sources on Asia was François Valentyn's *Oud en Nieuw Oost-Indiën* (*Old and New East India*), published between 1724 and 1726 in Amsterdam and Dordrecht. Valentyn was active as a Protestant minister in the Dutch East Indies, mostly in Ambon on the Moluccas, and besides his clerical duties, he dedicated his stay in Asia to a large-scale geographical description of the Malay Archipelago and the wider world surrounding it. In the title, he already made clear that his five-volume work had a wider scope than only the colonized islands under the rule of the Dutch East India Company:

> Old and new East India, containing a precise and detailed discussion of the Dutch Government in these regions, besides an extensive description of the Moluccas, Ambon, Banda, Timor, Solor, Java, and all the islands under the rule of the same administration, the Dutch directorate at Suratte as well as a description of the lives of the Great Mughals. Furthermore an

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calcarifer): Indian Ocean and Pacific (also Japan): *Lutjanus Lutjanus*: Indian Ocean and Indo-Pacific; *Lutjanus hasta*: Indian Ocean and Indo-Pacific; *Lutjanus erythropterus*: Indian Ocean and Indo-Pacific, also Japan. Part 5: *Lutjanus verres*: Indian Ocean and Indo-Pacific; *Sparus fasciatus* (*Cheilinus fasciatus*): Indian Ocean and Pacific (also Japan); *Sparus chlorourus* (*Cheilinus chlorourus*): Indian Ocean and Pacific (also Japan. Bloch also assumes that it is native St. Domingo and the Caribbean); *Sparus erythrourus* (*Gerres erythrourus*): Indo-Pacific and Pacific (also Japan); *Labrus trivittatus* (*Pentapodus trivittatus*): Indo-Pacific and Pacific (also Japan); *Lutjanus bohar* (*Sparus cynodon*): Indian Ocean and Pacific; *Labrus viridis*: Atlantic Ocean/Mediterranean. Part 6: *Labrus fasciatus* (*Hemigymnus fasciatus*): Indian Ocean and Pacific (also Japan); *Trichopodus trichopterus* (*Labrus trichopterus*): Southeast Asia (only freshwater); *Labrus melapterus* (*Hemigymnus melapterus*): Indian Ocean and Pacific (also Japan); *Perca argentata* (*Lutjanus argentimaculatus*): Indian Ocean and Pacific (also Japan); *Anthias macropthalmus* (*Priacanthus hamrur*): Indian Ocean and Pacific (also Japan); *Anthias testudineus* (*Anabas testudineus*): South and Southeast Asia (only freshwater). Part 7: *Anthias orientalis* (*Plectorhinchus orientalis*): Indian Ocean/Indo-Pacific. Part 8: *Clupea sinensis* (*Tenualosa reevesii*): South Chinese Sea. The indicated distribution ranges of each species are based on data from FishBase: Froese R. – Pauly D., *FishBase. World Wide Web Electronic Publication*. www.fishbase.org (02/2022).

26 Paepke, *Bloch's Fish Collection* 27.

> informative discussion of the most important facts on the Coromandel Coast, Pegu, Arracan, Bengal, Mocha, Persia, Malacca, Sumatra, Ceylon, Malar, Celebes or Macassar, China, Japan, Taiwan or Formosa, Tonkin, Cambodia, Siam, Bali, the Cape of Good Hope and Mauritius.[27]

Valentyn's work, which significantly shaped European ideas on Asia throughout the 18th century, covered what modern historians might call the wider "Indian Ocean World" and even stretched its scope to the Northern Pacific. Besides detailed descriptions of nature, the work offered historical descriptions of Moghul India and geographical accounts of South Asian cultures and religions. However, as Siegfried Huigen has recently argued, *Old and New East India* is characterized by a telling discrepancy between specific description and generalization. While the history and culture of the various Asian regions are discussed in terms of geographical diversity, descriptions of nature are largely limited to the Moluccas, and more specifically to Ambon itself. In Valentyn's account, the island serves as a model of Southeast Asian nature in general and he expected 'nature in the East Indies to be more or less the same everywhere.'[28]

This discrepancy between cultural diversity and assumed natural uniformity informed the European image of Asian nature.[29] Reading Bloch's misidentification of Asian fishes in the light of *Old and New East India* explains the ambiguity between his references to "Japan" and "East India."[30] In at least

27 Valentyn François, *Oud en Nieuw Oost-Indiën, vervattende Een Naaukeurige en Uitvoerige Verhandelinge van Nederlands Mogentheyd in die Gewesten, benevens Eene wydluftige Beschryvinge der Moluccos, Amboina, Banda, Timor, en Solor, Java, en alle de Eylanden onder dezelve Landbestieringen behoorende; het Nederlands Comptoir op Suratte, en de Levens der Groote Mogols; als ook Een Keuryke Verhandeling van 't wezentlykste dat men behoort te weten van Choromandel, Pegu, Arracan, Bengale, Mocha, Persien, Malacca, Sumatra, Ceylon, Malabar, Celebes of Macassar, China, Japan, Tayouan of Formosa, Tonkin, Cambodia, Siam, Borneo, Bali, Kaap der Goede Hoop en van Mauritius* [...] (Dordrecht, Joannes van Braam – Amsterdam: Gerard onder de Linden, 1724–1726). The entire book title is even significantly longer.

28 On the Dutch and European reception of Valentyn's work, see Huigen S., "Repackaging East Indies Natural History in François Valentyn's Oud en Nieuw Oost-Indiën", *Early Modern Low Countries* 3/2 (2019) 234–264, there 259.

29 Huigen, "Repackaging East Indies Natural History" 258–259.

30 Another Dutch geographical work that informed Bloch's *Natural History of Foreign Fishes* was Johan Nieuhof's travel account to the Dutch East Indies and other parts of Asia. In this account, both "Japan" and "China" are sometimes used interchangeably with "East India." See Nieuhof Johan, *Joan Nieuhofs Zee en lant-reize, door verscheide gewesten van Oostindien: behelzende veele zeltzaame en wonderlijke voorvallen en geschiedenissen. Beneffens een beschrijving van lantschappen, steden, dieren, gewassen, draghten, zeden en*

four instances, Bloch refers to his "Japanese" fishes by names that are clearly of Malay origin, for example in the case of *Lutjanus Lutjanus* or *Labrus trichtopterus* (*Trichopodus trichtopterus*), whose 'Japanese' names he notes as 'Ikan lutjang' and 'Ikan Marate Djantan'.[31] As an avid reader of Valentyn – he cites the Dutch clergyman more than thirty times – Bloch must have been aware of the difference between Java and Japan but what he did not fully comprehend were the immense biogeographical differences between the Malay Archipelago and the Northern Pacific. To European readers who relied on Valentyn, Asian nature appeared as one geographical continuum in which Java, Japan, China and Taiwan were more or less interchangeable. Modern studies have often noted with surprise that Bloch virtually never travelled – even within Europe.[32] His attempts to make sense of biogeographical differences depended on literature such as Valentyn's *Old and New East India* and Johan Nieuhof's Asian travel accounts and his acquisition of a "Japanese" fish collection from a dealer in exotic *naturalia* left with him with little more clue than what he found in these Dutch writers.

When Bloch did not trust his sources, he sometimes used comparative methods to make sense of a fish's region of origin. On one fish he had bought from a dealer in exotic natural objects, *Chaetodon ciliaris*, he noted:

> The origin of this fish is East India, according to the merchant in *naturalia* from whom I bought it. I tend to believe that this information is correct since the specimen shows long dorsal and anal fins: all the fishes I find in Marcgraf, Piso and in the drawings of Father Plumier [who had all described South American fishes – JM] show long anal and dorsal fins. In the ones that are depicted in Valentyn, these long fins are rounder.[33]

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godsdienst der inwoonders: en inzonderheit een wijtloopig verhael der stad Batavia, verciert doorgaens met verscheide koopere platen (Amsterdam, Jacob van Meurs: 1682), vol 1. The second volume offers a description of Dutch Brazil, which did not exist anymore at the time of publication. For less informed readers, the difference between "India" and "East India" might not always have been entirely clear.

31 Bloch, *Naturgeschichte der ausländischen Fische*, vol. 2, part 4, 108; part 6, 24. Other examples are *Holocentrus ongus* (*Epinephelus ongus*), called 'Ikan ongo' and *Lutjanus bohar* (*Sparus cynodon*), called 'Ikan Caccatoea Iju'. *Ikan* is the word for fish in Malay and a number of other Austronesian languages.

32 Paepke, *Bloch's Fish Collection* 15–16.

33 Bloch, *Naturgeschichte der ausländischen Fische*, vol. 1, part 3, 112: 'Dieser Fisch soll, wie mir der Naturalienhändler, von dem ich ihn gekauft habe, aus Ostindien gekommen seyn. Mir ist es wahrscheinlicher, dass er seinen Aufenthalt richtig angegeben habe, weil er mit einer langen After- und Rückenflosse versehen ist: denn fast alle Fische, die ich im *Marcgraf*, *Piso*, und in den Handzeichnungen des Pater *Plümier* finde, sind mit einer

His judgement was not correct – *Chaetodon ciliaris* is in fact a Caribbean and South American species – but such comparative methods to infer the geographical origin of an animal from its body shape is remarkable in a period when no coherent theory of biogeography was yet available. The idea that differences or similarities in fin shapes between different genera or families corresponded with their respective distribution range probably relied more on intuition but through comparisons like these, Bloch attempted to structure his collection in terms of both taxonomy and biogeography.

3 The Man-Eater and the Slave Ship – Anecdotes as a Source of Knowledge

Unable to study his "foreign" fishes live or even *in situ*, Bloch had to infer as much of information as he could from travel writing and other geographical literature. Such accounts often had an inevitable narrative and anecdotal character, which required clear strategies to use them as sources of natural-historical knowledge. Bloch was not alone in his attempt to make sense of such anecdotes. Post-Linnean zoology and botany is often seen as a break with the early modern encyclopedic, and inherently anecdotal, approach to natural history, and yet it produced its own historical anecdotes if nothing else was available.[34] Especially bigger species that left an impression with seafarers of fishers inspired historical anecdotes that repeated again and again in ichthyological literature. Body size was also a factor that could make it difficult for collectors to acquire or store entire specimens in their homes or museum. It is therefore no coincidence that the illustrations of large animals such as sharks or tuna are far less accurate than those of species were preserved specimens were available [Fig. 21.1].

The lack of complete specimens was therefore an important reason to rely more on accounts from travel writing, geographical literature or even mere hearsay to gain information about the size or the feeding behavior of a fish. Stories and anecdotes are strongly featured in Bloch's *Natural History of Foreign Fishes* and many other ichthyological accounts. Estimates of the power of their

langen Rücken- und Afterflosse abgebildet; dahingegen, die ich aus Ostindien erhalten habe, und die im *Valentyn* stehen, beinahe durchgängig dieselben Flossen abgerundet haben'.

34 One of the most notorious examples is the Welsh naturalist Thomas Pennant (1726–1798) who even tried to infer natural-historical knowledge from folksongs and poetry. See Pennant Thomas, *British Zoology* (London: Benjamin White, 1776–1777), vol. 3, for example 49; 82–83; 128; 335; 339.

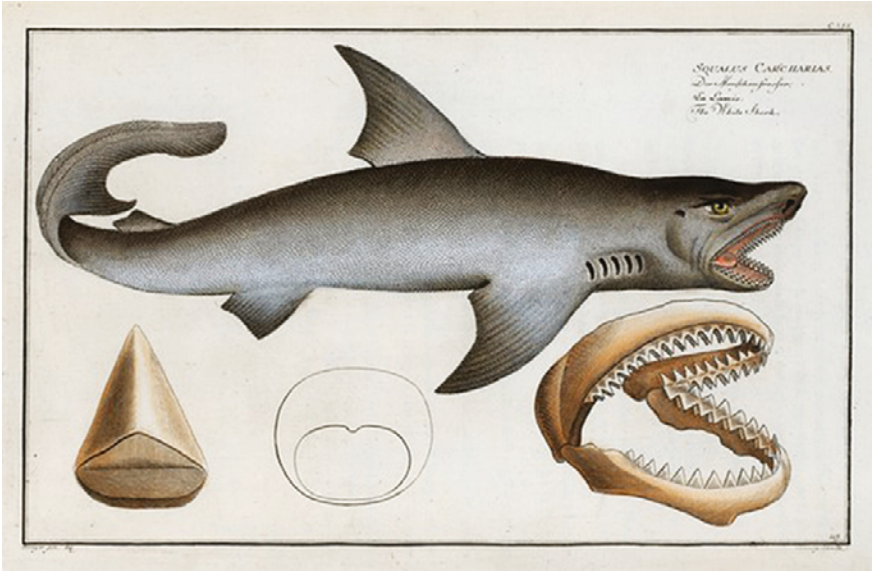

FIGURE 21.1 Great white shark (*Squalus carcharias*). In Bloch Marcus Elieser, *Ichtyologie, ou, Histoire naturelle, générale et particulière des poissons : avec des figures enluminées, dessinées d'après nature* (Berlin, Bloch – De la Garde: 1785–1797 [1787]), vol. 4, p. 127. The New York Public Library, Rare Book Division. https://digitalcollections.nypl.org/items/510d47da-695f-a3d9-e040-e00a18064a99

jaws were inferred from spectacular stories of bitten-off limbs or even deadly attacks. The section on the Great white shark (*Carcharodon* [Bloch: *Squalus*] *carcharias*), for example, is filled with accounts of that illustrate the rapacious nature of this animal: Bloch recounts how a sailor was wading in shallow water and had his leg bitten off or cites a story from Georg Forster's *Voyage Round the World* in which a caught shark tries to bite off a sailor's hand but only catches his sleeves. He continues his discussion of the shark's jaw apparatus with reports of entire seals or even fully-clothed humans that were found inside the fish's belly.[35] As Bloch concludes from such observations, the teeth of the Great white shark were only 'made to hold and bite' its prey, which was then not chewed but swallowed as a whole.[36]

These considerations bring him to one of the most-cited anecdotes in 18th- and 19th-century natural history: the story of a Guinea slave ship and the Great white shark – consistently named 'Menschenfresser' (man-eater) by Bloch. The anecdote was first mentioned in the third volume of Thomas Pennant's

35 Bloch, *Naturgeschichte der ausländischen Fische*, vol. 1, part 1, 35–37.
36 Bloch, *Naturgeschichte der ausländischen Fische*, vol. 1, part 1, 36.

British Zoology, who claimed to have received it first-hand from a slaver. Bloch quotes Pennant in the exact wording:

> A master of a Guinea-ship informed me, that a rage of suicide among his new bought slaves, from a notion the unhappy creatures had, that after death they should be restored again to their families, friends, and country. To convince them at lest that they should no re-animate their bodies, he ordered one of their corpses to be tied by the heels to a rope, and lowered it into the sea; and, tho' it was drawn up again as fast as the united force of the crew could be exerted, yet in that short space, the sharks had devoured every part but the feet, which were secured by the end of the cord.[37]

This gruesome story was widely spread and repeated in zoological and geographical literature until far into the nineteenth century.[38] Stories like these were also used in Abolitionist movements and sharks that followed slave ships became a trope in poems and anti-slavery literature. As maritime and slavery historian Marcus Rediker has argued, the idea that enslaved Africans committed suicide in order to be united with their ancestors in their home country was indeed based on some truth, and anecdotes like Pennant's should not be dismissed as mere sensationalism.[39] In Bloch, such anecdotes were not uncritically presented as clear evidence but by presenting them from a synoptic perspective and in relation to other accounts, they could be used as source of knowledge on phenomena that could not be studied by direct observation.

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37 Pennant, *British Zoology*, vol. 3, 82–83. In Bloch's translation: 'Ein Capitain der aus Guinea Sklaven auf seinem Schiffe hatte, und wahrnahm, dass die Schwarzen deswegen den Selbstmord ausübten, weil sie glaubten, sie stünden bey den Ihrigen wieder auf, wollte sie vom Gegenteil überzeugen: er liess einen Selbstmörder, nachdem er ihm die Beine hatte festbinden lassen, in die See werfen, und ohngeachtet er mit aller möglicher Geschwindigkeit wieder herausgezogen werden sollte, so hatte ihn ein Menschenfresser verschluckt, und an den Beinen glatt abgebissen' (Bloch, *Naturgeschichte der ausländischen Fische*, vol. 1, part 1, 37).

38 Goldsmith O., *A History of the Earth, and Animated Nature* (Glasgow, Fullarton: 1837 [1774]), vol. 3, 494; Smith T., *The Naturalist's Cabinet: Containing Interesting Sketches of Natural History*, 6 vols. (London, Cundee: 1806–1807), vol. 5, 65; Gregory G., *A New and Complete Dictionary of Arts and Sciences: Including the Latest Improvement and Discovery and the Present States of Every Branch of Human Knowledge*, 2 vols. (London, Oddy: 1815), vol. 2, 697.

39 Rediker M., "History from Below the Water Line. Sharks and the Atlantic Slave Trade", *Atlantic Studies* 5.2 (2008) 285–297. Rediker makes this arguments based on reports from ship surgeons.

It is interesting that the only sources that are explicitly criticized by Bloch with regard to the Great white shark are those of other naturalists, not the non-scholarly accounts discussed above. Especially Peter Artedi and Guillaume Rondelet, who assumed a relationship between sharks and whales (Rondelet even believed that they had breasts like mammals) are relentlessly criticized. Bloch was thus not an uncritical reader but he apparently believed that stories told by 'practical men' such as sailors or fishers might contain some informative value.[40] As he notes in the preface to his *German Fishes*, he did not only write for scholars but also for readers with a more practical or economic interest in fish and it was their judgment that was taken as serious as (and sometimes perhaps more serious than) scholarly speculations.

4 The Leyden Jar and the Electric Eel – Bloch's Hermeneutics of Empirical Observation

Bloch's mode of description went far beyond noting basic anatomic features and putting them into a taxonomic framework. Fishes that were known for their extraordinary behavior were discussed in close detail and Bloch dedicated several pages to observational accounts of these species. One of the most enigmatic creatures to 18th-century European science were the African and South American electric eels, whose physiological features inspired new theories of electricity.[41] Electric fishes had long been known in Europe – some Mediterranean species were already described by Aristotle and Galen, and some Roman court physicians advised the use of live electric rays for therapeutical purposes. Electric eels from South America, however, received a renewed and greater attention and were used for different kinds of experimental research as their discharges were up to three to ten times stronger (*Electrophorus electricus* can produce shocks of more than 600 V).[42]

The existence of such enigmatic and dangerous creatures inspired a wide number of sensational accounts and sparked curiosity among European audiences. The South American electric eel also featured in Aphra Behn's novel

40 Bloch, *Naturgeschichte der ausländischen Fische*, vol. 1, part 1, 41.

41 See e.g. Koehler P. – Finger S. – Piccolino M., "The 'Eels' of South America: Mid-18th-Century Dutch Contributions to the Theory of Animal Electricity", *Journal of the History of Biology* 42.4 (2009) 715–763; Wu C.H., "Electric Fish and the Discovery of Animal Electricity: The Mystery of the Electric Fish motivated Research into Electricity and was Instrumental in the Emergence of Electrophysiology", *American Scientist* 72.6 (1984) 598–607.

42 Koehler – Finger – Piccolino, "The 'Eels' of South America" 723.

Oroonoko: or the Royal Slave (1688).[43] Experiments with these animals were first conducted in the Dutch Essequibo Colony between Surinam and British Guyana in the 18th century. Dutch colonists who had observed that electric eels could cause heavy pains and cramps, put the fish into tubs and found out that they had the capacity to kill chickens.[44] Reports of such observations were sent to the Netherlands and reached the Leiden professor Pieter van Musschenbroek, whose groundbreaking research on electricity had just resulted in his invention of the Leyden jar when he heard about the news from the Essequibo. Van Musschenbroek and others concluded that the described phenomena were indeed caused by 'animal electricity', similar to those of the new invention.

European naturalists soon learned that the electric eel offered significant research opportunities as it was one the few fishes that could survive long voyages by ship. While water animals from Asia or the Americas typically did not survive the journey as their water containers could not be sufficiently oxygenated, electric eels were tolerant to hypoxic environments. It was only later discovered that they could use the vascularized tissue of their mouth as an air-breathing organ which allowed them to survive at very low oxygen levels.[45] The first electric eel was brought to colonial North America and examined by the Scottish physician Alexander Garden in Charleston in 1774. Another eel even survived the journey to England and was there studied by John Walsh and John Hunter, who examined the fish live and then dissected it, which allowed for further theorization of electric capacity in animals.[46]

Bloch, who dedicated more than 15 pages to the electric eel (described as *Gymnotus cauda obtusa*), paid close attention to the history of these discoveries.[47] Studying all available reports on these fishes, he argued that it was not Walsh or Hunter who should be celebrated for discovering the phenomenon of animal electricity, but the Dutch colonists of Essequibo.[48] His

43 Behn Aphra, *Oroonoko: or the Royal Slave. A True History* (London: Canning, 1688) 153–154; 162–163.

44 Koehler – Finger – Piccolino, "The 'Eels' of South America" 741.

45 Graham J.B., *Air-Breathing Fishes. Evolution, Diversity, and Adaptation* (San Diego: 1997) 40.

46 Finger S., "Dr. Alexander Garden, a Linnaean in Colonial America, and the Saga of Five 'Electric Eels'", *Perspectives in Biology and Medicine* 53.3 (201) 388–406.

47 Bloch confused several African and South American electric eels in his discussion and assumed that they all belonged to the same species. See Bloch, *Naturgeschichte der ausländischen Fische*, vol. 1, part 2, 44: 'Wir treffen diesen Fisch in Guinea, Surinam, Cayenne, Peru, an den afrikanischen Küsten im Fluss Senegal, und überhaupt unter dem heißen Himmelsstrich, an'.

48 Bloch, *Naturgeschichte der ausländischen Fische*, vol. 1, part 2, 57: 'Hunter hält zwar den Walsh für den Entdecker der thierischen Elektricität, allein da dieser erst 1773 die

account quotes more than twenty sources and discusses eight observational reports in detail. In an attempt to theorize electricity in animals, he relied on a comparative and synoptic analysis of all these reports, ranging from 17th-century travel accounts to the Guyanas and the first experiments of Dutch colonists in Essequibo to the latest research on the anatomy of these animals. His analysis is divided into several steps: after describing each experiment or observational account, he summarized the most important theoretical conclusions that could be drawn from each respective report. He then tried to harmonize the findings by comparing the specific conditions under which the experiments were conducted.[49]

Comparing the different accounts of electricity in fish, Bloch noticed a number of contradictions: 1. some reports described electrical discharges even above the water surface, 2. others reported that sticks or other objects could transmit the shocks to bodies outside the water, and 3. some writers asserted that electric eels could be handled or even taken out of the water without releasing any electric discharges.[50] These problems were then be solved by a number of hypotheses, that allowed for a wider theorization of animal electricity. In order to make sense of the different experiments and observations, Bloch assumed that the fish could control its electric behavior or that it was at least dependent on its mood:

1. That the fish does not cause any adverse reactions when it is in a calm state.
2. That, on the contrary, when it is aggressive ('böse'), it will cause a shock, and that this shock will be more intense after physical irritation.
3. That a fresh fish will display this effect much stronger than one that has been stored in a container for a longer period.[51]

Furthermore, the intensity of the shocks depended on the fish's health and was caused by a strong contraction of its muscles behind its head. Its function was to catch prey and to defend the fish against enemies. As Bloch concluded,

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Versuche mit dem Zitterrochen zu Rochelle angestellt hat, und Gravesand u. a. m. verschiedene Jahre vorher durch Versuche diefe Eigenschaft bey unserm Fisch hinlänglich erliefen hatten; so kann auch Walsh nicht für den Entdecker gehalten werden'. Laurens Storm van 's Gravesande ("Gravesand") was the governor of the Essequibo Colony and the author of the report that was sent to the Netherlands.

49 Bloch, *Naturgeschichte der ausländischen Fische*, vol. 1, part 2, 47–53.

50 Bloch, *Naturgeschichte der ausländischen Fische*, vol. 1, part 2, 52–53.

51 Bloch, *Naturgeschichte der ausländischen Fische*, vol. 1, part 2, 52–53: '1.) Dass der Fisch, wenn er ruhig ist, keine widrige Empfindungen verursache. 2.) Dass er im Gegentheil, wenn er böse ist, einen Stoß hervorbringe, und dass dieser desto heftiger sey, je mehr er vor der Berührung gereizt wird. 3) Dass ein frischer Fisch diese Würkung ungleich stärker äußere, als einer der schon lange in einem Gefäße gestanden hat'.

all these features could also be applied to the electric ray (*Torpedo sp.*) that was already known in Europe since antiquity. A comparison of the existing accounts on torpedoes and electric eels could only lead to the conclusion that both fishes used the same physiological mechanism. As he closed his argument triumphally, 'hereby all hypotheses that were offered in the last 2.000 years have become obsolete.'[52]

5 Ichthyology as *Second-Order Observation*

It is telling that most of Bloch's more theoretical conclusions were drawn from observations made by others. Theorizing such accounts was only possible by approaching them from a comparative and synoptic perspective and taking into account the specific circumstances under which they were produced. In this sense, projects such as Bloch's were dependent on what sociological systems theorists have called *second-order observation*, or the observation of the observations of others.[53] A systematic description of the fishes of the world by Linnean principles did not only involve the anatomical study of conserved specimens but an elaborate system of information management, in which knowledge was both produced and structured. Such natural-historical knowledge brought its objects and materials in relation to the often anecdotal sources of information that circulated in- and outside the world of learning. In this respect, the reform of natural history in the eighteenth century did not fully erase older encyclopedic forms of writing and documenting: stories and anecdotes remained a crucial part of ichthyological knowledge and their comparative evaluation was one of the central methods of the *Natural History of Fishes*. Bloch's work laid the base for a wide number of strictly empirical studies, such as Francis Day's survey on the fishes of India.[54] His influence on such 19th-century projects reflects how empirical observation and the interpretation of second- and sometimes third-hand accounts belonged and that textual

52 Bloch, *Naturgeschichte der ausländischen Fische*, vol. 1, part 2, 54: ' […] und sind dadurch alle Hypothesen, die man seit zweitausend Jahren erdacht hat, selbige zu erklären, unnütz geworden'.

53 See e.g. Foerster H. von, *Observing Systems* (Seaside, CA: 1981); Luhmann N., *Social Systems* (Redwood, CA: 1996).

54 Wells, Ellen B., "M.E. Bloch's Allgemeine Naturgeschichte der Fische: A Study", *Archives of Natural History* 10.1 (1981), 7–13, there 7; Day, Francis, *The Fishes of India: Being a Natural History of the Fishes Known to Inhabit the Seas and Fresh Waters of India, Burma, and Ceylon*, 2 vols. (London: Quaritch, 1875–1878).

criticism remained a key feature of zoological knowledge production in the 19th century.

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