

Naming the World

Pieter Bleeker's Travels and the Challenges of Archipelagic Biodiversity

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Abstract

Dutch zoologists in the colonised areas of the Malay Archipelago were amongst the most prolific authors of new zoological species descriptions. The Sunda Islands are one of the most biodiverse regions of the planet and the overwhelming abundance of different species posed a challenge to European practices of taxonomy and nomenclature. This chapter focuses on the ichthyologist Pieter Bleeker (1819-1878) and examines his strategies of collection and information management. Bleeker described almost 2,000 species and established 511 new taxonomic genera, many of which remain in use to this day. As is argued, his approach to describe Southeast Asian nature was indebted to indigenous knowledge and critically depended on interactions with local populations.

Keywords: Taxonomy, zoological nomenclature, indigenous knowledge, fish, Dutch East Indies, biodiversity

The Malay Archipelago is one of the most biodiverse regions on the planet and the list of newly discovered and described plants and animals continues to grow to this day.¹ The overwhelming abundance of different species posed a challenge to the classification systems of nineteenth-century natural history, and European naturalists and travellers frequently expressed their astonishment at the wealth of unknown plants and animals. Even researchers who had spent decades in the Dutch East Indies were sometimes unprepared for the extraordinary number of unknown species, both flora and fauna, found in other parts of the archipelago – an area that encompasses between 13,000 and 18,000 islands, depending on their exact definition.² Each island held its own zoological and botanical surprises and the sheer size of this vast insular world resisted all systematic attempts to map the full extent of its wildlife. As the Dutch zoologist Pieter Bleeker (1819-1878) noted in his memoirs, he had dramatically underestimated his stated aim – to map the entire fish fauna of the Dutch East Indies in his *Atlas Ichthyologique des Indes Orientales Néerlandaises* (Ichthyological Atlas of the Dutch East Indies, 1862-1878) – and he could never ‘have guessed that it would take at least forty years to complete this



Portrait of Pieter Bleeker. Collection Rijksmuseum, Amsterdam.

task'.³ After dedicating more than three decades to this ambitious project, he did not live to see the publication of all 36 parts, which appeared in nine volumes.

The attempts of colonial science to map the biospheres of the Dutch East Indies coincided with wider trends in taxonomic classification and the description of new taxa. Indeed, as Bleeker noted, between the 1790s and

1833, the number of fish species known to science expanded from 832 to at least 10,000.⁴ This rapid increase challenged the existing classification systems and led to a large number of taxonomic synonyms that confused and continuously questioned the identity of the living organisms behind the ever-changing nomenclatures. This chapter examines the strategies employed by European scientists to deal with this new and confusing array of names, descriptions, collected specimens, and living animals. Examining the naming practices and ordering systems used by Dutch naturalists to classify the flora and fauna of Southeast Asia, I discuss colonial-scientific practices of nomenclature and classification in the context of travelling and travel accounts. Bringing the history of nomenclature into dialogue with travel writing reveals another dimension of colonial interactions with the living world that is often hidden behind the rhetoric of scientific discovery. Relocating the description and the naming practices of animals in the colonial world to the specific local contexts and sites shows how the 'discovery' of plants and animals was in fact embedded in practices of naming and knowledge production that preceded European science and its methods.⁵

Focusing on the work of Bleeker mentioned above, I analyse the naming practices in his taxonomic descriptions as performative acts that need to be understood in relation to specific interactions with local populations as well as to practices of collecting and travelling. As Bleeker's articles that preceded the *Atlas Ichthyologique* and his travel accounts to Sulawesi, the Moluccas, and the interior of Java reflect, his descriptions and nomenclatural decisions were not a form of 'Adamic' naming within a cultural vacuum. Rather, his findings were deeply

indebted to earlier, indigenous interactions with the described species. Scholars in the fields of biogeography, zootaxonomy, and ethnobiology have recently called for a turn in scientific naming practices and for a reinstallation of indigenous names in taxonomical nomenclature.⁶ Using local vernacular in taxonomic descriptions is not new in itself: Even though the Linnean binominal system is indeed still largely based on Graeco-Latin names, Bleeker – along with other eighteenth- and nineteenth-century naturalists such as the Scottish ichthyologist Francis Buchanan-Hamilton – paid close attention to indigenous names and even used them in their descriptions of species that were new to science.⁷ Bleeker meticulously noted the local vernacular names of each species in his descriptions in as many languages as possible and even named entire genera after their indigenous Asian names.

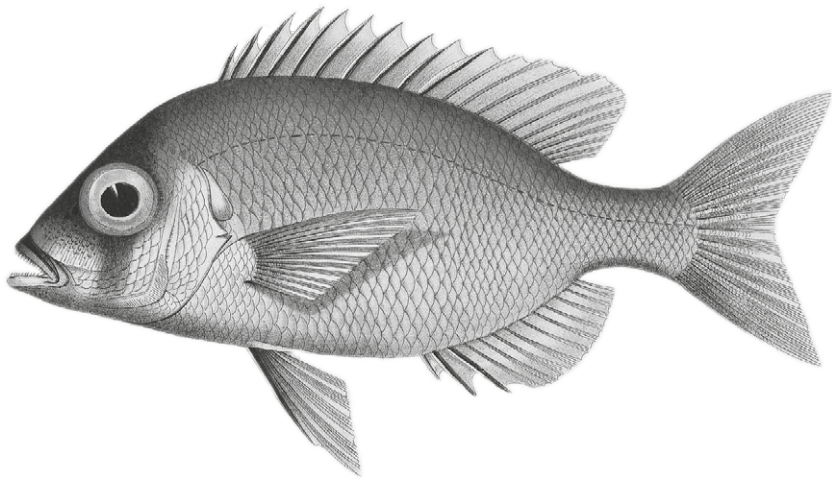
Yet these nomenclatural decisions were not inspired by the idea of doing justice to indigenous voices. Rather, they reflect his dependence on local knowledge and experience. First discussing Bleeker's wider approach to naming animal species and genera, I then turn to Bleeker's travel accounts of his journeys to the Moluccan Islands and the interior of Java, and his references to travel in his species descriptions. Addressing his interactions with local fishermen and their expertise, I will discuss how indigenous forms of knowledge helped European scientists to make sense of the rapidly increasing awareness of faunal diversity. Whilst colonial naturalists were always dependent on local assistance and expertise when finding specimens for their botanical and zoological collections, Bleeker's case illustrates how local bodies of knowledge and experience could also become relevant in matters of taxonomy and nomenclature – especially when nomenclatural decisions concerned animals new to European science.

Even though Bleeker did not travel very frequently after his arrival in Java, his travel accounts to the interior of the island, as well as to the Moluccas, provide an interesting perspective on his approach to the gathering of knowledge in a colonial setting. It soon became apparent that Bleeker was not an adventurous traveller and he never portrayed himself as such. His work took place in the administrative centre of the colony and his knowledge of the vast array of islands depended on information he received from others – very often members of local fishing communities. The notes he included in his travel accounts reveal the type of information he requested from locals – most importantly, indigenous names (*'nomina indigeni'*), habitats and fishing sites (*'loci'*), but also dietary uses and sometimes the methods employed in capture.⁸ Such forms of information and local knowledge framed Bleeker's project and sharpened his eye for the biogeographical patterns he observed between the Greater Sunda Islands and the eastern parts of the archipelago.

What's in a name? Naming practices in colonial science

The ways in which names and practices of naming shape social reality have been extensively discussed in scholarly fields as diverse as anthropology, linguistics, and ethnobiology.⁹ Surprisingly, the body of literature on this topic has only recently been brought into dialogue with the history of scientific nomenclature and its colonial legacy.¹⁰ At the same time, biologists and ecologists have recognised that non-scientific vernacular names can hold important information about human-animal interactions and the ecological history of species whose habitats have been severely impacted by human interference.¹¹

Despite their intrinsically arbitrary nature, names are always embedded in wider discursive frameworks and can shed light on underlying social practices, mentalities, and ordering systems. The act of naming a person, place, mountain, or animal incorporates it into a wider semantic and semiotic framework and in this respect, naming is an act that creates structures and relationships amongst and between groups of individuals or series of objects, attributing certain qualities and establishing identities and hierarchies.¹² Names and naming practices fall within a distinct linguistic category and can hardly be understood outside the context of specific social and performative acts that constitute them. In J.L. Austin's now classic text *How to Do Things with Words* (1962), the act of naming serves as the most iconic and self-explanatory example of a performative speech act. As Austin makes clear, the utterance 'I name this ship the Queen Elizabeth' is not a descriptive statement



Paracentrus microdon (Bleeker), now *Gymnocranius microdon*. Collection University of Amsterdam/Geheugen van Nederland.

that can be evaluated within categories such as ‘true’ or ‘false’, but rather is an act that establishes a new *status quo*.¹³

In this respect, taxonomic nomenclature is not fundamentally different from other, less systematic practices of naming.¹⁴ Despite the highly regulated and formalised binominal system of nomenclature that dates back to the tenth edition of Carl Linnaeus’ *Systema Naturae* (1758-1759), the exact naming of a genus or taxon is a decision of the description’s author. However, all levels of taxonomic classifications operate within a frame of reference that assumes relationships to other, already existing orders, families, and genera. Establishing genera or naming species is therefore inherently an act of ordering the living world and creating structures, hierarchies, and relationships. According to Bleeker, the first half of the nineteenth century had profoundly challenged existing taxonomic ordering structures and their resulting nomenclatures. The more colonial scientists became aware of the seemingly endless faunal diversity of the Malay Archipelago, the more it became clear that the newfound nature greatly exceeded the existing ordering systems and required new classifications and, consequentially, new naming practices. As Bleeker noted in 1858:

When Linnaeus wrote his diagnoses, he had a simple task. The relatively small number of species, made its distinction in a few words easy. But those diagnoses usually have lost their value because of the thousands and thousands of species discovered since, and on several of these new species one or other diagnosis of Linnaeus would fit entirely, without stopping them being entirely different species as those for which the reformer of zoology and botany formulated his diagnoses.¹⁵

The description of new species did not only require far more precision than in Linnaeus’ day; the new awareness of the world’s zoological diversity also questioned the relationships between the various animals and often called for drastic interventions in existing systematics. Transferring already known species into new genera inevitably generated new names: After reordering the systematics of South and Southeast Asian anabantoids or labyrinth fishes – to name just one example amongst thousands of nomenclatural revisions that took place in the mid-nineteenth century – the Sri Lankan combtail gourami, *Polyacanthus signata* (Günther, 1861), became *Belontia signata*, named after a South Sumatran local name for a closely related species. Over his entire career, Bleeker established more than five hundred new genera and described almost 2,000 species, mostly fishes, but also reptiles and other animals. To this day, the history of ichthyological nomenclature has been profoundly shaped by his naming decisions.

The 'self-made' zoologist

As Bleeker states in his memoirs, he did not have an intrinsic fascination for ichthyology before travelling to the Dutch East Indies. However, upon his arrival he soon realised that local fishermen sold many species that were new to science and thus he began to document them for very pragmatic reasons, namely to fill a significant zoological gap, which would allow him to make a name for himself in the scholarly community of the Dutch colonial empire.¹⁶ As he stated in retrospect, his later research career was rather unexpected. Born in Zaandam into a family of sailmakers without any connections to academic circles, he lacked a good education and could only dream of an academic training. His memoirs are characterised by his self-fashioning as an outsider to the world of learning. As he repeatedly states, the only thing in which he excelled at school was rebellious behaviour.¹⁷ Bleeker's parents lacked the means that would have enabled him to pursue a university education and instead he became the assistant to a pharmacist in his neighbourhood. Yet it was his time in the pharmacy that ultimately provided a route into the academic world, finally allowing him to enter a medical-pharmaceutical programme in Haarlem, and to become a physician.

After several attempts to obtain a position in European natural history museums, Bleeker enrolled in the Dutch East Indies Army as a medical doctor and was stationed in Batavia in 1842. Whilst there, he tried to learn more about the local flora and fauna and after realising that he did not recognise many of the Javanese fishes, he began to acquire specimens for a private collection.¹⁸ As he later stated, his choice to focus on fishes was also inspired by their wide and ready availability and the fact that they were cheap and easy to preserve. Unlike birds or mammals, the preservation of which would have required elaborate taxidermic skills, fishes could be preserved in arak, an originally Levantine aniseed liquor that was popular throughout the Indian Ocean World. Not only did Bleeker lack the appropriate technical or preservation equipment; he also lacked the scholarly reference works necessary to contextualise and compare his findings. As he states in the first volume of the *Ichthyologiae Archipelagi Indici Prodromus* (1858-1860) – a series of pre-publications to the *Atlas ichthyologique* – all he could rely on during his early studies were 'some zoological handbooks and the *Histoire naturelle des Poissons* of Lacépède'.¹⁹

Bleeker's positioning as an academic 'self-made man' was not entirely ungrounded.²⁰ 'Without any aids and appliances' and with only a very limited body of scientific literature available, it was even more difficult to position the fishes he found within a wider taxonomic systematics.²¹ It took Bleeker years to build up a collection of reference works and newer ichthyological studies, and thus he had to start his research in a highly improvised and independent approach. The lack of access to good libraries and nomenclatural works prompted him to meticulously

note all the available common names of the animals he studied. His entire oeuvre, which includes roughly five hundred publications, is a unique repository for local and indigenous Southeast Asian animal names, and its ethnobiological value has yet to be explored.²² The *Atlas Ichthyologique*, its several pre-publications, and the numerous articles on the archipelagic fish fauna contains more than 1,500 local and indigenous names of fishes from all over Southeast Asia. Local names guided Bleeker through the early stages of his research, but he kept noting them throughout his career, also including as many as possible in the *Atlas*. A description of a species typically included the Malay name and several local ones from other islands. Some entries listed as many as twenty-five or even thirty different names, including the names that were current amongst Chinese or Arab minorities in the Dutch East Indies.²³ In the case of *Anabas testudineus* (Bloch, 1792), the climbing perch, Bleeker noted twenty-five names in total: fourteen European names and scientific synonyms, and eleven Asian names, as well a list of the habitats in which the fish could be found:

<i>Sennal</i>	Incol. Tranquebar.
<i>Peize porco</i>	Lusitan. Ind. Or.
<i>Pannei-eri</i>	Tamul.
<i>Pané-éré</i>	Malabar.
<i>Coi vel Coimas</i>	Bengal.
<i>Nabiema</i>	Birmann.
<i>Ikan Beto</i>	Malaic. Malace.
<i>Kété-kété</i>	Incol. Insul. Celeb.
<i>Ikan Betokh</i>	Mal. Batav. et Pajacombo
<i>Ikan Betik</i>	Sundaic. et Javan.
<i>Ikan Puju</i>	Malaic. ad Luc. Sinkarang
Habit.	Batavia, Tjiringin, Seran, Tjimanok, Pandeglang, Cheribon, Gombong, Samarang, Ambarawa, Patjitan, Surakarta, Mojokerto, Surabija, Javae insulae, in aquis dulcibus. Bangcallang, Sumanap, Madura insulae, in fluvjis. Lacus Sinkarang, Pajacombo, Sumatrae occidentalis, in aqua dulci. (P. Jakles). ²⁴

Bleeker's notes on names also reflect interesting ethnotaxonomic patterns, especially in the case of the Malay and Sundanese names used by local fishermen. Most fishes were classified as *Ikan* in Malay, the common word for fish, and the specific fish is indicated as adjectival or nominal epithet, in the case of the climbing perch *Betokh*, or *Gabus* for the striped snakehead.²⁵ The generic *Ikan* was, however, not

used for more bottom-oriented carp-like fishes such as the Labeoninae, which were referred to as *Millem* or *Wadong* (or *Wadon*). Catfish species that showed some outward similarities to fishes from this family were again called *Ikan*, with respective epithets such as *Ikan Manjong utik* or *Ikan Manjong pidada*.²⁶ Occasionally, Bleeker incorporated such classifications into his nomenclatural system, for example by naming a small barb that reminded him of the Labeoninae (Malay: *Wadon*) *Barbus wadon*. He would only later learn that his specimen was in fact a juvenile fish that looked quite different after reaching adulthood, which led to the decision to put it into a different genus (*Systemus*).²⁷

Another case in which Bleeker tried to transfer indigenous classification systems into a scientific binominal name was his description of the silver demoiselle, a small perch-like marine fish from the eastern part of the archipelago. Due to its outward similarity to the above-mentioned climbing perch (an air-breathing freshwater fish), the species was called *Ikan betokh lawut*, literally the *Ikan betokh* (climbing perch) ‘of the sea’. Despite the lack of any closer phylogenetic relationship between these two species, Bleeker named the fish *Glyphisodon anabatoides* (Bleeker, 1846), referring to the order of air-breathing Anabantiformes, to which the climbing perch belonged.²⁸

Local Malay and Sundanese names did not only inform Bleeker’s nomenclatural decisions in the case of species, but also in that of entire genera.²⁹ Perhaps the most famous case in which Bleeker redescribed a fish and established a new genus by referring to a local common name was his description of *Betta trifasciata* (Bleeker, 1850; now *Betta picta*). Bleeker was both a skilful observer when it came to original animal specimens and a careful reader and interpreter of written sources. Ordering nature and establishing taxonomic systems not only depended on scrutinous empirical observation, as each finding also required careful contextualisation and had to be brought into dialogue with other studies and species descriptions. As he soon realised, a great body of natural knowledge vanished on the paper trail between Asia and Europe. Moreover, European scientists were not always able to make sense of the information they received or indeed, of the preserved specimens themselves. In 1850, Bleeker presented an overview of Central and East Javanese fishes and a description of all known Anabantiformes from the Dutch East Indies, an order of perch-like fishes with the ability to breathe air and survive in very warm and polluted water bodies.³⁰ He put one of the newly described fishes into a new genus, *Betta*, but he soon realised that the fishes on which this classification was based were now known in Europe and had since been placed in a very different order.

After reading and commenting on Georges Cuvier and Achille Valenciennes’s *Histoire naturelle des poissons* and a series of fish drawings from an expedition by Heinrich Kuhl and Johan van Hasselt, Bleeker realised that Cuvier and Valenciennes had already described the same fish, but in an entirely different way.³¹ Based on

similarities with other specimens they had received from India and the Sunda Islands, they chose the name *Panchax pictum*, which put the species into a genus within the order of egg-laying tooth carps – a group of fishes without any closer relationship to Anabantiformes like the new *Betta*. As Bleeker notes:

Panchax pictum Val. belongs to a totally different genus and is made known in more detail by myself under the name *Betta trifasciata*. Earlier I did not know the similar identity of *Betta trifasciata* with *Panchax pictum*, but it became apparent, after I came in the possession of a drawing, left by Van Hasselt and provided with the name *Anastoma pictum*. Van Hasselt noticed very well the generic difference of both species and placed *Panchax Buchananii* in his genus *Homalopsis*, whereas he placed *Betta picta* (*Betta trifasciata* Blkr) in his genus *Anastoma*.³²

Bleeker's decision to name the new genus *Betta*, after the local Ambarawese name *Ikan Wader bettah*, reflects the uncertainty around this 'discovery'. As he noticed, the fishes had a labyrinth organ that allowed them to breathe air when necessary, which suggested a closer relationship to Anabantiformes, such as the aforementioned climbing perch. However, at the same time, the differences to other fishes within this order were significant, which inspired Bleeker to install a new monotypic genus, containing only one single species. By adopting an indigenous name, he placed this new group more loosely within the existing classificatory structure and thus avoided overly specific references to other families or genera.

As this case clearly demonstrates, comparisons to other descriptions were sometimes only possible through the meticulous examinations of drawings, notes, and second- or even third-hand accounts. Confusion about the identities of specimens, species, and genera were often an inevitable result of the communication networks of nineteenth-century colonial science, and the information and the materials that reached Europe did not always hold the same epistemological implications as they did in places where knowledge could be more directly contextualised.³³ Bleeker's decision to establish *Betta* as a new genus without direct references to other related genera proved viable: Since 1850, this taxonomic decision has never been challenged and the once monospecific genus now contains no less than 73 species, the latest described only in 2020.³⁴

Bleeker realised the necessity of a functioning scholarly infrastructure as an indispensable prerequisite for research in the Dutch colonies. Preserving fishes in cheap liquor was not the largest obstacle to his project. Far more problematic were the lack of a scientific network, the immense delay of communication across two oceans, as well as the conventions of taxonomic descriptions that could not keep up with the awareness of the richness of Southeast Asian nature. Since his early years in Batavia, Bleeker was an ardent proponent of new scientific journals and



Image from Bleeker's fish collection.
Collection Naturalis Biodiversity Center
Leiden.

societies, some of which he founded himself.³⁵ His work would not have been possible without these institutions, but the same is also true for his approach as a new researcher starting out in the colony: Talking to local populations and meticulously noting all names and available habitat data were key strategies in order to make sense of the overwhelming biodiversity that resisted full scientific and classificatory comprehension.

Life in other worlds: Bleeker between Java and the eastern archipelago

Following his arrival in Java, Bleeker, as stated earlier, was not a keen traveller, carrying out most of his research activities from Java – mostly Batavia. He participated in a number of smaller expeditions into the interior of Java, but his only longer journey beyond the island took place in 1855 and brought him to the eastern parts of the archipelago, where he visited Sulawesi and a number of the Moluccan Islands, including Ternate, Tidore, Ambon, Seram, and Banda. The travel account that resulted from this journey and appeared under the title *Reis door de Minahassa en den Molukschen archipel* (Journey through the Minahassa and the Moluccan Archipelago, 1856) provides an insight into Bleeker's approach to collecting and interpreting nature.³⁶ Whilst his ichthyological publications are stringently structured around their subject matter – fish – his translated account offers far more contextualised descriptions of the landscape, geology, society, economy, flora, and fauna.

Bleeker's travels were not research expeditions into an unexplored terrain, but rather took place within a colonial and highly administrated space – and were described from such an administrative perspective. For example, his journey to Sulawesi and the Moluccas was part of a visit paid by A.J. Duymaer van Twist (then Governor-General of the Dutch East Indies) to this part of the Dutch colonial empire. Furthermore, administrative questions and matters of colonial governance are consistent elements of the travel account.³⁷ In contrast to other

travelling researchers active in the Dutch colonial empire, such as Caspar Georg Carl Reinwardt, Heinrich Kuhl, Johan van Hasselt, and Franz Wilhelm Junghuhn, Bleeker never fashioned himself as an adventurous explorer who ‘discovered’ new plants or animals in spectacular research expeditions.³⁸ The very few occasions when he caught fish himself were at the invitation of others, for example the Dutch entrepreneur Maarten Dirk van Renesse van Duivenbode, who resided in Ternate.³⁹ Van Duivenbode, who shared Bleeker’s interest in natural history and later collaborated with Alfred Russell Wallace, organised a small fishing trip at the beach near his home, seemingly to entertain Bleeker as his guest. Indeed, such activities typically had the character of leisure rather than systematic research.

Bleeker’s broad geographical approach to travel writing, which is in some regards similar to Humboldt’s, shows the islands of the eastern archipelago from a contextualised perspective, in which nature, culture, colonial economy, governance, and religion are interwoven aspects of life in an insular world.⁴⁰ Throughout the text, Java serves as an implicit point of reference to which the respective islands are compared, not only in terms of local cultures, languages, and economies, but also in terms of their flora and fauna, in which Bleeker noted striking differences to the Western archipelago. Some aspects of the area’s geology gave him an impression of striking otherness compared to the Greater Sunda Islands and, even when he saw similarities, he presented them in terms of an underlying alterity – for example when travelling through the Minahassa Peninsula of Sulawesi, which he called a ‘miniature version of Java’.⁴¹ Arriving at the peninsula, he noted the ghostly absence of mammals and reptiles, which he suspected to be too shy to appear in daylight. Indeed, the further east he travelled, the greater the discrepancies between the natural world of the Sunda Islands became.⁴²

Bleeker’s impression of a striking difference between the biospheres of the Moluccas and the fauna with which he was familiar resembles the notes he made in his first years in Java, when the local flora and fauna were still entirely new to him. This experience of unfamiliarity resulted in a number of crucial observations that were later theorised by others. Whilst Bleeker noticed a wide range of new species or high concentrations of certain animal groups or genera, his most surprising observation was the lack of certain fishes he had expected to find. As he noted both in his travel account and the zoological papers in which he went into more details on the Moluccas’ fauna, certain fish groups did not appear on Celebes and the other eastern islands, and seemed to be oddly ‘replaced’ by others. Lacking a conceptual vocabulary to theorise how ecological niches were filled in different biogeographical regions, on the fish fauna of the Bacan Islands he notes: ‘In the freshwaters, just as on Celebes, carp-like fishes are lacking and they are replaced by species from the genera *Ambassis*, *Dules*, *Mesoprion*, *Eleotris*, etc., of which only *Dules* can be regarded actual freshwater fishes.’⁴³

Bleeker's sharp eye for small differences between the faunae of the Greater Sunda Islands and the Moluccas foreshadow a ground-breaking hypothesis that was published only two years later by the 'father of biogeography', Alfred Russel Wallace.⁴⁴ Wallace used a wide range of zoological and botanical data to postulate a biogeographical line between the Indo-Malayan and the Australasian ecozones that divided the Malay Archipelago between Bali and Lombok in the south, and Borneo and Celebes in the north. Bleeker was not yet able to formulate this hypothesis, but the striking faunal differences inspired him to compare his observation to other collections that revealed the same patterns. The results of this comparative approach sometimes seemed to suggest that the fishes of the eastern archipelago were actually marine species that had only recently migrated into freshwater. However, his dependence on specimens from other collectors, and the lack of exact and reliable catch data, meant that he found himself in the same position as the European ichthyologists struggling to make sense of and interpret the notes and materials they received from others. As a result, he could only note the absence of a typical Indo-Malayan fauna, but was unable to explain the origins of Moluccan freshwater fishes. As he noted on a collection he had received from Ida Pfeiffer and Joseph Hartzfeld from Seram:

The freshwater fishes were probably caught in estuaries as they belong to species that normally live in the sea – with perhaps a single exception. What makes this collection remarkable for the freshwater fauna of the Moluccan Islands is the complete absence of cyprinids (carp-like fishes), silurids (catfishes), anabantiformes (labyrinth fishes), nonacanthines (spiny eels), etc, that are all very common in the freshwaters of the Greater Sunda-Islands.⁴⁵

The discovery of the division of the Dutch East Indies into two different ecozones was thus reserved for Wallace, even if Bleeker observed many of the faunal specifics that laid the foundation for later theories of biogeographical regions. As his travel account and his papers on the Moluccan fish fauna reflect, his approach typically relied on interactions with locals, whose knowledge and experience with the animals allowed him to contextualise his findings. Collections and notes from elsewhere were far less reliable, as information on habitats and exact sites of collection were often either lacking or, at best, unreliable. Spending only a short time on the Moluccan Islands and Sulawesi limited his ability to follow the contextualised approach he was accustomed to in Java, where he bought most of his specimens from local fishermen. Even though he tried to learn more about the fishes he collected on his journey to Celebes and Ternate via local interactions, it was more difficult to find 'knowledgeable persons' and it was only at the local fish markets that he could find such expertise.⁴⁶

Over his entire career, Bleeker sent between 12,000 and 16,000 preserved fishes to the Netherlands, most of which went to the National Museum of Natural History in Leiden.⁴⁷ As he freely admitted and often described in detail, most of these animals were bought at local fish markets, either by himself or by his contacts who sent him preserved materials from all over the Dutch East Indies. As he noted in his memoirs: 'Collecting fishes was neither very time-consuming nor very expensive. The fish markets offered an abundance of materials, and the preservation was easy.'⁴⁸ Yet, the practical advantages of acquiring fishes at local markets were not the only reason for this approach: As he was fully aware, his descriptions of 'new' species were not discoveries of hitherto unknown animals and there was already an entire body of knowledge that could be used. Throughout his ichthyological articles, compendia, and travel accounts, local fisheries appear as the most valuable sites of relevant information. His doubts about the habitats of the described animals seldom concern specimens from local sources, but typically collections from other colonial agents. Collecting and meticulously citing all local names needs to be understood as a strategy to embed and contextualise his work in a body of knowledge that already existed and that helped to make sense of the overwhelming diversity of aquatic life he encountered surrounding the islands of the Dutch East Indies. Establishing a nomenclature within this plethora of living organisms was not an act of primordial naming of a previously blank and unnamed *fauna incognita*, but rather an attempt to 'transfer' knowledge into a new scientific system.

Conclusion

In an overview on the history of ichthyology, published in 1902 in the journal *Science*, David Starr Jordan proposed a distinction between two types of post-Linnean zoologists: 'the explorers and the compilers'.⁴⁹ In his discussion of nineteenth-century Dutch ichthyologists, he presents Bleeker as a pioneer in a colonial space 'where almost everything was new' and where most of the local faunas had yet to be explored by European science.⁵⁰ Starr's judgment on Bleeker was not exceptional and both contemporaries and later historiographers consistently presented his work in terms of 'great discoveries'. The Dutch educator Enno Zuidema included Bleeker into his list of 'most significant geographical explorers', and as Pieter Harting wrote in Bleeker's obituary, 'only the number of fishes from the Indian Sea first discovered and described by him added up to more than 1,100 species', not to mention the many freshwater fishes.⁵¹

Situating Bleeker's approach to ichthyological research and collection practices in the context of their interactions with Javanese and Moluccan locals makes clear

that his immensely productive career defies the heroic tropes of scientific fieldwork and exploration into a hitherto unknown nature.⁵² Adventurous research expeditions into unexplored hinterlands such as those undertaken by contemporaries like Arthur B. Wallace were very different: Such endeavours would have turned the *Atlas Ichthyologique* into an unmanageable project of which only fragments could be finished during his lifetime. Fieldwork did not consist of hazardous expeditions to unknown places, but more typically of visits to local markets, conversations with fishermen, and the establishment of correspondence networks with people who were willing to send him preserved specimens, the latter being the least fruitful, as he had to rely on the sources of information his contacts were able to provide. In contrast to other travelling naturalists and researchers, this rhetoric of discovery is largely absent from Bleeker's work and his dependence on local knowledge, sources, and infrastructures is always clear.

It is remarkable that the vast majority of the Indo-Pacific fish species that were described in the Dutch colonial period were of direct or indirect relevance to local fisheries. Very few of the fishes in Bleeker's ichthyological works were smaller than 5 cm and lacked any nutritional value – indeed, the vast majority of such small species were only described after the 1950s.⁵³ This discrepancy reflects the crucial dependence of Dutch colonial science on interactions with local and indigenous communities: The knowledge of Dutch ichthyologists was little more than the knowledge of local fishing communities, translated into an academic framework. In other words, what Bleeker and his European informants knew was what they received from locals who caught the fish and could provide information about their habitats as well as their local names. Wherever Bleeker lacked such information, he lamented the incompleteness of his descriptions.⁵⁴

Such colonial approaches to collecting and systematising have thus far received less attention than they deserve. The role of indigenous expertise and assistance in colonial research expeditions has been more widely acknowledged, for example in the case of Ali 'Wallace' from Sarawak, who assisted Alfred Russell Wallace as a fieldwork assistant.⁵⁵ The importance of indigenous knowledge in less spectacular forms of collecting and knowledge production is equally important and the full ethnobiological significance of the indigenous fish names Bleeker collected has yet to be fully examined and explored. As Bleeker's case shows, the role of Asian native knowledge systems in colonial science goes far beyond aid and assistance in expeditions and a full acknowledgment of indigenous agency begs the question to what extent European 'discoveries' were in fact also processes of transfer between different systems and archives of knowledge.

Notes

- ¹ See for example Woodruff, 'Biogeography and Conservation in Southeast Asia'.
- ² For a discussion of the various ways in which this is estimated and the respective methods and definitions, see Martha, 'The Analysis of Geospatial Information'.
- ³ Bleeker, *Atlas Ichthyologique*, 9 vols.; Bleeker, 'Levensbericht P. Bleeker,' 23: 'geenszins kon ik vermoeden dat een tijdvak van minstens veertig jaar noodig zou blijken, om het geheel tot uitvoering te brengen.' For a detailed revised chronology of the *Atlas Ichthyologique*'s publication history, see Kottelat, 'Dates of Publication of Bleeker's Atlas'.
- ⁴ Bleeker, *The Fishes of the Indian Archipelago. Part I*, 13.
- ⁵ For a seminal argument in favour of the crucial importance of specific 'places' in the production of scientific knowledge, see Livingstone, *Putting Science in Its Place*.
- ⁶ Ban, Frid, et al., 'Incorporate Indigenous Perspectives'; Gillman & Wright, 'Restoring Indigenous Names in Taxonomy'.
- ⁷ Buchanan-Hamilton named far more species after local Asian names than Bleeker, but did not systemically indicate these indigenous names in his descriptions. See Buchanan-Hamilton, *An Account of the Fishes Found in the River Ganges*.
- ⁸ See e.g., Bleeker, 'Fragmenten eener Reis over Java' [Midden-Java], 230-234; Bleeker, 'Fragmenten eener Reis over Java' [Oostelijk Java], 140-143; Bleeker, *Bijdrage tot de kennis der Ichthyologische fauna van Midden- en Oost-Java*, 6-13.
- ⁹ Vom Bruck & Bodenhorn, *The Anthropology of Names*; Hough, *The Oxford Handbook of Names and Naming*. For ethnobiological approaches to names and naming, see Berlin, *Ethnobiological Classification*. On pre-Linnaean forms of scholarly naming practices in Europe, see e.g., Berrens, 'Naming an Unknown Animal'.
- ¹⁰ Ban, Fried, et al., 'Incorporate Indigenous Perspectives'; Gillman & Wright, 'Restoring Indigenous Names'; Rubis, 'The Orang Utan Is Not an Indigenous Name'; Whaanga, Papa, Wehi & Roa, 'The Use of the Māori Language in Species Nomenclature'.
- ¹¹ Freire & Pauly, 'Richness of Common Names'; Palomares, Garilao & Pauly, 'On the Biological Information Content of Common Names'.
- ¹² Finch, 'Naming Names'.
- ¹³ Austin, *How to Do Things with Words*, 6.
- ¹⁴ In a provocative and controversial argument, ecologist Carol K. Yoon proposed to disconnect nomenclature from genetic systematics in order to preserve more 'intuitive' and traditional naming systems even if they no longer correspond to newer genetic insights: 'But taxonomy is not just another science, born out of naked reason and using elegant experimentation to make its way steadily forward. Taxonomy is instead a science born out of an ancient human practice – the ordering and naming of life out of the urgings of the human *umwelt*.' Yoon, *Naming Nature*, 16.
- ¹⁵ Bleeker, *The Fishes of the Indian Archipelago. Part I*, 13.
- ¹⁶ Bleeker, 'Levensbericht', 22-23. Looking back to his childhood, he notes that scholarly fame was already an ambition. See Bleeker, 'Levensbericht', 14-15.
- ¹⁷ Bleeker, 'Levensbericht', 14: 'Ook rekende men mij volstrekt niet onder de knapste scholieren, maar wel onder de voornaamste der belhamels.'
- ¹⁸ Bleeker, 'Levensbericht', 23: 'Toen ik trachtte meer van nabij bekend te worden onder anderen met de te Batavia voorkomende vischsoorten, stuitte ik spoedig op een aantal mij volstrekt onbekende vormen.'
- ¹⁹ Bleeker, *The Fishes of the Indian Archipelago. Part I*, 14.

- ²⁰ On Bleeker's identification as a 'self-made man,' see Bleeker, 'Levensbericht', 43. As he states here, his return from the colony to the homeland was, at least partly, one of disillusionment as he realised that social mobility was still very limited compared to his experience in the Dutch East Indies: 'In het oude Nederland waren de self-made men de uitzonderingen.'
- ²¹ Bleeker, 'Levensbericht'. On Bleeker's role in colonial-scientific infrastructural networks, see also Groot, *Van Batavia naar Weltevreden*, 315-16; Boomgaard, 'The Making and Unmaking of Tropical Science', 200-201.
- ²² For other fruitful ethnotaxonomic and ethnoichthyological approaches to Southeast Asian fish faunas, see e.g., Hidayati, Aminah, Ghani, et al., 'Using Ethnotaxonomy'. On the crucial importance of ethnoichthyological knowledge for conservation and fishery management, see Previero, Minte-Vera & De Moura, 'Fisheries Monitoring in Babel'.
- ²³ See e.g., Bleeker, *The Fishes of the Indian Archipelago. Part I*, 275-276.
- ²⁴ Bleeker, 'Bijdrage tot de kennis der Visschen met doolhofvormige kieuwen', 8. Pier Jakles was a fellow army surgeon stationed in West Sumatra who provided Bleeker with fish specimens.
- ²⁵ In modern Malay, the climbing perch is mostly only called *Betokh* or *Betik*, without the generic *Ikan*. *Ikan gabus*, however, is still in use as the common name for the striped snakehead *Channa striata* (Bloch, 1793). For *Channa striatus* (named *Ophicephalus* by Bleeker), see 'Bijdrage tot de kennis der Visschen met doolhofvormige kieuwen', 13-14.
- ²⁶ Bleeker, 'An Illustrated Translation of Bleeker's Fishes', 139, 156, 158, 173, 181, 189, 200, 202, 213, 309; Bleeker, *The Fishes of the Indian Archipelago. Part I*, 78, 92, 102, 107, 109, 114, 116.
- ²⁷ Bleeker, 'An Illustrated Translation of Bleeker's Fishes', 309.
- ²⁸ Bleeker, *Labroideorum Ctenoideorum Bataviensium diagnoses*, 29.
- ²⁹ Some of Bleeker's Malay- or Sundanese-based species names are no longer valid, for example the horse mackerel species *Decapterus lajang*, *Decapterus kurra*, *Selar malam*, *Selar para*, or *Selar xanthurus*.
- ³⁰ Bleeker, *Bijdrage tot de kennis der Ichthyologische fauna van Midden- en Oost-Java*; Bleeker, *Bijdrage tot de kennis der Visschen met doolhofvormige kieuwen*.
- ³¹ Cuvier & Valenciennes, *Histoire naturelle*, vol. 18, 385. See also Roberts, 'The Freshwater Fishes of Java'. On the nomenclatural confusion around the genera *Panchax* and *Betta*, see Klee, 'Panchax vs. Killifish', 23.
- ³² Bleeker, *An illustrated translation of Bleeker's Fishes*, 467.
- ³³ See also Livingstone, *Putting Science in Its Place*, 16.
- ³⁴ Kamal, Tan & Ng, 'Betta Nuluhon'.
- ³⁵ Bleeker, 'Levensbericht', 29-34.
- ³⁶ Bleeker, *Reis door de Minahassa*. See also Bleeker, 'Levensbericht', 29-34.
- ³⁷ Large parts of the 'Journey through Minhassa' are concerned with questions of agriculture and economy, and the ways in which the islands can be incorporated into the Dutch colonial system. See e.g., Bleeker, *Reis door de Minahassa*, 42-44, 71-75, 261-267.
- ³⁸ On Reinwardt's 'rhetoric of discovery', see Judith E. Bosnak & Rick Honings' contribution to this volume. See also Weber, *Hybrid Ambitions*, 159-166. On Reinwardt, van Hasselt, Kuhl, and Junghuhn, see also Boomgaard, 'The Making and Unmaking of Tropical Science', 199-201.
- ³⁹ Bleeker, 'Zevende bijdrage tot de kennis der ichthyologische fauna van Ternate', 358.
- ⁴⁰ On Humboldt's integrative approach to geography and travel writing, see Buttner, 'Beyond Humboldtian Science and Goethe's Way of Science', 107-109.
- ⁴¹ Bleeker, *Reis door de Minahassa*, 20.
- ⁴² Bleeker, *Reis door de Minahassa*, 20-21. On notable differences between the mammalian fauna of the Greater Sunda Islands and the Moluccas, see Bleeker, *Reis door de Minahassa*, 60-61.

- ⁴³ Bleeker, *Reis door de Minahassa*, 248-249: 'In de zoete wateren ontbreken hier, even als op Celebes, de karperachtige visschen, die er vervangen zijn door soorten van Ambassis, Dules, Mesoprion, Eleotris enz., van welke slechts die van Dules als eigenlijke zoetwatervisschen aan te merken zijn.'
- ⁴⁴ Camerini, 'Evolution, Biogeography, and Maps', 704.
- ⁴⁵ Bleeker, 'Derde bijdrage tot de kennis der ichthyologische fauna van Ceram', 234: 'De zoetwatervisschen zijn evenwel waarschijnlijk in de riviermondingen gevangen, omdat zij, met welligt slechts eene enkele uitzondering, tot soorten behooren, welke gewoonlijk in zee leven, zoodat deze verzameling voor de zoetwaterfauna van de Moluksche eilanden slechts merkwaardig is door het volstrekt gemis van Cyprinoiden, Siluroïden, Osphromenoiden, Notacanthinen, enz., welke in de zoete wateren van de groote Soenda-eilanden zoo algemeen zijn.'
- ⁴⁶ Bleeker, 'Zevende bijdrage tot de kennis der ichthyologische fauna van Ternate', 358: 'Van de visschen, op de markt gekocht, heb ik de namen kunnen aantekenen, waaronder zij te Ternate bekend zijn. Ten opzichte der overige visschen ontbrak mij daartoe de tijd en de aanwezigheid van deskundige personen.'
- ⁴⁷ In his memoirs, Bleeker estimates the number of fishes he had sent to Leiden to be 12,000 specimens, in another note indicating the number may have even reached 16,000. See Bleeker, 'Levensbericht', 38; Van Oijen, 'Data on the Genesis of the Atlas Ichthyologique', 3-8. On Dutch colonial practices of collecting and the transfer of preserved specimens to Dutch natural history collections, see Weber, 'Collecting Colonial Nature'.
- ⁴⁸ Bleeker, 'Levensbericht', 23: 'Het verzamelen van visschen was noch zeer tijdroovend, noch zeer kostbaar. De vischmarkten leverden overvloed aan materiaal en de bewaring der voorwerpen was gemakkelijk, vermits zij slechts na eene kleine toebereiding in hun geheel in arak behoeften te worden geplaatst.' For more references to markets as a source for fishes, see e.g., Bleeker, 'An Illustrated Translation of Bleeker's Fishes', 149; Bleeker, *Reis door de Minahassa*, 39, 174, 200, 224; Bleeker, 'The Fishes of the Indian Archipelago. Part I', 80, 84, 86, 93, 107, 118, 120, 123, 157, 172, 228, 252, 287, 310, 316.
- ⁴⁹ Starr Jordan, 'The History of Ichthyology', 246.
- ⁵⁰ Starr Jordan, 'The History of Ichthyology', 254.
- ⁵¹ Zuidema, *De voornaamste aardrijkskundige ontdekkingen*, 9; Bleeker, 'Levensbericht', 8 (preface by P. Harting): 'Alleen het getal der door hem in de Indische zee nieuw ontdekte en beschreven soorten bedraagt meer dan 1100.'
- ⁵² On the self-fashioning of colonial scientific travelers as 'discoverers', see e.g., Byrne, 'The Scientific Traveler', 20-21.
- ⁵³ One of many examples would be the fishes in the genus *Parosphromenus*, none of which exceeds 4.5 cm. The genus was established by Bleeker in 1859, but he knew of only one species. Between 1979 and 2021, more than 20 new species were added to this group. See Shi, Wentian, Guo, et al., 'Diagnoses of Two New Species of *Parosphromenus*', 71.
- ⁵⁴ See e.g., Bleeker, 'Zevende bijdrage tot de kennis der ichthyologische fauna van Ternate', 358.
- ⁵⁵ Camerini, 'Wallace in the Field'; Van Wyhe, 'Wallace's Help'; Van Wyhe & Drawhorn, 'I am Ali Wallace'.

Bibliography

- Austin, J.L., *How to Do Things with Words: The William James Lectures Delivered at Harvard University in 1955* (Oxford: Clarendon Press, 1962).
- Ban, Natalie C. & Alejandro Frid et al., 'Incorporate Indigenous Perspectives for Impactful Research and Effective Management', in: *Nature Ecology & Evolution* 2 (2018), 1680-1683.
- Berlin, Brent, *Ethnobiological Classification: Principles of Categorization of Plants and Animals in Traditional Societies* (Princeton: Princeton University Press, 1992).
- Berrens, Dominik, 'Naming an Unknown Animal: The Case of the Sloth (Folivora)', in: *Archives of Natural History*, 47 (2020) 2, 325-343.
- Bleeker, Pieter, 'An Illustrated Translation of Bleeker's Fishes of the Indian Archipelago. Part II: Cyprini'. Ed. and transl. Martien van Oijen & Ineke Loots, *Zoologische Mededelingen Leiden*, 86 (2012), 1-469.
- Bleeker, Pieter, 'The Fishes of the Indian Archipelago: Part I – Siluri'. Ed. and transl. by Martien van Ooijen, Ineke Loots & Florence Limburg, in: *Zoologische Mededelingen Leiden* 83 (2009), 1-317.
- Bleeker, Pieter, *Atlas ichthyologique des Indes orientales néerlandaises: Publié sous les auspices du gouvernement colonial néerlandais*. 9 vols. (Amsterdam: Frederik Muller, 1862-1878).
- Bleeker, Pieter, 'Levensbericht P. Bleeker', in: *Jaarboek van de Koninklijke Academie van Wetenschappen* (1877), 5-159.
- Bleeker, Pieter, *Reis door de Minahassa en den Molukschen archipel: Gedaan in de maanden september en oktober 1855 in het gevolg van den gouverneur generaal Mr. A.J. Duymaer van Twist*, 2 vols. (Batavia: Lange, 1856).
- Bleeker, Pieter, 'Zevende bijdrage tot de kennis der ichthyologische fauna van Ternate', in: *Natuurkundig tijdschrift voor Nederlandsch Indië* 10 (1856), 357-386.
- Bleeker, Pieter, 'Derde bijdrage tot de kennis der ichthyologische fauna van Ceram', in: *Natuurkundig tijdschrift voor Nederlandsch Indië* 5 (1853), 233-248.
- Bleeker, Pieter, *Bijdrage tot de kennis der Ichthyologische fauna van Midden- en Oost-Java, met beschrijving van eenige nieuwe species* (Batavia: Lange, 1850).
- Bleeker, Pieter, 'Bijdrage tot de kennis der Visschen met doolhofvormige kieuwen van den Soenda-Molukschen Archipel', *Verhandelingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen* 23 (1850), 1-15.
- Bleeker, Pieter, 'Fragmenten eener Reis over Java: Reis door de Binnenlanden van Midden-Java', in: *Tijdschrift voor Nederlandsch Indië*, 7-12 (1850) 2, 1-22, 81-98, 141-169, 219-238.
- Bleeker, Pieter, 'Fragmenten eener Reis over Java: Reis door Oostelijk Java', in: *Tijdschrift voor Nederlandsch Indië*, 7-10 (1849) 2, 1-55, 93-145, 177-190, 266-270.
- Bleeker, Pieter, *Labroideorum Ctenoideorum Bataviensium diagnoses et adumbrationes. Verhandelingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen* (Batavia: Lange, 1849).
- Boomgaard, Peter, 'The Making and Unmaking of Tropical Science: Dutch Research on Indonesia, 1600-2000', in: *Bijdragen tot de Taal-, Land- en Volkenkunde* 162 (2006) 2/3, 191-217.
- Bruck, Gabriele vom & Barbara Bodenhorn, *The Anthropology of Names and Naming* (Cambridge/UK: Cambridge University Press, 2006).
- Buchanan-Hamilton, Francis, *An Account of the Fishes Found in the River Ganges and Its Branches* (Edinburgh: Constable, 1822).
- Buttimer, Anne, 'Beyond Humboldtian Science and Goethe's Way of Science: Challenges of Alexander Von Humboldt's Geography', in: *Erdkunde*, 55 (2001) 2, 105-120.

- Byrne, Angela, 'The Scientific Traveller', in: Alasdair Pettinger & Tim Youngs (eds.), *The Routledge Research Companion to Travel Writing* (Abingdon: Routledge, 2020), 17-29.
- Camerini, Jane R., 'Evolution, Biogeography, and Maps: An Early History of Wallace's Line', in: *Isis*, 84 (1993), 700-727.
- Camerini, Jane R., 'Wallace in the Field', in: *Osiris* 11 (1996), special volume *Science in the Field*, 44-65.
- Cuvier, Georges & Achille Valenciennes, *Histoire naturelle des poissons*. 22 vols. (Paris: Levrault, 1828-1849).
- Finch, Janet, 'Naming Names: Kinship, Individuality and Personal Names', in: *Sociology*, 42 (August 2008) 4, 709-725.
- Freire, Katia & Daniel Pauly, 'Richness of Common Names of Brazilian Marine Fishes and Its Effect on Catch Statistics', in: *Journal of Ethnobiology* 25 (2005) 2, 279-296.
- Gillman, Len Norman & Shane Donald Wright, 'Restoring Indigenous Names in Taxonomy', in: *Nature Communications Biology* 3 (2020): article number 609 (2020).
- Groot, Hans, *Van Batavia naar Weltevreden: Het Bataviaasch Genootschap van Kunsten en Wetenschappen, 1778-1867* (Leiden: Brill, 2009).
- Hidayati, Syafitri, Bibi Aminah, Abdul Ghani, Beena Giridharan, et al., 'Using Ethnotaxonomy to Assess Traditional Knowledge and Language Vitality: A Case Study with the Vaie People of Sarawak, Malaysia', in: *Ethnobiology Letters* 9 (2018) 2, 33-47.
- Hough, Carole, *The Oxford Handbook of Names and Naming* (Oxford: Oxford University Press, 2016).
- Kamal, Syafiqah Shamsul, Heok Hui Tan & Casey Keat-Chuan Ng, 'Betta Nuluhon, a New Species of Fighting Fish from Western Sabah, Malaysia (Teleostei: Osphronemidae)', in: *Zootaxa* 4819 (2020) 1, 187-194.
- Klee, Albert J., 'Panchax vs. Killifish: The Origin of "Panchax"', in: *American Currents* 40 (2013) 3, 23-30.
- Kottelat, Maurice, 'Dates of Publication of Bleeker's Atlas ichthyologique and Poissons de Madagascar', in: *Zootaxa*, 3681 (2013), 281-285.
- Livingstone, David, *Putting Science in Its Place: Geographies of Scientific Knowledge* (Chicago: University of Chicago Press, 2003).
- Martha, Sukendra, 'The Analysis of Geospatial Information for Validating Some Numbers of Islands in Indonesia', in: *The Indonesian Journal of Geography* 49 (2017) 2, 204-211.
- Oijen, Martien van, 'Data on the Genesis of the Atlas Ichthyologique from a Little Known French Paper by P. Bleeker', in: *The Raffles Bulletin of Zoology Supplement* 13 (2005), 3-8.
- Palomares, Marie Lourdes, Cristina V. Garilao & Daniel Pauly, 'On the Biological Information Content of Common Names: A Quantitative Case Study of Philippine Fishes', in: B. Séret & J.-Y. Sire (eds.), *Proceedings of the 5th Indo-Pacific Fish Conference* (Nouméa: Paris, Société Française d'Ichtyologie, 1999), 861-866.
- Previero, Marília, Carolina V. Minte-Vera & Rodrigo Leão de Moura, 'Fisheries Monitoring in Babel: Fish Ethnotaxonomy in a Hotspot of Common Names', in: *Neotropical Ichthyology* 11 (2013) 2, 467-476.
- Roberts, Tyson R., 'The Freshwater Fishes of Java, as Observed by Kuhl and van Hasselt in 1820-23', in: *Zoologische Verhandlungen* 285 (1993).
- Rubis, June Mary, 'The Orang Utan Is Not an Indigenous Name: Knowing and Naming the Maia as a Decolonizing Epistemology', *Cultural Studies*, 34 (2020) 5, 811-830.
- Shi, Wentian, Shujie Guo, et al., 'Diagnoses of Two New Species of Parosphromenus (Teleostei: Osphronemidae) from Bangka Island and Kalimantan, Indonesia', in: *Zootaxa* 5060 (2021) 1, 71-92.
- Starr Jordan, David, 'The History of Ichthyology', in: *Science* 16 (1902) 398, 241-258.
- Weber, Andreas, 'Collecting Colonial Nature: European Naturalists and the Netherlands Indies in the Early Nineteenth Century', *BMGN – Low Countries Historical Review* 134 (2019) 3, 72-95.

- Weber, Andreas, *Hybrid Ambitions: Science, Governance, and Empire in the Career of Caspar G.C. Reinwardt (1773-1854)* (Leiden: Leiden University Press, 2012).
- Whaanga, Hēmi, Wiki Papa, Priscilla Wehi & Tom Roa, 'The Use of the Māori Language in Species Nomenclature', in: *Journal of Marine and Island Cultures* 2 (2013) 2, 78-84.
- Woodruff, David S., 'Biogeography and Conservation in Southeast Asia: How 2.7 Million Years of Repeated Environmental Fluctuations Affect Today's Patterns and the Future of the Remaining Refugial-Phase Biodiversity', in: *Biodiversity and Conservation* 19 (2010) 4, 919-941.
- Wyhe, John van, 'Wallace's Help: The Many People Who Aided A. R. Wallace in the Malay Archipelago', in: *Journal of the Malaysian Branch of the Royal Asiatic Society* 91 (2018) 1, 41-68.
- Wyhe, John van & Gerrell M. Drawhorn, "'I am Ali Wallace": The Malay Assistant of Alfred Russel Wallace', in: *Journal of the Malaysian Branch of the Royal Asiatic Society* 88 (2015) 1, 3-31.
- Yoon, Carol K., *Naming Nature: The Clash between Instinct and Science* (New York: Norton, 2009).
- Zuidema, Enno, *De voornaamste aardrijkskundige ontdekkingen en ontdekkers* (Utrecht: Bijleveld 1881).