

Special Issue

Dining on Geologic Fish: Claiming the Australian *Ceratodus* for Science

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The Australian lungfish was discovered for science by Australian Museum curator Gerard Krefft in 1870. He immediately recognized that it was a “living fossil” linking fish and amphibians. He quickly named the fish and sent specimens around the world. The bodies of the transformed, travelling fish became a personal and material connector as they entered the unstable, relational exchange economies and value scales of international science. Still, there were gaps in relations and processes: in incomplete specimens, in long supply chains and delayed communications, in translating and translocating field knowledge of the living fish, and in the credibility and authority of the colonial scientists who were vying for imperial attention. In these gaps we can see the local practice of settler-scientists, colonists and the local Gubbi Gubbi people, along with other possible ontologies of nature and culture. From that gap, and the acute anxiety of description and classification on the colonial edge, we can also see the creation of the very odd fantasy-fish, the *Ompax*.

The scientific history of the Australian lungfish, *Ceratodus forsteri*, and its strange cousin the *Ompax*, demonstrate what happened when affect, ambition and stubbornness, local materiality, story, and practice met the geographical and material constraints and odd, instrumental logic of imperial natural history. It is an object lesson in the crucial importance and the limits of go-betweens in field knowledge-making and the persistence of other lineages and ways of knowing within museum specimen collections and the archives of colonial science.

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Fancy a triton or a newt three feet in length, covered in huge scales the size of a crown piece, with four scaly flappers or fins instead of legs, with four plates of horny teeth, two in each jaw, which resemble segments of a cog-wheel in a horizontal position—with a tail like a Siluroid or Catfish, with small eyes and a partly cartilaginous skeleton, and the modern *Ceratodus* is complete.¹

Gerard Krefft, 1870

Scientist and museum curator Gerard Krefft (1830–1881) had only “discovered” the Australian lungfish days earlier when he described it in fanciful detail in 1870. However, he already understood its enormous

¹ Krefft, “To the Editor.” Gerard Krefft arrived in Australia from Brunswick, now in Germany, during the gold rush in 1852. His first natural history work was conducted on an 1857 expedition to the Murray River led by Wilhelm Blandowski. He was appointed to the Australian Museum in Sydney in 1860 and became Director in 1864. His broad scientific interests crossed paleontology and zoology. In 1874 he was dismissed from the museum and died in Sydney in 1881. Nancarrow, “Gerard Krefft.”

significance.² It was a fish with both gills and lungs: a transitional link between fish and amphibians with a direct link to the fossil record. As Thomas Huxley wrote later, “this wonderful creature seems contrived for the illustration of the doctrine of Evolution.”³ Scientific publication and endorsement from the European scientific establishment was slow and difficult from the remote colony and would mean many months delay for his announcement, so Krefft did not wait to publish a formal description in a scientific journal. Instead, he shared his exciting news in a letter to the editor of the local newspaper, the *Sydney Morning Herald*:

To the Editor of the Herald

One of the most important discoveries in Natural History has lately been made by the Minister for Lands, the Hon. William Forster, MLA, in the shape of an amphibious creature inhabiting northern streams and lagoons, the teeth or dental plates of which resemble some fossil fish-teeth of the Liassic Period.⁴

There are three different *Ceratodus forsteri* in Krefft’s description. The composite, mythical beast was for the imaginary grasp of the newspaper’s general readership. This description played to well-established nineteenth-century stereotypes of Australian nature as a place for curious, uncertain, and extraordinary animals.⁵ In turn, these disorderly animals were important cultural identifiers for the colony, a place that became (and still is) peculiarly over-identified with its unusual flora and fauna.⁶ Naming animals is as much a social process as a scientific one, and there is a social fish here too, that paid homage to influential New South Wales colonial politician, William Forster (1818–1882). Faux-modestly, Krefft allowed Forster the discovery of the fish and in the reciprocal gift economy of taxonomic naming, it was Forster’s origin story that Krefft immortalized in naming it *Ceratodus forsteri*.⁷ Not coincidentally, Krefft’s act of attaching Forster’s name to the fish also gives permanent place to the apparently haphazard, artless story of the genius of Krefft who recognized the fish’s “true character” by seeing it as a “missing link,” a revelation that had apparently eluded all others and was only possible with Krefft’s particular blend of scientific knowledge, local field experience, and imagination.⁸ It is the naming of the lungfish after Forster that was also responsible for one of the most persistent stories still attached to the *Ceratodus forsteri*. This is the untrue, but compelling, origin fiction that Krefft discovered the fish’s scientific novelty once it had been cooked and prepared and was served to him at a Sydney dinner party.

Not mentioned by Krefft is the fact that by 1870 the fish was already well known in the Mary River and Wide Bay district in north Queensland where it still lives, and that it already had several local names and an established place in the economic, cultural and social lives of the district. There, well before it became an object for scientific observation, collection and knowing, the lungfish was revered and cared for by the local Gubbi Gubbi people, who named it “barramunda” and “Dala.” They had always lived side-by-side with the giant, slow fish and incorporated its being and presence into their own complex explanations of the natural world in human-animal genealogies, story, and knowledge practice.⁹ Sacred Dala was not considered a taxonomic problem to be solved for the Gubbi Gubbi, but rather seen as a companionable friend when it surfaced at night to breathe close by their riverbank camps. The pragmatic, prosaic recent colonial settlers in the area knew and traded the fish too. They called it the Burnett River Salmon, after the river in which it lived and its pink flesh and good eating.

There was no shared language, scale, or epistemological framework for interpreting, understanding and knowing the Queensland lungfish on Australia’s far-stretched, contested and sometimes violent colonial edge. But Australia’s ambitious scientific men tried their best to make one. They extracted the lungfish from its environment as a classic “boundary object”: a mobile carrier not just for their own heroic stories

² Conant, “Historical Overview.” For contemporary lungfish science, see Meyer et al., “Giant Lungfish Genome.”

³ Huxley, “The Laws of Evolution.” Huxley wrote a full scientific description of the *Ceratodus* in “On *Ceratodus Forsteri*” in 1876.

⁴ Krefft, “To the Editor.”

⁵ Ritvo, *The Platypus*; Olsen, *Upside-Down World*.

⁶ Franklin, *Animal Nation*.

⁷ In 1982 *Ceratodus forsteri* was renamed *Neoceratodus forsteri*. I retain the older nomenclature as I am referring to the fish in its historical context.

⁸ Krefft, “To the Editor.” For speculation on why the uncharismatic *Ceratodus* had not been “discovered” before 1870, see Robin, “Paradox.”

⁹ Audrey Appudurai, “The Lungfishes,” 82–84. Bird Rose explains Indigenous Australian concepts of multispecies kinship and connectivity in “Shimmer.”

of discovery, for scientific knowledge and a history of collecting, but for evolutionary theory and deep time itself.¹⁰ However, the bridge was not secure or the translation complete, and into the gap between local being and stasis, and scientific explanation and circulation fell yet two more lungfish. The specimens themselves, emptied of story and traded and exchanged as fungible objects in complex systems of scientific value, came to rest anonymously on museum shelves around the world.¹¹ The improbable *Ompax*, a purely literary fish, was conjured by local settlers from the same scientific naming tools and hierarchies, combined with the uncertain origins of “field” knowledge that was not as self-evident as it seemed.

Situating nature is essential to a more connected and complex global-local history of science. My article describes the late nineteenth-century scientific discovery of the Australian lungfish to consider knowledge-making and its ecologies in a settler-colonial context. However, on the Australian colonial “edge” where “colonialism has been a struggle over archives and its processes as much as anything else,” it is important to look also at the multiple agencies and exchanges involved in the creation, translation and mobilization of scientific knowledge.¹² It is in the movement of specimens away from the field of collection, and especially in their peer-to-peer exchange, that their scientific value changed and grew. And it is only through relationships and the work of “go-betweens” operating both in the field and in museums that exchange could happen in what Australian historian of science Warwick Anderson calls “the libidinal economy of the field.”¹³ Krefft himself, with his special combination of situated experience, knowledge and access, was more than a mere go-between. Like the lungfish itself, he was a living “missing link” that could connect Australian nature and placeless science.

The first specimens of Australian lungfish were quickly translated and memorialized in scientific images and text. They were also made into material objects that could be valued and traded. Left behind in this process is the Aboriginal archive, embedded not in the place-based object-work of fieldwork, but instead in the ontology of “Country” that is “a kind of mutual knowledge transfer between place, person, and history.”¹⁴ Unknown and unreported by colonial settlers and scientists, and far removed from colonial-scientific memory practices, the story of “Dala” was transmitted in song and story by authorized custodians who continued to “live” (carry, care for, activate, add, inscribe, interpret) their archive into the present. Science is just one—dominant and privileged—system of knowledge in the intercultural zone created around the *Ceratodus* in colonial Australia.¹⁵

Creating a Lungfish for Science

The twin goals of the advancement and promotion of Australian natural science and the cultivation of his own scientific persona constituted Gerard Krefft’s professional and personal mission. Krefft had worked hard and long to establish his career in museum natural science.¹⁶ Appointed curator at the Australian Museum in Sydney in 1864, he published widely on Australian snakes, mammals, minerals and rocks and he was particularly well regarded for his work on Australia’s fossil fauna. Forthright and opinionated, he remained unpopular with most of the museum’s conservative governing trustees who admired his scientific output and energy but mistrusted both his methods and his enthusiasm for scientific novelty.

In his first description of the *Ceratodus*, Krefft provides careful scientific framing for his “geologic fish.” Above all, for Krefft the fish provides a clear example of Charles Darwin’s new evolutionary theory, that had been heavily influenced by the time Darwin spent in Australia in 1836 and that was published in 1859. In the Australian colonies in 1870, Darwin’s radical rethinking of the origin of species was still regarded with general suspicion and antagonism. However, Krefft was a rare supporter and advocate of Darwin’s ideas, proselytizing his theories in the newspapers and at the museum and also sending Darwin corroborative data.¹⁷ Krefft saw that the living fish’s teeth matched those from both the Australian fossil record and the work of creationist paleontologists Louis Agassiz in North America and Richard Owen in London on similar fossil fish from South America.

¹⁰ Star and Griesemer, “Boundary Objects,” 411–13. At the natural history museum, boundary objects including specimens enable scientists, amateurs, and administrators to reconcile meanings, communicate, and cooperate to represent “Nature.”

¹¹ Driver et al., *Mobile Museums*.

¹² Anderson, “Edge Effects.”

¹³ My use of the term “go-betweens” builds on the work of Schaffer et al. in pointing out their crucial role in the creation of mobile knowledge and modern science. See “Introduction” to *The Brokered World*. Anderson, “Objectivity,” 558.

¹⁴ Neale, “Knowledge in Country,” 62.

¹⁵ On de-colonising natural history collections, see Das and Lowe, “Nature Read.”

¹⁶ Nancarrow, “Gerard Krefft.”

¹⁷ Moyal, “Evolution in Australia,” 139–45.

Krefft was not shy of the implications of his naming the fish as a *Ceratodus*, and bringing it into debates about the distinctions between fish and reptiles and of evolution by natural selection. In his letter he wrote that “we cannot be surprised at the discovery of fresh links connecting the ancient fauna with that of the present day... [since] it is in Australia in particular where zoological questions of great importance will yet be solved.” In asserting this, Krefft was making a direct challenge to mainstream anti-Darwin thought within Australian science and museums and following Darwin in making a strong claim to put Australia at the forefront of world evolutionary studies. He will, he confidently asserted, “be found correct.” However, Krefft’s confidence was misplaced, and it would be another twenty years before evolutionary theory was settled science in Australian museums and universities.

In deliberately making the lungfish into a carrier of evolutionary arguments, Krefft placed himself in the company of the greatest scientific minds of the Victorian age. In just one, assertive paragraph he name-checked his work against paleontologists Richard Owen and Louis Agassiz, and the preeminent defender of Darwin’s theory, Professor Huxley. In Sydney, his description was directed at the conservative anti-Darwinists amongst the trustees of the Australian Museum and the article’s subtext is an unspoken war over interpretation and scientific authority. Krefft redoubled his provocation when he reported back on the unanimous praise and endorsement of his classification by the leading European scientists of his day.¹⁸ He quoted from letters he had received from Mr. Sclater at the Zoological Society of London (“one of the finest Zoological discoveries of this period”) paleontologist Sir Phillip Egerton (“this is the most important discovery that has been made in modern times, with reference to fossil ichthyology”) and curator Albert Günther from the British Museum (“I congratulate you ... you are right ... the fish is a true *Ceratodus*.”)

Of course, Krefft himself was also a “living link.” Both working within the limitations and using the advantages of his position on the colonial periphery, Krefft positioned and figured himself as both the essential practical go-between and as the central knowledge broker in naming and describing the *Ceratodus*. He could not only work between field and museum to procure and disseminate specimens, but he could also leverage his first-hand experience of Australia’s living and fossil animals to link developing European scientific knowledge with the exciting theoretical possibilities of Australia’s category-defying fauna.

The material remains that formed the evidence base for this scientific *Ceratodus*, however, were not complete. Just two specimens had been sent to Sydney from Queensland. Packed in a box, they were preserved in salt, with their insides removed and therefore missing the distinctive lung that allows them to breathe both in and out of water. For years, William McCord and his cousin William Forster, both landholders in the Burnett River district, had been trying to get the fish noticed by the colony’s scientific establishment.¹⁹ As settler-landholders and not naturalists or sanctioned natural history collectors, they were not considered reliable or credible scientific observers and their findings were ignored.²⁰ Krefft himself admitted that only five years earlier he had dismissed the lungfish’s significance.²¹

Krefft’s own training and practice as a naturalist was based in extended fieldwork and collecting and he knew that embedded, local understanding and assistance would be crucial both for an understanding of the lungfish and for securing a reliable specimen supply. In February, he made a newspaper appeal for local settlers to send specimens to the Australian Museum, as “it is only through the resident settlers that many questions can be cleared up.”²² However, translations between the local and the scientific, and animal and text were not always smooth. Neither were local observations always reliable. By July, rumor had reached Sydney that the *Ceratodus* could be seen in the branches of trees, and jumping off into the water and mud.²³

Ground knowledge was written out of museum-scientific accounts of the fish as it moved out of its lived environment, and into scientific knowledge, imperial networks, and the mobile materiality, trade, and exchange of colonial natural science. But the long-living fish still remained in just a few deep ponds on the Mary and Burnett Rivers, mostly hiding among the reeds. It was a food source for the local settler community but this fish is timeless “Dala” or “Teevine” too, living alongside the Gubbi Gubbi First Peoples

¹⁸ Krefft, “*Ceratodus Forsteri*.”

¹⁹ Luck, “The Fishiest Fish,” 90–94.

²⁰ On the lowly status of field collectors in colonial science, see Kuklick, “Personal Equations,” 4–9.

²¹ Whitley, “Discovery of the Queensland Lungfish,” 363.

²² Krefft, “Newly-Discovered Amphibian.”

²³ Cooksey to Günther, 12 July 1870. Keeper of Zoology’s [Günther] Correspondence, NHM (London).

of the district for thousands of years.²⁴ Never killed or eaten, Dala was an integrated part of daily family life, and an intimate, sensory presence in the river, seen in the shallows and heard moving and breathing at the surface, able to be stroked and touched from a canoe due to its huge size and slowness.²⁵ Dala was a comforting ancestor spirit, too, and an important actor in a fluid, living cosmology of creation stories with the liminal Dala as “the forefather and foremother, really, of all the animals in the world.”²⁶ It is a relationship so close, and a way of being with “wild” animals that embeds a personal relationship and an ethics of care so alien to Western ways of understanding, that the fish, heard slowly breathing along the river at night, is both family and friend. Krefft in faraway Sydney knew nothing of this Indigenous knowledge practice of storytelling or the cosmological fish-as-friend.²⁷ Instead, his dead, dismembered trophy-fish were caught in a time-based net of anxiety about logistics, scientific primacy, authority, and description.

Strategizing with a Fish

Since it is Krefft who is celebrated as the “discoverer” of the *Ceratodus*, the way he deployed the fish for his own strategic advantage is an important moment in the often-used historiography of Australian natural history as a story of difficulty, curiosities, and oddities and of his role as mediator and broker of fish, knowledge and influence.²⁸ The fish became part of what Arjun Appadurai calls “tournaments of value” where meaning, identity, and relations are all traded along with specimens.²⁹ But the fish could not simply be managed rhetorically and smoothly translated into the globalizing language of science as Krefft wished. Museum natural history is also transacted materially, and it depends on the mute testimony of its animal objects. Specimens were created, preserved, labelled, traded, and moved, in the complex logistics and valuations of natural history practice. In that messy marketplace, the contestable story of the fish is not a description or a taxonomy, but a time- and material-bound narrative that brings together multiple iterations of locality, fish, people, and practice in and between specific places.

Although Krefft had claimed naming rights to the fish by publishing his account in a Sydney newspaper, fish were not his main scientific interest. In order to certify the fish as evidence and receive the widest scientific recognition for his work, he sent one of the partial specimens to London, to taxonomist, fish expert and compatriot Albert Günther (1830–1914) at the British Museum for full description and appraisal. This positioned the fish at the epicenter of world-zoological research. At the same time, Krefft sent a short formal scientific paper on the *Ceratodus* to the Zoological Society of London (ZSL) that was read before the members in April 1870.³⁰ The ZSL had the added advantage of producing a lavishly-illustrated journal to aid wide dissemination of new papers. Krefft understood the vital role of visual evidence in authenticating his scientific claims, and his published paper includes three illustrations.

Krefft had begun his natural history career as a natural history artist and he was a pioneer experimenter with animal photography and its deployment for scientific, personal and museum purposes in Australia.³¹ Krefft knew that the photographs he had taken of the whole fish and its skeleton would be as important—and more long-lasting—than his vulnerable, fresh *Ceratodus* specimens. Unlike the still-rare specimens, these images could be endlessly duplicated as paper prints and sent to correspondents across the world. The photographs plot the dissection. First the fish was captured whole, showing a side view of its flippers and tail. For identification purposes, the teeth and jaws were the most important part of the fish and these were carefully photographed in five poses. The flesh still clings to the bones in the first three photographs, registering the immediacy and urgency of the dual processes of dissection and photography. In each view, the fish is carefully staged to maximize detail and precision as the fish transitions from whole to scientific parts. Each image includes traces of the animal's flesh, a visual reminder that though it might look like a fossil and is deliberately photographed arranged in fossil-like poses, this was recently a living thing. The final two photographs show the cleaned incisors in upper and lower views.

²⁴ Krefft reported the local name as *Baramoonda* or *Baramoondi* but Dala and Teevine are the preferred Gubbi Gubbi names.

²⁵ Kind, “Australian Lungfish,” 85.

²⁶ Interview with Gubbi Gubbi elder Dr Eve Fesl and Nick Franklin. Quoted in Audrey Appudurai “The Lungfishes,” 82.

²⁷ Behrendt, “Indigenous Storytelling,” 175–86.

²⁸ Julius von Haast's exchange and sale of moa bones is a similar story from New Zealand. Barton, “Haast and the Moa.”

²⁹ Arjun Appadurai, “Introduction,” 21.

³⁰ Krefft, “Description of a Giant Amphibian.”

³¹ Finney, *Capturing Nature*.

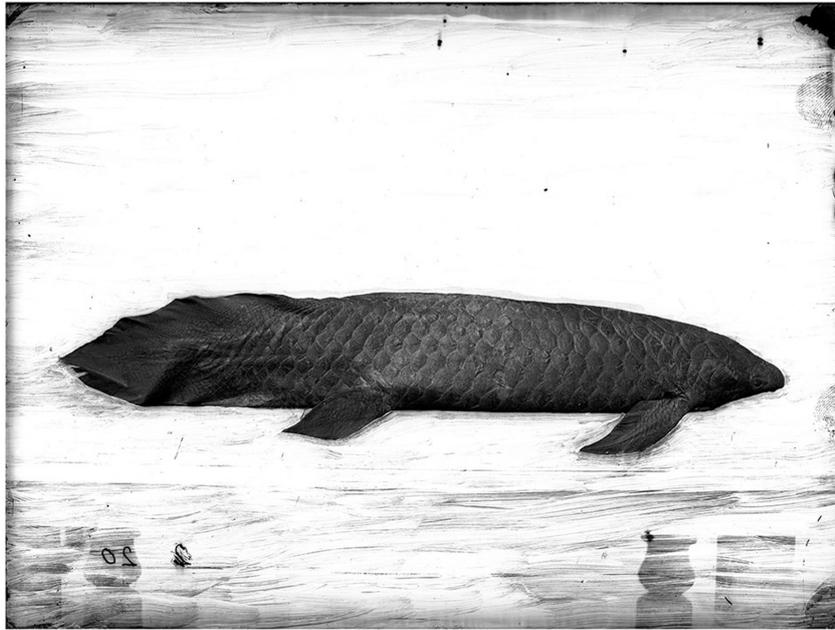


Figure 1: This figure and the next ones are four views of *Ceratodus forsteri*, 1870. The fish was destroyed in the dissection process, so that these photographs are the only remaining records of the first *Ceratodus forsteri* specimen. Photographer Henry Barnes. Reproduction courtesy of Australian Museum Archives; AMV0058-62.



Figure 2

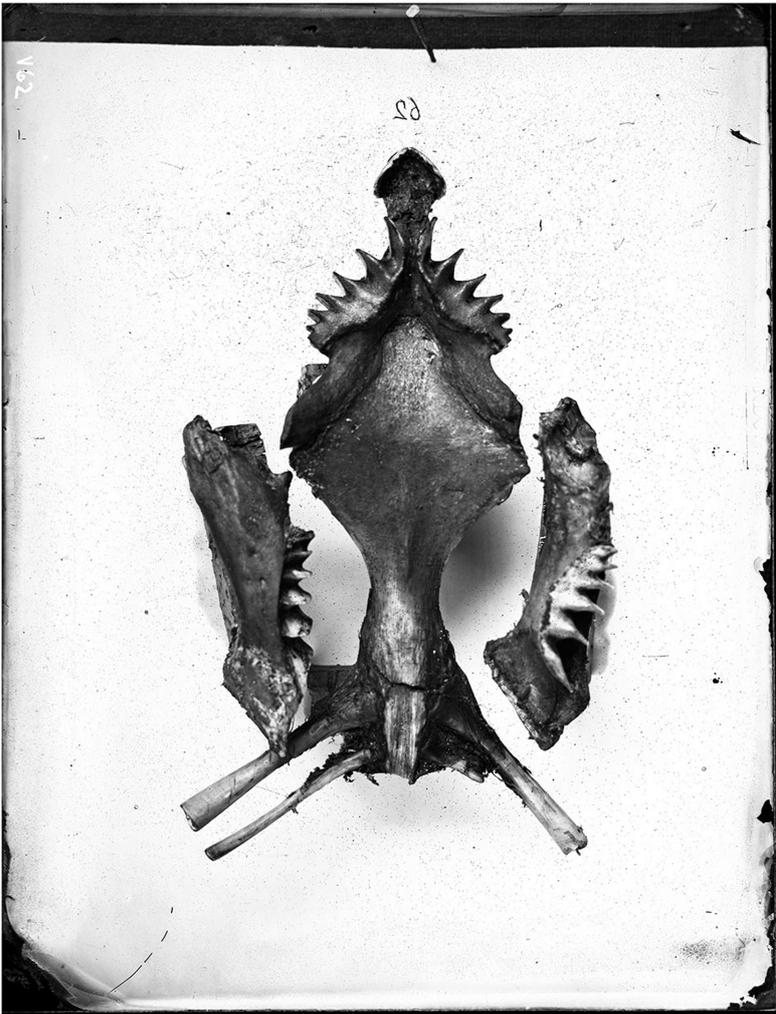


Figure 3



Figure 4

The lungfish's notoriety as a possible "missing link" between fish and amphibians set off a hunt for more specimens. Each side needed intact specimens to prove their theories. The fish, once caught and sold at the local fish market as Burnett River Salmon for eating (remarks on the deliciousness of its flesh are common) had crossed from the local, edible, and mundane to the unusual and scientifically valuable. It could now be sold for profit to museums and collectors all over the world. Alternatively, specimens could be bartered for more intangible personal and institutional benefits as the fish entered the economies of imperial natural science. Status, authority, fame and reputation were now all at stake, along with the material disposition and distribution of the fish as a new "central token of value" in Australian natural history.³²

First off the mark was Edward Ramsay (1842–1916). A Sydney-born naturalist with ambitions for a career in natural history, Ramsay lived at Maryborough from 1868 to 1870 managing local operations for his family's sugar business. A bird collector and amateur natural history trader, he had well-established natural history networks in Sydney. Ramsay immediately saw an opportunity to profit. His rewards could be both financial, in cornering the commercial market for fish specimens, and—just as importantly—personal, in rewarding his Australian natural history patrons with a rare and special scientific gift and in building his limited imperial scientific networks. In a move that infuriated Krefft, it was Ramsay who was the first to send complete specimens to London. He sent one each way, to anti-evolutionist Richard Owen at the British Museum, and to PL Sclater for presentation at the more progressive ZSL. Both specimens arrived in November 1870, only three months after Krefft's sensational specimen.

Ramsay's fish passed through many hands and much scrutiny on their way to London and their progress is a vivid illustration of the hierarchies of place and the ranks of labor and reward of Australian natural history in 1870. Creating a specimen was a multi-step process. First, Ramsay's local agent in Queensland, Mr. Helsham, had to travel to a branch of the Mary River on Eootaley Station near Maryborough. The fish, however, were not captured by him. Instead, he employed local Gubbi Gubbi people who located the fish and used hooks and lines to capture them.³³ These expert collaborators are unnamed in Ramsay's published description but their environmental knowledge, their fishing technologies and skills, and their labor were essential to the success of his venture, and they were also charged with the important work of "preparing" the fish for travel to Sydney and beyond.³⁴

Helsham's fish haul was then sent 150km by coach or horseback to Maryborough to await a steamer for transport to Sydney. In Maryborough, they were received by Mr. Buchanan who let the staff at the *Maryborough Chronicle* view the fish and describe one of them for their readers. Again, Indigenous participation, agency and knowledge is actively over-written in the description. Contextual information and Indigenous environmental and item-level knowledge on where to find the fish, or how to prepare it as a specimen (or for good eating), are framed as infantile and unimportant compared with accounts of its parts and anatomy:

The specimen is about two feet in length, and very fairly preserved, considering that it was prepared by an aboriginal [sic], whose thoughts were no doubt more intent on the repast he promised himself from the flesh, than on maintaining intact the parts which exemplify the anatomical peculiarities of the creature.³⁵

The fish then made its way by sea over 1,200km south to Sydney, where it was received by Ramsay (and by-passed Krefft at the Australian Museum) and then sailed north once more and on to London. This was another three-month sea journey of over 22,000km. In London, the fish's own life-history, the collaborative work of supply and preparation, Ramsay's contribution, and the chains of custody and care are all hidden or disappear. At the British Museum, the fish's story was abbreviated to just three, colorless columns: "In spirit; Queensland; Presented by Prof. Alex M Thomson."³⁶

By August the Australian Museum had also mobilized, and staff collector George Masters (1837–1912) was sent to North Queensland with instructions to collect 200 specimens. However, Masters seems to have been more interested in, and a lot more successful at, collecting insect specimens than he was at fishing for

³² Appadurai, "Introduction," 21.

³³ Ramsey, "Letter Read."

³⁴ Aboriginal guides and collectors were also essential for the later "discovery" of *Ceratodus* reproduction by William Caldwell (Gayndah, 1884–1885) and Richard Semon (Gayndah, 1891). Olsen and Russell, *Australia's First Naturalists*, 94–95, 141–43.

³⁵ Republished in *Brisbane Courier*, 9 June 1870.

³⁶ Ichthyology Specimen Register, NHM (London). Registration BM(NH) 1870. 11.30.67.

Ceratodus. He returned to Sydney in November with 10,000 insects and only nineteen *Ceratodus*. Fishing for them with line and meat bait took patience, but also allowed Masters the time to note some of the fish's habits and habitats. Masters reported that settler-residents along the banks of the Burnett River, who had lived besides the fish for many years, were "astonished to see them pulled out from under their very noses."³⁷

Collaboration between natural history collectors in Australia and local Indigenous expert guides and collectors was common in a complex and uneven but two-way trade of knowledge, animals, and consumables (payments were often made in tea and flour).³⁸ Instead of fishing with pole and line, Masters noted that the local Indigenous people used a more behavioral approach based on their experience of living alongside Dala. They knew, long before Krefft's "discovery," that the fish had a lung that could help it survive in low-oxygen environments by breathing at the water's surface. They had long experience, too, of the particular timing and conditions needed for the fish to come to the surface for air. Instead of casting lines, they simply waited for the "Teevine" to come to the surface on a hot day or when the river was in flood and then looked for an opportunity to "knock many of them on the head with their waddys [clubs]."³⁹

Nineteen *Ceratodus*

Although it is no longer possible to trace all nineteen of the lungfish that Masters shipped back from Gayndah in late 1870, it appears they were all deployed in strategic exchange, since none were registered as Australian Museum specimens.⁴⁰ Official museum record-keeping was still haphazard. As well, since person-to-person relationships were still key to scientific visibility, authority, and for access to specimens and information, some transactions were conducted through private correspondence, and do not appear in official records. The number nineteen, however, is backed up by a photograph Masters took of his fresh fish haul on the banks of the Mary River.⁴¹ Those fish that can be traced travelled far and wide, passing from person-to-person and through extended chains of labor and logistics to individuals and institutions across the globe. Along with the specimens went expectations for returns, sometimes literally in specimen exchanges, but always with the idea that the chosen recipients would extend the reach and reputation of Krefft and the Australian Museum.

At least three of the fish were gifted by Krefft to Albert Günther at the British Museum. Günther was the world's foremost fish classification expert and had the world's largest natural history collection and library at his disposal to describe its morphology and amplify Krefft's alignment of the new fish with the worldwide fossil record. Günther published a detailed monograph of his studies the following year.⁴² To even the political/scientific scales, another of Masters' specimens was gifted to Professor Owen at the British Museum by Edward Smith Hill (1819–1880), wine and spirit merchant, anti-Darwinist activist and trustee at the Australian Museum. Further fish were utilized as valuable currency for specimen exchanges, including one with Professor Enrico Giglioli (1845–1909) at the Genoa Museum in 1878 and two specimens sent to German geologist Julius von Haast (1882–1887) for the Canterbury Museum in New Zealand. Indicating the high local exchange value of the fish, in 1873 Krefft exchanged a specimen with Professor Frederick McCoy (1817–1899), Director at the Melbourne Museum in Victoria, for a rare Pig-footed bandicoot skeleton. Perhaps the most interesting of the international exchanges was with Louis Agassiz, Director of the Harvard Museum of Comparative Anatomy (MCZ) in Cambridge, Massachusetts.

By the 1870s, British imperial models of centralized scientific authority were increasingly fragile and the mobility of specimens across museum networks outside Britain is one of the markers of this loss of imperial gravitational force. One of the most persistent challengers was Louis Agassiz. He was also the world's foremost expert on fossil fish and had been the first to describe the fossil *Ceratodus* genus using fish remains he collected in South America. Agassiz's deep systematic knowledge and his scientific imprimatur were essential for Krefft to fully authorize his naming of the fish as a *Ceratodus*, and for a full comparative analysis of the fish's anatomy. Agassiz's praise and support were also problematic for Krefft since Agassiz was well known to be opposed to Darwin's ideas. Despite this, Krefft sent at least three fish to Agassiz

³⁷ Masters, "Observations of *Ceratodus Forsteri*," quoted in Monteith, "Fishy Tale."

³⁸ Olsen and Russell, *Australia's First Naturalists*.

³⁹ Monteith, "Fishy Tale," 27.

⁴⁰ There was likely also some wastage. The first AM specimen was registered in 1879, A7348.

⁴¹ Masters' undated photograph is held in AM Photograph Album, 1879, AMS421/16. It cannot be reproduced here for cultural reasons.

⁴² Günther, "Description of *Ceratodus*."

although the transaction was approved with the condition that only the “smallest specimen” was to be sent.⁴³

Agassiz went out of his way to welcome Krefft and this intra-colonial transaction in a series of letters he wrote praising and encouraging Krefft’s work, and proposing a suite of exchanges for their mutual benefit and for display at each museum. Like Krefft, Agassiz was fully aware that rare and new specimens from the colonies were useful as tradeable commodities and as exchange material for other collections from around the world. Cultivating exchange networks, including flattering gatekeepers like Krefft, was the most efficient (quickest and cheapest) way to build comprehensive comparative collections:

I cannot close without once more congratulating you upon your discovery of the living *Ceratodus* and I hope you may succeed in getting a large number of specimens and making the medium of supplying cheaply your Museum with the best things to be had from other continents.⁴⁴

By November 1870, Agassiz had sent Krefft three lots of shells, coral and fish, with the clear hope of receiving Australian animals and precious *Ceratodus* specimens in return. He needed both skeletons and whole fish, since the work that he proposed to do would rethink the entire *Ceratodus* family and require a large number of specimens for examination and dissection:

You may imagine with what delight I received the magnificent specimen of *Cestracion* you sent me. But this one stimulates my appetite. ... In order to do this [revise the genus] critically it would be essential to have males and females, young and old, all ages of both.⁴⁵

Like Krefft, Agassiz was susceptible to the acute, unrequited “longing” and dislocation caused by colonial distance.⁴⁶ Agassiz conceded that Günther had rights to the first description since he received the first whole specimens, but he was impatient with waiting for his fish specimens and for Günther’s publication. Unfortunately, Agassiz never finished his work on the *Ceratodus* genus. He had long been in ill health, and he died in 1873 without publishing his work.

After the first rush of descriptive fervor, and the race for human (white, male) scientific primacy, a brisk trade and exchange of scientific specimens continued for the next decade, sourced from Queensland local collectors, Sydney natural history traders and scientists, and in secondary international commercial trades and museum specimen exchanges. More lungfish were sent to London and specimens also arrived in Germany, acquired by the Museum Godeffroy in Hamburg in 1873 and 1874, and passed on to museums in Dresden and Stuttgart. More specimens arrived in North America too; a specimen was displayed at the Philadelphia Academy of Natural Sciences in 1875.⁴⁷

These increasingly well-travelled fish were passing through many hands on their way to worldwide notoriety and exposure. Citations and mentions of the *Ceratodus* in scientific literature also become more common as the decade progressed.⁴⁸ However, as description thickened and the excitement of the novelty fish wore off over the decade from 1870, its scientific exchange value decreased. The monetary value of the specimens appears to have dropped quickly too. Illustrating just how quickly value fell, in 1880 the Australian Museum purchased a collection of ten *Ceratodus* from Queensland collector Thomas Barker. Originally offered for £2–10/ each, within only a month Barker had reduced his price to £2 each, presumably finding no other buyer keen to purchase a large quantity of preserved lungfish.⁴⁹

The Ompax

Early descriptions of the *Ceratodus* are sometimes lost for the right words to describe a fish that escapes known categories: aquatic, amphibian, fish, monster. Notably, Krefft’s first newspaper description of the fish escapes his ability to describe it across three genres: scientifically, metaphorically, or as a visual whole. Writing within the tightly rule-bound genre of systematics in his first scientific paper read at the ZSL in April

⁴³ Exchange Committee Minutes, May 27, 1871, AMS 2

⁴⁴ Agassiz to Krefft, October 12, 1870, Letters Received, AMS 7.

⁴⁵ Ibid., November 29.

⁴⁶ Ibid., December 29.

⁴⁷ Leidy, “Report of the Curators,” 510.

⁴⁸ Conant, “An Historical Overview.”

⁴⁹ Thomas Barker to AM Trustees, C10:80: 25 and C10:91:28, Letters Received, AMS 7.

1870 made the task easier, with the fish contained within normative descriptive parameters but with the limitations of a specimen that was “somewhat mutilated and without intestines.”⁵⁰ As the lungfish became more common in collections and description became more detailed, museum specimens were regularized as known taxonomic units. But when they returned to the field, observers still struggled to describe the elusive fish in words, or contain it to scientific explanation. In all these later descriptions, the *Ceratodus* is constantly referred back to its human origin story of Forster and Krefft and the overlooked mystery, loathe to give up the secrets of its life cycle and habits, hiding in plain sight but brought to language and scientific study by our two detective heroes.⁵¹

It is into this descriptive gap that the entirely fictitious *Ompax* was inserted by local settlers, perhaps bemused by the earnest concentration of the serial, serious scientific observers who descended on the Gayndah area to observe the *Ceratodus forsteri* in its living environment. The 1879 invention of the *Ompax*—“one of the quaintest jokes in scientific history”—was described in Sydney news magazine *The Bulletin* in 1930:

While he was visiting Gayndah station the hard-cases there prepared a new fish for Staiger made of the head of a lung fish, the body of a mullet and the tail of an eel. It was nicely cooked and placed before him for his breakfast, with the remark that it was something new—a very rare fish that had never been seen anywhere but at Gayndah. Mr Staiger was immensely interested, and expressed regret that he had not seen it alive. On being told that it might be months before another was caught, he made a careful sketch of the cooked specimen before he started to eat it. The sketch and a description were subsequently sent to an ichthyological expert, Count Castelnau, and that gentleman named it *Ompax spatuloides*. Whenever a marine mystery was captured afterwards in the Gayndah district, the locals would remark with a grin that it “must be an *Ompax*!”⁵²

The joke was on the earnest, innocent, single-minded scientist. It is true, as historian Geoffrey Luck has written, that the joke could only be played on credulous naturalists like Karl Staiger (d1888), curator of the new Brisbane Museum, and his collaborator, French Consul and amateur ichthyologist, Count De Castelnau (1802–1880).⁵³ It was Castelnau who published the first description of the “new” discovery, which was duly read at the Linnaean Society of NSW and published by the ZSL in London in 1879.⁵⁴ This purely literary, imaginary or folk-fish remained part of the mainstream scientific record until Australian Museum fish scientist Gilbert Whitley’s debunking of the story in 1929. Whitley could not decide if the *Ompax* was a joke gone wrong or a deliberate scientific fraud. Certainly, it was a gross perversion of gentlemanly codes of natural history fieldwork and the role of invisible but reliable fieldworkers as trustworthy go-betweens. Incredibly, the *Ompax* can still be found, even if listed as “doubtful,” in the GBIF database today.

The *Ompax* hoax played to the larrikin or trickster spirit supposed to be at large on the Australian colonial frontier, and the potentially disruptive power of field-based go-betweens, informants and translators.⁵⁵ In a link back to the invisible, unknown Indigenous collaborators who “found” the first lungfish at Gayndah, it illustrates the perils of assigning scientific authority on an unstable, cross-cultural frontier within a system that relies on credible witnesses and the continuing negotiation of authority. The *Ompax* case foregrounds too the unreliability of visual descriptions, the problem of fixed “types,” and what to do in the absence of material evidence for natural history knowledge in Australia. It references the *Ceratodus* faux origin story of a scientific fish served for dinner, and much older traditions of exotic, composite natural history monsters.

The joke worked at a visceral level too: the unlikely fish served for breakfast to the scientist torn between two appetites: bodily hunger and scientific glory. Boundaries between animal taxonomies and their commodification as specimens, and their parallel supply and consumption as food were not well drawn in the nineteenth century. Certainly, Charles Darwin, the great precursor and model collector, was a known

⁵⁰ Krefft, “Description of a Giant Amphibian,” 221.

⁵¹ Beer, “Forging the Missing Link,” 118–19. Beer noted the links between detective stories and the “missing link” metaphor in Victorian literature, where narrative emphasis is on the human actors and not the physical vestiges.

⁵² Quoted in Whitley, “Discovery,” 566.

⁵³ Luck, “The Fishiest Fish.”

⁵⁴ De Castelnau, “On a New Ganoïd Fish.”

⁵⁵ Turnbull, “Boundary-Crossings,” 388–90. Go-betweens are always two-sided, both enablers and betrayers. The trickster is the “spirit of disorder.”

gourmet, collecting specimens to eat at the same time as collecting them for his studies.⁵⁶ Of course this transgression by consumption of the animal/specimen border is a pleasure not allowed to the Indigenous preparators of fish specimens who had been disparaged and condemned for “stealing” the flesh of the *Ceratodus* in 1870.

The *Ompax* hoax relied on the credulity, naivety, and eagerness for novelty of the taxonomist outside the museum, taken out of the orderly world of systematics, into the “wild.” It showcases the superior knowledge of complex natural environments of local informants, and their superior understanding of human “nature” too. It demonstrates how knowledge can get created and develop perpetual motion through citation. The *Ompax* subverts the descriptive drive of scientific ego and unmasks the fragility of systematics which, despite its heroic assertiveness, still relies on imagination and speculation and regimes of negotiation, trust and authorization. But it marks the persistence of systematics too. In a remarkable demonstration of the inertia of natural history classification, the *Ompax spatuloides* generated its own pedigree by citation. Following Castelnau’s initial description, it was included in multiple fish catalogues from 1881 to 1929. Even after its categorical debunking by Whitley, the fish retained its momentum and was listed as late as 2004 in William N. Eschmeyer’s definitive database, *The Catalogue of Fishes*, with the note “Perhaps mythical.”⁵⁷

The *Ompax* was created when myopic human desire and the imaginative, material and logistical limits of natural history met on the Australian colonial frontier. With its defiant, difficult animals and environments, in nineteenth-century Australia the forms and practice of natural history were entwined with imperial goals of territorial and symbolic dispossession and possession. The technologies and tools of systematic description and indexation were political as much as they were scientific. But the drive for description, method, control and the institutionalization of nature reached its limit in edge places like the Mary River. Here, transactional natural history collided with experience, duration, and bio-cultural complexity. The geographic and temporal gap between field and museum was filled with stories, jokes and half-truths, as much as it was with attempts to control the flow of specimens and information and the creation of scientific authority. On the literal edge of white settlement, on the “conceptual range margin,” and at the limits of the colonialist drives for order and organization, the busy anxiety of discovery, descriptive practice, and specimen logistics went on; but stasis, local knowledge, collaboration, and remembering happened too.⁵⁸ When they were ignored, a hoax could arise, survive, and thrive.

Conclusion

This paper has followed the Australian lungfish and its strange cousin the *Ompax* as they moved from pond and plate through personal, social and logistical networks into museum collections and natural history knowledge. Specimens of the extraordinary, rare fish were set in global motion, circulating as social capital and scientific specimens among the practitioners and practices that made up colonial cultures of natural history. Key to this mobilization was museum scientist and “living link” Gerard Krefft and his attempts (not always successful) to act as go-between, authoritative specimen broker, and communication node among field collecting sites, transport routes, traders, and knowledge centers in Europe and the United States. Even as the many collaborative hands that made and moved the scientific *Ceratodus* were ignored, the elusive, living fish remained just out of reach. Its rarity, its murky, deep-water habitat, nocturnal habits, and its distant location on the fringes of colonial settlement magnified the gap between the drive for scientific description and the resistance and tensions of local settler and Indigenous knowledge, use, and lore. Rather than a study of smoothly mobile, globalizing natural science, the *Ceratodus* points to wider problems for the rigid taxonomic logic, eternal present, and specimen-based practice of museum natural history when its rhetoric of easy trade, translation and transmission met real (geographical, practical and logistical) and imaginary (cultural and epistemological) obstacles on the colonial edge. The scientific history of the Australian lungfish and the *Ompax* demonstrate what could happen when go-betweens worked in this intercultural zone to bridge stubborn, situated, local materiality, knowledge, story and practice and the odd, instrumental logic of imperial natural history.

⁵⁶ Noyce, “Darwin, the Gourmet Traveler.”

⁵⁷ Luck, “The Fishiest Fish,” 91.

⁵⁸ Anderson, “Objectivity.”

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