



The Great

and the

ABOVE
Julien Léopold Boilly (1796–1874)
Le Chevalier Geoffroy St Hilaire
1821
lithograph
Courtesy Wellcome Library,
London, V0002214

ANN MOYAL EXAMINES A
DOCUMENT BY ÉTIENNE
GEOFFROY SAINT-HILAIRE
THAT PROVIDES A SNAPSHOT
OF THE FEROCIOUS DEBATE
SURROUNDING AUSTRALIA'S
MOST FAMOUS MONOTREME

THE NATIONAL LIBRARY OF AUSTRALIA has recently added to its Manuscripts Collection some outstanding handwritten notes written by a man described as ‘one of the great French naturalists of all times’—the visionary, colourful and influential Geoffroy Saint-Hilaire (1772–1844). For several decades, Geoffroy played a fiery part in the cross-English Channel debate on the biology and classification of the mysterious Australian platypus.

Étienne Geoffroy Saint-Hilaire was born near Paris and, having made one of his given names his surname in his youth, he was widely known thereafter by it alone. A gifted student, at the age of 15 Geoffroy became a canon in the church, with prospects of a religious career but, with the outbreak of the French Revolution in 1789, he turned to law, then medicine and embraced revolutionary ideas. At the beginning of the Reign of Terror in September 1793, his assistance in securing



French Naturalist

PLATYPUS

the release of Abbé Haüy, one of the great founders of crystallography imprisoned for being a priest, won Geoffroy the appointment that year to the post of Professor of Quadrupeds, Birds, Reptiles and Fish at the Museum of Natural History in Paris. He was 21. There he introduced the first course in Paris in zoology and began his enduring zoological work on mammals and marsupials, becoming a founder of comparative anatomy, experimental embryology and evolutionary palaeontology.

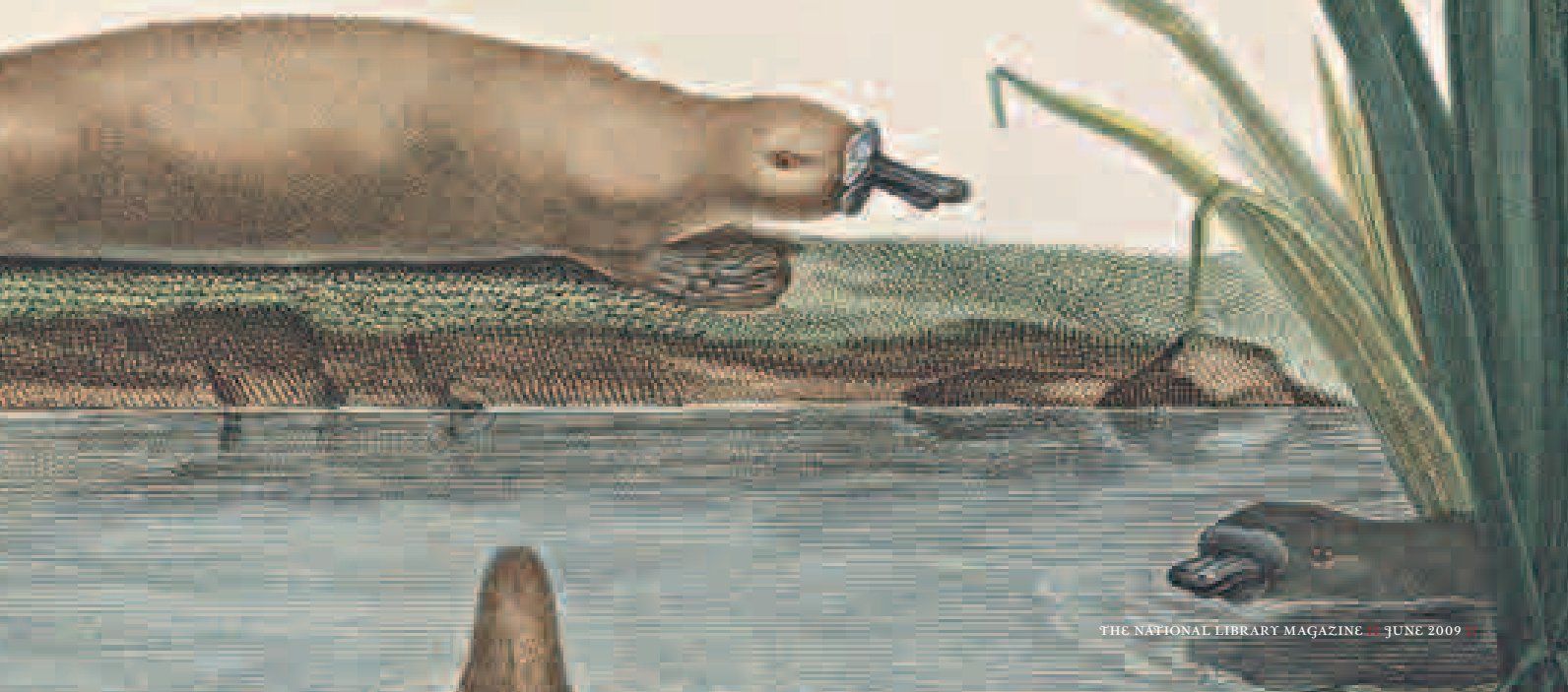
When Napoleon Bonaparte organised his famous Egyptian campaign in 1797, Geoffroy joined the corps of savants, which Bonaparte gathered to his quest, and from 1798 to 1801 conducted scientific enquiries on birds, fish and reptiles living along the Nile. With the French defeat by British forces in Egypt, he successfully rescued his valuable collections and returned them for classification in France.

Back in Paris, Geoffroy's sharp eye was drawn to the Australian platypus. In several

papers published between 1800 and 1802, Britain's leading comparative anatomist at the Royal College of Surgeons in England, Everard Home, had determined from his dissections of the earliest preserved specimens to reach England that this unusual animal was a mammal of 'a new tribe', resembling in part birds, reptiles and mammals. Working from Home's descriptions, in 1803 Geoffroy swiftly grouped both the platypus and the echidna in a new classificatory taxon, which he named Monotremata, being animals that he described as 'digits clawed, having no true teeth, a common cloaca opening to the exterior by a single orifice (for birth and excretion) and an absence of mammae'.

The battle for personal and national priority in what would become a protracted contest to classify this oddity of nature had begun.

BELOW
Choubard (active 1807–
1830)
*Nouvelle-Hollande,
Nelle. Galles du Sud,
Ornithorinque* 1807
hand-coloured engraving
24.2 x 31.8 cm
Pictures Collection
nla.pic-an7568602





Other eminent French naturalists entered the fray. Jean-Baptiste Lamarck (1744–1829), then in charge of invertebrates at the Museum of Natural History, dubbed the ‘Professor of Insects and Worms’, asserted in his *Philosophie Zoologique* in 1809 that these were not mammals and grouped the platypus and echidna in a new class—Prototheria—a term still in use today.

A few years later, the glittering new star of France’s natural sciences, Georges Cuvier (1769–1832), whom Geoffroy had attracted to the Museum, noted the peculiarity of the two animals’ generative structure and placed the perplexing monotremes temporarily into the order of the toothless Edentates (anteaters and sloths).

Two major questions were now central in the platypus debate: did the platypus possess

mammary glands that signified it was, indeed, a mammal; and what was its method of generation?

During the 1820s, a report arrived from the German comparative anatomist Johann Meckel (1781–1833) of evidence of primitive mammary glands on the female platypus’ abdomen that, although without nipples, opened directly onto the skin. Meckel also proposed that the platypus might bear live young or, alternatively, might be an egg-laying mammal, thereby making it a ‘transitional form’. Another distinguished German anatomist, Karl von Baer (1792–1876), gave Meckel’s ‘mammas’ his support.

But Geoffroy, fresh from an opportunity to dissect a female platypus (preserved specimens on the Continent were hard to obtain), rejected Meckel’s proposition on mammas as quite untenable. In a spirited paper in 1826, he expressed the view that Meckel’s findings could never be ‘mammary glands’, as the very absence of nipples would render it especially difficult for an animal with a beak to gain food by suckling. Indeed, he claimed that the so-called glands were more likely to be similar to those used to secrete lubricating



liquid disposed along the flanks of fish, sharks and aquatic reptiles. Nonetheless, he was ready to accept that the platypus' anomalous organic structure meant that the animal was a mammal but without the true mammalian characteristics. Did not this, he demanded, justify his original creation of Monotremata as a special taxonomic order? Like his colleague Lamarck, Geoffroy believed that the platypus was oviparous and laid eggs.

Into this hotbed of controversy and theoretical speculation, a report arrived from New South Wales in 1832 from the Hon. Deputy Lieutenant Lauderdale Maule to the Zoological Society of London that imparted a tantalising reference to suckling platypuses and platypus eggs. No eggs had in fact been found in a perfect state but 'when skinning a female platypus while still warm ... it was observed that milk oozed through the fur on her stomach' although no teats were visible. In addition, 'two canals were discovered, both of which contained milk'. To this information, the inimitable Geoffroy countered with lively French pragmatism, 'If these glands produce milk, where is the butter!'

Geoffroy, however, was about to meet a formidable new protagonist. The young Richard Owen (1804–1892), assistant conservator to Sir Everard Home at the Hunterian Museum in London, was not only a rising figure in biological science and destined for pre-eminence in comparative anatomy, he had enviable access to preserved material from the colonies. Having carefully dissected five fully grown female platypus specimens, he noted the glands' appropriate position in the abdomen of the female and their absence in the male and in June 1832 launched his famous paper 'On the Mammary Glands of the *Ornithorhynchus paradoxus*' before the Royal Society of London, giving unequivocal confirmation of the existence of mammary glands.

With considerable sophistication, Owen compared the size of the ovaries with the lactating parts and found the glands enlarging in the different female specimens as they developed. Henri de Blainville (1777–1850), Cuvier's successor at the Paris Museum, rallied

behind the mammary glands, arguing that regardless of the substance secreted, the glands performed the same nourishing function as mammary glands.

The stakes in the battle had risen but Geoffroy was not to be vanquished. Confident for 30 years that the monotremes were an egg-laying duo of a reptilian nature belonging to the order of Monotremata, he was certain of one thing—egg-laying (oviparity) decreed an absence of mammae. It was wholly unnatural, he insisted, to have a mammiferous, milk-producing, egg-laying animal—an amphibian mammal—it went against the 'all-powerful rules, the very plan of nature'. Swift off the mark, he published this opinion in a memoir in France's *Gazette Medicale* in January 1833 and, as a Foreign Member of the Zoological Society of London, despatched a copy of it in March for discussion in the Society's *Proceedings*. Pushing his thesis that the young could not suckle from a breast that lacked a nipple, Geoffroy rehearsed his argument: the



ABOVE
The first page of '*Nouvelles Considérations sur la nature des Glandes abdominales des Monotrèmes*' (1833) by Étienne Geoffroy Saint-Hilaire
Manuscripts Collection
MS 10038

OPPOSITE TOP
Walker & Boutall, London
Richard Owen, c.1846
reproduced from *The Life of Richard Owen ...*, vol. 1
(London: John Murray, 1894)

OPPOSITE BELOW
Unknown artist
Platypus and Fruit Bats c.1880
chromolithograph
17.7 x 26.4 cm
Pictures Collection
nla.pic-an23288906



ABOVE
G. Schoorf
Ornithorhynchus paradoxus
Sketched in Postures Which
It Assumes while Sleeping,
Partially Awakened, Combing
Itself, and Feeding c.1835
plate 34 reproduced from 'Notes
on the Natural History and
Habits of the *Ornithorhynchus*
paradoxus, Blum' by George
Bennett, in *Transactions of the*
Zoological Society of London,
vol. 1 (London: Zoological
Society of London, 1835)

liquid produced from these simple glands was not milk; at best, it was a nutritious mucus eaten by the young or perhaps a secretion dispersed in the water for the young after hatching. Alternatively, like the odiferous musk glands of the shrew, the liquid could be designed to attract a mate. Finally, he suggested it was carbonate soda to form a shell around the egg.

Owen, who had founded the Zoological Society of London a few years before, assessed Geoffroy's presentation and concluded that he was by no means ready to admit the correctness of its arguments. In particular, from his present study of the anatomy of the echidna, an animal that inhabited sandy land, he strongly rebutted Geoffroy's latest tenet that the secretion from monotreme mammary glands could be dispersed in water.

A copy of Owen's *Proceedings* was forwarded to Geoffroy. (Collegiate politeness, firm in viewpoint, prevailed.)

Writing in his own hand, Geoffroy produced a French notation of Owen's comments, dated 12 May 1833, and set down a long manuscript, dated 1 July 1833, in which he repeated and extended his counter-argument. And it is these handwritten manuscripts, namely '*Observations de R. Owen, 12 Mai 1833*' and '*Nouvelles Considérations sur la nature des Glandes abdominales des Monotrèmes par M. Geoffroy S. Hilaire déposé le 1er Juillet 1833*' which, stitch-sewn into the relevant printed pages of the *Proceedings of the Zoological Society of London* of 12 March 1833, comprise the manuscript recently acquired by the National Library of Australia. Their original provenance is not disclosed but, reputedly, they form the basis for an article later published by Geoffroy in *L'Institut, Journal général des Sociétés et Travaux scientifiques de la France et de l'Etranger*, 2, no. 73, 1834.

They are accompanied by a loose leaf mounted on a card of autograph notes and drawings: 'Dissection of platypus', 1 July

1833 showing the aorta of a very young platypus and portion of the upper half of the whole length of the intestinal canal.

Geoffroy's manuscript returned him to his hard-held argument on the nature of the 'milk'. At 61 and Owen's senior by three decades, and confident in his long experience as a naturalist acquainted with the variations of nature, he questioned the younger biologist's conclusions: '*Lequel de nous deux a raison dans cette détermination a priori? Pour moi, j'essaie a le savor.*' ('Which of the two of us is right in this determination? For my part, I am trying to find out.') Drawing his analogies widely once more from sharks, porpoises and rays, and finding in their gland excretion a similar substance to that of the monotremes but which was 'not milk', Geoffroy persisted with his theory. And he requested, in the interests



LEFT
Edouard Traviès (1809–?)
L'Ornithorhynque 1860s
coloured lithograph
25.1 x 17.1 cm
Pictures Collection
nla.pic-an11333616

of science and with the current absence of observations, that the Zoological Society of London obtain microscopic evidence of the secretions of the monotreme milk from the field for his examination.

Questions of priority lay deep in nineteenth-century science and, with his established claim to the classification of Monotremata, Geoffroy keenly felt his disadvantage in accessing biological material from Australia. In the final remarks of his manuscript statement, he makes his frustration, disappointment and some anger plain. 'We are going to and we can finish such important research with the material that we possess', he pronounces, but 'the honour will go to the English' [*aux Anglais en appartiendra l'honneur*]. And he notes that an association of British savants had just sent a naturalist to New Holland with the express mission of examining the controversial questions on the subject of the ornithorhynchus.

Science, however, holds many byways and false speculations. Both Geoffroy and Owen pushed flawed contentions. For 50 years the authoritative Owen held tenaciously to the view that the platypus was 'ovoviviparous', producing fully formed eggs retained and hatched within the mother's body before the young were expelled, a belief that was diligently supported by his colleague, the 'young naturalist', Dr George Bennett, in New South Wales. Arriving there in 1835, Bennett

sought assiduously in between his role as a Sydney physician to confirm Richard Owen's hypothesis in the field. There was a misjudgement that delayed the animal's classification for over half a century. Geoffroy, for his part, believed correctly (if for the wrong reason) that the platypus laid eggs. In the event, Owen was 80 and Geoffroy had been dead for 40 years when a brilliant young Scottish postgraduate from Cambridge University, William Caldwell, on a research visit to Australia, aided by Aboriginal people, rounded up a large number of platypuses on Queensland's Burnet River and shot a female platypus that had laid one egg and held another at the mouth of her uterus. His famous telegram 'Monotremes oviparous, ovum meroblastic' sent to the international biological fraternity meeting in Montreal that year made biological history.

Geoffroy Saint-Hilaire's entry into Australian scientific history was, like all he did, spirited, determined and sustained while his Monotremata stands in the accepted taxonomic order of zoological classification. Brilliant and controversial, he was a polymath. A tenacious adversary, he lent high French profile and considerable colour to the great nineteenth-century platypus debate. It is our good fortune to have his rare handwritten document in the National Library of Australia's collection.

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DR ANN MOYAL is a leading historian of Australian science and the author of *Platypus: The Extraordinary Story of How a Curious Creature Baffled the World* (Allen and Unwin, 2001).

The author thanks Jocelyn Clark and H  l  ne Anderson for their help with the French translations.

THE LIBRARY has now added to its collection three more nineteenth-century documents related to the debate about the platypus, including a rare copy of a manuscript letter by Frenchman Henri de Blainville (1777–1850), an early researcher on monotremes, in which he publicly rebuts Geoffroy's attacks on him over the nature of the platypus' mammary glands. The other two items are *Beschryving van den Ornithorhynchus paradoxus ...* by Joan Calkoen (dates unknown) who describes the first platypus specimen to arrive in Holland and *M  moire sur le genre Ornithorhinque (Ornithorhynchus Blumenbach)* by Jan van der Hoeven (1802–1868). These new acquisitions can be viewed online at nla.gov.au/nla.aus-vn4583967, nla.gov.au/nla.aus-vn4592819 and nla.gov.au/nla.aus-vn4592944, respectively.