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THE UNEASY CORRESPONDENCE BETWEEN T. H. HUXLEY
AND E. P. WRIGHT ON FOSSIL VERTEBRATES FOUND IN JARROW,
CO. KILKENNY (1865–67)

by

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The collection of Carboniferous fish and amphibian fossils found in Jarrow in 1864 has been the object of several studies, and has resided successively in at least three Irish museums. This paper draws from the Huxley archives in Imperial College London and from other archives to trace the history of its finding and earliest description. The story was marked by naivety, ambition, abuse, deception and delays, but eventually some of the fossils were salvaged by the expertise and determined action of Thomas Henry Huxley, not usually known for his patience, who stepped into a minefield of conflicting interests but managed to publish and illustrate seven new genera and species from among the specimens. In so doing he trampled, perhaps by relying too much on Wright's assurances, on the sensitivities and possible claims to priority of other local experts.

Keywords: fossil amphibians; William Hellier Baily; Thomas Henry Huxley; Jarrow; Trinity College Dublin; Edward Perceval Wright

ORIGIN OF THE HUXLEY–WRIGHT CONNECTION

In a recent paper,¹ DeArce has explored the history of the *Natural History Review*, a journal founded by Edward Perceval Wright (1834–1910) in 1854, which was handed over to Thomas Henry Huxley in 1860 when it became clear that it was unviable because of the impossibility of increasing the number of subscribers among its intended readership, namely Irish naturalists. At the time, Wright (figure 1) was a lecturer in zoology at Trinity College Dublin (TCD). Huxley, determined to broaden circulation by using the *Review* as a vehicle for Darwinian natural history, replaced the earlier editorial team

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Figure 1. Edward Perceval Wright. From Dixon.⁵

composed of William Henry Harvey, Samuel Haughton, Alexander Henry Haliday, William Riky Hogan and E. P. Wright, retaining only the last. The members of the new team were all Darwinians, including John Lubbock, George Busk, and even Joseph Dalton Hooker, who became involved towards the end of the life of the journal. Wright was a member of the Royal Irish Academy (RIA) from 1857.² Eventually,³ Wright pronounced the *Review* dead on 13 December 1865, just when the first issue of volume 6 of its second series was due out. The difficulty, as we shall see in part here, was not that Irish natural history was dead, or that there was any lack of adequate new material for publication, but it was a matter of management. In fact the correspondence between Huxley and Wright picked up considerably precisely around this time,⁴ on the subject of a new and large find of fossil fishes and amphibians that had come to Wright's attention from the Irish coal beds in Co. Kilkenny, and which came to form the basis for several publications.⁵ Although the full story could be said to have unfolded from the autumn of 1864 to March 1874, the core of the matter, which is the manner of Wright's and Huxley's involvement with the fossils, took place in just two months, between 9 November 1865 and 9 January 1866, with some 30 letters crossing between Wright and Huxley in that period.

This paper narrates the story of the finding and description of this important hoard of Carboniferous vertebrate fossils, drawing from material hitherto unexplored for this purpose.⁶ Surprisingly, this aspect of the fossil collection is absent from major biographies of Huxley,⁷ from the existing sketchy biographies of Wright,⁸ from published records of the Department of Geology at TCD⁹ and from late nineteenth-century Irish cultural history.¹⁰ The following story illustrates the fraught relationships between the small coterie of British Darwinians and more traditional Irish academic and field naturalists.

FINDERS NOT ALWAYS KEEPERS

The Dublin scientific community first became aware of the existence of fossils in the Jarrow colliery when William Bookey Brownrigg (*ca.* 1843–1906) announced to a Council Meeting of the Royal Geological Society of Ireland¹¹ (RGSi) on 1 March 1865 that he intended to ‘bring forward a paper on some fossils from the Leinster coalfield’. However, this offer was conditional on that society’s funding the production and printing of plates that he wished to accompany the paper. This was agreed,¹¹ and Brownrigg read his paper on 14 June 1865 to a meeting of the RGSi,¹² which was subsequently published in their journal.¹³ Twenty members were present at the reading, and although Wright was a member he was not among them.¹⁴ This was followed by an oral presentation to the same society on 8 November 1865 by Henry Beresford de la Poer Wall,¹⁵ a prize-winning science student of Trinity College, Dublin, who hailed from the midland town of Portarlington. Wall also took the opportunity to exhibit to the assembly more fossils of the same provenance.¹⁶ Unfortunately Wall’s paper was not subsequently published. The appreciation of the RGSi meeting of Brownrigg’s contribution was wholesome and undisputed, at both the 14 June and 8 November meetings, and it was clear that the academic value of the fossils did not escape the assembly. A further meeting, this time of the RIA in Dawson Street,¹⁷ was held on 8 January 1866. Between these last two meetings an important and dramatic, but subtle, change had occurred, namely that Brownrigg’s initiative in the enterprise had been effectively taken away from him, behind a thick smokescreen of many good words from Wright and from Huxley. The audience heard a presentation by Dr E. P. Wright, written by himself and Professor Thomas Henry Huxley, entitled ‘On the fossil remains of some large Batrachian reptiles from the Irish coal measures’. Here Wright mentioned W. B. Brownrigg Esq. of Brannockstown as having sighted

traces of several vertebrate remains which struck him as new. . . . These specimens he showed to several friends in Dublin who pronounced them to be the remains of fish, and reptiles; and in the autumn of last year one of the authors of this paper paid two visits to the coal pit in company with Mr Brownrigg . . . collecting a very valuable series of specimens . . .¹⁷

William Bookey Brownrigg (figure 2) of Moor Hill, Brannockstown, Co. Kildare, was born in about 1834, the only son of William Brownrigg, a local landowner and Justice of the Peace. He studied at Trinity College,¹⁸ Dublin, where he was a scholar in 1856, graduated BA in 1859 and was registered as a University Elector on 27 October 1860. Thus he was a contemporary of Edward Perceval Wright, whom he knew when they were both students in Trinity. While still a student, Brownrigg demonstrated his scientific interests by having a paper published on the wood-boring shipworm *Teredo norvegica* that he had discovered at Tramore, Co. Waterford.¹⁹ Although he was a landowner in Co. Kildare he also had an estate of 596 acres near Kilkenny,²⁰ and like others of his social standing he also maintained a Dublin home, at 18 Adelaide Road, from where he wrote to Huxley (see below).

On 11 January 1860 Brownrigg was elected an Associate Member of the Geological Society of Dublin (GSD) and only four months later read his first paper to the society,²¹ describing the geological structure near Dungarvan, Co. Waterford; the paper was co-authored²² with Theodore Cooke (1836–1910). Cooke later became a renowned botanist in India.²³ On 12 December 1861 Brownrigg was elected a Fellow of the GSD,²⁴ having been proposed by R. H. Scott and seconded by E. P. Wright. Shortly afterwards, on 11 February 1863, he was elected an ordinary member of the society’s Council and



Figure 2. William Bookey Brownrigg. Portrait from E. P. Wright's photographic album now in the care of Patrick N. Wyse Jackson, Department of Geology, Trinity College Dublin.

served for more than four years in this capacity. This was an important period in the life of this society, because on 28 March 1864 the society was granted permission by Queen Victoria to style itself the RGS. ²⁵ Brownrigg also undertook the production of a catalogue of the society's library, in conjunction with William Hellier Baily. ²⁶

Brownrigg's 1865 published report ¹³ was an able, albeit preliminary, paper describing the Kilkenny coal beds rather than the fossils, written with the explicit purpose of establishing his priority to the find that he had made. At the meeting of 14 June 1865 he had said:

I have brought these remarkable fossils before you perhaps somewhat prematurely . . . principally with the view to securing the priority to the discovery, and the priority of publishing their notice in our 'Journal'. . . I hope to be in a position to describe them at no distant day; and I desire to take this opportunity of thanking our Council for most liberally promising to illustrate such description with four Plates, in our 'Journal'.

Although he did not describe any of the fossils in detail, Brownrigg mentioned that he could discern ‘at least six, if not seven, perfectly new genera of reptile’ [*sic*, actually amphibians, as it emerged later], suggesting that one of them should be named *Wandesfordii*, after the owner of the estate—Mr Wandesforde—where the find was made. Tipped off by Wright on 9 November,²⁷ Huxley had written to Brownrigg²⁸ on 29 November and to Wright²⁹ enquiring whether it was their intention that he (Huxley) would undertake the job of describing the fossils. Huxley was the international expert on fossil amphibians and it is probable for this reason that Wright had made contact with him about the Kilkenny find. By 30 November Huxley reported having had a very satisfactory reply from Brownrigg.³⁰ Wright had also surrendered all his claims to the fossils to Huxley.³¹ This needed to be clarified for the additional reason that there was a note prepared for the RIA that required agreement on the issue of authorship. The owner of the field, the exploiter of the coal seam, the actual worker at the coalface, the scholar who saw the potential scientific value of the fossils, the supervisor of the scholar if he was a junior, the professional collectors of the Geological Survey of Ireland who were on site, and the actual describer of the fossils, which was no easy task as some of the fossils were new species and even genera—all had reasonable claims on the material, and the potential for conflict was considerable if any of them was not satisfied. Although modern rules of scientific nomenclature³² evolved much later, the principle was well established in the nineteenth century that the first publication to adequately describe a new species ensured priority for the author. It was (and remains) a matter of fact that those responsible for bringing specimens of new species to the world at large also receive recognition. The international significance of the fossils from Jarrow meant that there would be an understandable desire for recognition by the finders and competition in the academic community to be the author of any new species. The amphibians from Jarrow were the oldest fossils of their group in the world, and that record remained for over a century. They filled an important void in the fossil record between fish and the evolution of tetrapods (that is, all four-limbed vertebrates and descendant forms with reduced or absent limbs and represented among extant taxa by crown-group amphibians, reptiles, birds and mammals) at a time when Darwin’s theory was spreading through scientific circles. It would be a matter of loss of face for local palaeontologists to be trumped by Huxley, the international expert, and a matter of humiliation for Wright to admit that his role would recede because he brought Huxley into the fray. Irish illustrators and lithographers also took second place (see below), because top international experts were engaged to produce the plates.

Huxley came to Dublin at Wright’s request to see the fossils,³³ travelling at night to save time, and also meeting two notable geologists, Joseph Beete Jukes (1811–69), Local Director of the Geological Survey of Ireland, and the Rev. Samuel Haughton (1821–97), Professor of Geology, Trinity College, Dublin. The group met for dinner on 22 November.³⁴ It was agreed that a selection of the fossils would be sent to Huxley in London for his further study before the big publication. After his return to London, Huxley wrote to Sir Charles Lyell on 27 November, delighted with the project and noting the sudden emergence of such amphibian fossils over the previous decade:³⁵

My dear Sir Charles—I returned last night from a hasty journey to Ireland, whither I betook myself on Thursday night, being attracted vulture-wise by the scent of a quantity of carboniferous corpses. The journey was as well worth the trouble as any

I ever undertook, seeing that in a morning's work I turned out ten genera of vertebrate animals of which five are certainly new; and of these four are Labyrinthodonts, amphibia of new types. These four are baptised Ophiderpeton, Lepterpeton, Ichtherpeton, Keraterpeton. They have ossified spinal columns and limbs. The special interest attaching to the two first is that they represent a type of Labyrinthodonts hitherto unknown, and corresponding with Siren and Amphiuma among living Amphibia. Ophiderpeton, for example, is like an eel, about three feet long with small fore legs and rudimentary hind ones.

In the year of grace 1861, there were three genera of European carboniferous Labyrinthodonts known, Archegosaurus, Sclerocephalus, Parabatrachus. . . .

I reckon there are now about thirty genera of Labyrinthodonts known from all parts of the world and all deposits. Of these eleven have been established by myself in the course of the last half-dozen years, upon remains which have come into my hands by the merest chance.

Five and twenty years ago, all the world but yourself believed that a vertebrate animal of higher organisation than a fish in the carboniferous rocks never existed. I think the whole story is not a bad comment upon negative evidence.

However, as new fossils were discovered at Jarrow, Wright reported³⁶ 'important new finds'. The fossils came from several collectors, some associated with particular institutions; as a collection, the only time spent together before the 1950s was in the initial studies in which all were submitted to Huxley for examination. The assembled collection travelled in two consignments, one arriving on 10 December³⁷ and the other on 21 December.³⁸ As agreed, Wright wrote the introduction to the paper to be published in *Transactions of the Royal Irish Academy*, and Huxley's detailed description would follow on the same paper but completely separately.³⁹ A comparison between Brownrigg's initial presentation and Wright's introductory paper shows that the latter had just copied the former, although both referred more to the geology of the site and neither dealt with the fossils as such. However, the new fossils being dug up made Wright feel that he would have to rewrite some of the introduction.⁴⁰ Wright, partly following Brownrigg, had asked Huxley⁴¹ to name some of the fossils for the discoverer (Brownrigg), the wife of the owner of the coal (a gentleman called Samuel Bradley of Little Castle, Castlecomer) and his agent (Kildare Dobbs). Huxley duly obliged and immortalized the three as *Ophiderpeton brownriggii*, *Ichtherpeton bradleyae* and *Lepterpeton dobbsii*, as well as *Urocordylus wandesfordii*, to follow Brownrigg's wishes. Meantime, Huxley had classified some of the contents of the second box, some fine specimens of *Ophiderpeton* and *Keraterpeton*,⁴² but Wright discussed Huxley's draft repeatedly.⁴³ On 6 January Huxley sent notes on Jarrow's labyrinthodonts, approved of by Wright.⁴⁴

The two men had a short argument on priority and delineation of their work,⁴⁵ with Huxley defending his position that he alone should be responsible for his own work. On 8 January 1866 Wright presented a summary of his work with Huxley to a meeting of the RIA that was published in *Geological Magazine*,⁵ where it was noted that this was to be published in full in volume 24 of *Transactions of the Royal Irish Academy* with illustrations by Mr Dinkel (see below for details on illustrations). The short article established in a scientific publication for the first time the names of several new species and genera and their preliminary descriptions, which were attributed to Huxley. Under modern rules of nomenclature³² all of these names are attributed to Huxley alone. Even in

the *Transactions* paper of 1867 not all names were detailed sufficiently, and several awaited detailed descriptions.

WILLIAM HELLIER BAILY CONTESTS PRIORITY

On 3 February Huxley⁴⁶ reported to Wright about a letter printed in *Geological Magazine* in which William Hellier Baily (1819–88) claimed that the credit for the discovery of these fossils was entirely due to Brownrigg and Wright, and that the correspondent (Baily) had had sight of the fossils before Huxley.⁴⁷ Baily (figure 3) was a palaeontologist from Bristol, a fellow of the Geological and Linnean societies, who had been working as acting palaeontologist in the Geological Survey of Ireland since 1857 and thus under the direction of Joseph Beete Jukes.⁴⁸ He was a considerable and very accurate lithographer who specialized in fossil illustration, and by the end of his life had catalogued more than 30 000 fossil specimens, had written more than 60 original contributions on fossils, and had produced a considerable number of illustrations for his own and other people's palaeontological work.⁴⁸ He had also worked with Brownrigg in the RGSi in the preparation of a catalogue of its library.⁴⁹

The report of the GSD meeting of 10 June 1863 in that society's *Journal*⁵⁰ recorded in addition other work from Mr Baily, and was not published until 1864. Baily had made informed comments on other Carboniferous fossils found in Donegal.⁵¹ After Wall's paper on the Castlecomer fossils on 8 November 1865, Baily, together with Brownrigg and Haughton, made some verbal contributions to a debate on their significance. At the next meeting (of the then-styled RGSi) on 13 December 1865, Baily⁵² exhibited a watercolour of *Keraterpeton galvani* from Jarrow (figure 4) dated November 1865, thus antedating Wright's or Huxley's involvement in the description of these fossils. The name had almost certainly been suggested by Brownrigg or possibly by Baily himself, although it is now credited to Huxley as first publisher. This watercolour is in the archives of the Geological Survey of Ireland.

Geological Magazine was a lively monthly journal with a regular correspondence section. The January 1866 issue had carried a commentary by Robert Etheridge,⁵³ a palaeontologist with the Geological Survey of Great Britain and working also at Jermyn Street, where he described the finding of the fossil amphibians as 'one of the most important discoveries and additions made to Paleontological research during the past ten years'. Baily responded to Etheridge's notice by saying that it gave the impression that Huxley had been the first to ascertain their Saurobatrachian character (Saurobatrachian is an early synonym for the Urodela, or tailed amphibians such as salamanders). Baily made two points. The first was that Brownrigg showed the fossils to him first, and that he had ascertained their true nature, and supplied him with a list of the associated fossil plants and fish then collected, before the June 1865 meeting of the RGSi. The second point was that the presence of Saurobatrachian forms in the Carboniferous period had been observed several times before: in 1844 by von Meyer in Bavaria, in 1853 and 1854 by Owen in Nova Scotia, in 1857 by Wyman in Ohio, and in 1860 and 1863 by Dawson. This is noted in the article by Wright and Huxley,⁵⁴ in which a letter by Jukes of 8 November 1865 quotes Baily's recognition of earlier publications but decreases the value of Baily's observation as follows: 'it does not appear that Mr Baily ever gave a more definite opinion than this as to the nature of these remains.' In the same paper,



Figure 3. William Hellier Baily, aged 44 years. (Courtesy of British Geological Survey (GSM I/639).)

Baily also mentioned other names of people involved in the Jarrow find, such as Mr Charles Galvan, one of the fossil collectors of the Geological Survey of Ireland, which caused Huxley to give his name to one of the new species, *Keraterpeton galvani*, and the two Trinity students Henry Wall and John Edge, both of whom had collected in the locality, and who presented their specimens to TCD. All had consulted with Baily, who gave his opinion freely, and with the caveat that the identity of fossils would become clearer as more were found. Baily concluded with a religious point, saying that the creatures of the past were as well adapted to their environment as those of the present, 'thus confirming the perfection of wisdom in the Great Creator'.

Huxley was obviously alarmed by these statements. They jeopardized his claim to priority and introduced a religious consideration that was entirely misplaced. He told Wright that he

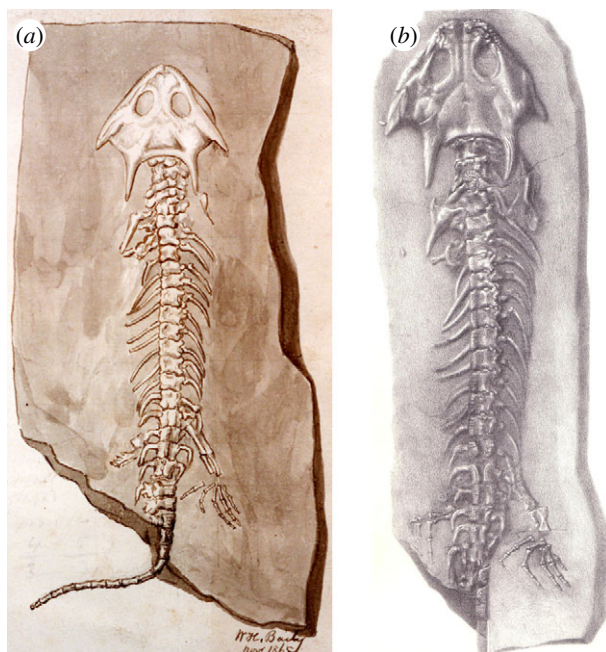


Figure 4. (a) A watercolour of *Keraterpeton galvani* Huxley 1867 from Castlecomer, Co. Kilkenny, signed by Baily and dated November 1865. Huxley had sight of the Jarrow fossils in Dublin on 22 November that year, but Dinkel did not receive the order to proceed with his engravings until 12 December 1865 (ICL Huxley archive ref. 29.155). (b) Dinkel's rendition of what seems to be the same *Keraterpeton* specimen as that shown in (a). (Online version in colour.)

was keen to have a note published in the next issue of *Proceedings of the Royal Irish Academy* denying Baily's claims.⁵⁵ Wright replied on the following day,⁵⁶ agreeing to the publication of the note but disregarding Baily's comments, which he had not seen yet, although in subsequent letters⁵⁷ he seemed to be ready to accept Huxley's assessment of Baily.

PRESSURE TO PUBLISH AND VARIOUS DELAYS

Throughout February 1866 Huxley continued to make progress in the study of the Jarrow fossils. At this point an embarrassing issue emerged: Wright had given the only copy of his part of the manuscript to a Dublin newspaper journalist, who had not returned it. The long report in *The Irish Times* of 9 January⁵⁸ on the meeting of the RIA replicates much of the technical information about the coal fields contained also in Wright's *Transactions of the Royal Irish Academy* paper introducing Huxley's descriptions, so it is likely that Wright was referring to the *Irish Times* reporter. By June 1866 the pressure from the Council of the RIA was mounting to have the final text for approval,⁵⁹ and on 20 June Wright sent Huxley an ultimatum demanding the final version of the paper.⁶⁰ Huxley sent it on 27 June,⁶¹ which was acknowledged by Wright⁶² on 28 June. Exactly one month later⁶³ Huxley reported on a piece of gossip suggesting that in spite of the pressure put on

him to complete the manuscript, the publication did not go ahead because Wright's introduction was not ready. To this Wright replied⁶⁴ that he had understood from the secretary of the RIA that the printing of Huxley's part would go ahead, and that his own part would be just a reprint from *Geological Magazine*. By 22 November⁶⁵ Wright sent Huxley the proofs, but raised another alarm, this time concerning the lettering on the illustrations, which was not in accordance with the lettering Huxley had on the manuscript. Huxley replied⁶⁶ showing surprise that the plates had been printed without his final approval. However, Huxley had procrastinated on sending back his corrected proofs, and on 3 December⁶⁷ Wright informed him that the secretary of the RIA wanted to go to print on 12 December, so the corrected proofs were urgently needed. This drew Huxley's ire on the RIA,⁶⁸ but he was put right by a letter from Jukes⁶⁹ in which he explained the attitude of the Council of the RIA towards his paper, and that the delay was entirely due to Wright. There is, on the issue of the illustrations, an additional confusing element. At the meeting of the RIA of 9 January 1866, George Victor Du Noyer, a geologist and prestigious illustrator who worked for the GSI and was present at the meeting at which Brownrigg showed the fossils, had offered to make drawings of the fossils gratis for the subsequent publication, an offer that was accepted. We have, in addition, Baily's watercolour dated November 1865. However, in the *Transactions* paper, which has five plates (two of them being fold-outs), the illustrations were printed in London by the firm of M. and N. Hanhart and drawn and lithographed by Joseph Dinkel, the top scientific illustrator for fossils of his day, who rose to prominence for his illustrations for Louis Agassiz's *Recherches sur les poissons fossiles* (1833–43). The alleged Du Noyer drawings have not been found in any of the places in Dublin likely to hold them (the RIA library, the Royal Society of Antiquaries in Dublin, the archives of the Irish Geological Survey, the National Library or Trinity College Library). To add to the authors' troubles, the secretary of the RIA required the authors to cover the costs of additional illustrations, to which Huxley replied⁷⁰ that he was happy to pay his share of the excess expenditure. Eventually, on 26 February, Huxley⁷¹ reported to Wright that the Royal Society had approved a grant for continuation of the publication of the Irish fossils. The specimens were returned to Ireland on 27 July 1867. The Wright–Huxley *Transactions* paper was published in 1871, with the initial original work having been read in 1866. This was a normal delay for the *Transactions* papers; the 1871 volume comprised papers read from 11 April 1859 to 11 April 1870. When in 1874 Wright became secretary of the RIA, he moved in Council that Huxley be made an honorary member of the academy, which was gracefully accepted.⁷²

The various specimens described by Huxley and used as the basis for his various species names ended up in several institutions in Dublin. There are also small numbers of specimens in museums overseas. TCD held the majority of the specimens until their geological museum was reduced in size and subdivided for use as laboratories.⁷³ The specimens were transferred to the relative security of the National Museum of Ireland in 1959, where they joined specimens given directly to that museum in the early twentieth century and specimens in the collections of the Geological Survey of Ireland that had been transferred to the National Museum of Ireland in 1955. In 1995 it was reported that the TCD specimens were being returned,⁷⁴ but some specimens still in fact remain to be transferred.

One of the problems for curators dealing with specimens from Jarrow coal seams is the chemistry of the original stagnant pools where the coal sediments accumulated. These gave rise to the sulphur-rich iron mineral pyrite, which developed as tiny crystals within

the thin coal laminae. If pyrite is allowed to get moist it can break down, causing the expansion of crystals and shattering of the host rock. This was noted early in the history of the specimens,⁷⁵ and various treatments were devised.⁷⁶ Over the years, Jarrow specimens have been embedded in plaster or in paraffin wax to exclude air in damp museum stores and to hold the friable pieces together. This process has not met with approval from modern geological conservators,⁷⁷ and the only known specimen of *Lepterpeton dobbsii* Huxley, 1866 was illustrated on the front of a journal with the caption 'this type specimen has been rendered practically useless by mounting it in paraffin wax.' However, in many cases the wax can be removed; these specimens can be made stable and so are still available for study.

PRIORITY, PERSONALITY AND PERMANENCE

Several elements of the story require clarification. At the coalface it must have been difficult to establish absolute priority with regard to noticing the academic value of the fossils, because there were several people involved *ex officio* as fossil collectors in the Geological Survey of Ireland, and such value must have dawned gradually on the people concerned. Brownrigg had been a student in Trinity, had an MA and an MB⁷⁸ and might have seen fossils in the college museum, and he was initially entrusted by his contemporary Wright with their description,⁷⁹ because he was an active member of the RGSi and because Wright knew his scientific qualities from his earlier studies. Brownrigg wrote in a neat but not oversimple calligraphy and used correct grammar and a wide lexicon, including words such as 'quixotic' and 'reptilian'; apparently he could draw as well.⁸⁰ Brownrigg was a wealthy local amateur naturalist and geologist (he is nowhere listed as member of the RIA, nor was he a member of the British Association) who had made a valuable chance finding that he was prepared to exploit for his own advancement; at the same time he comes across as a little insecure of his palaeontology. Having stated his priority over the material at a public meeting and in print, and his intention to describe the fossils 'at no distant day', his complete surrender of his 'right' to Huxley is somewhat difficult to explain, unless he ceased to have a professional interest in them, or through pressure from Wright. His interest in the material did not cease until a few years later (see below), so we can only surmise that it was pressure from Wright that caused Brownrigg to pull away from his project, especially when he discovered that Wright had contacted Huxley with news about the fossils. Huxley was the acknowledged expert on fossil amphibians, and so Brownrigg would have known that he would have not been competent enough to produce a description to the high standard that Huxley promised (which Wright also probably realized). What is unusual is that Brownrigg was not offered co-authorship of the RIA paper, particularly as Wright had drawn heavily on his 1865 paper for his introduction, but then he was only an amateur and unlike Wright was not an academic.

Several facts suggest that Brownrigg was a rather competent geologist: first, Wright effectively copied parts of Brownrigg's initial report; second, his suggestion to wait until more material had been found was sensible and it was also what Baily had indicated, and the name he proposed for one of the new species was respected by Huxley; and third, both Huxley and Brownrigg coincided on the number of new species identifiable in the hoard. All these elements were probably part of the discussions that all those involved had among themselves. The least we can conclude is that Brownrigg was competent,

although we cannot really assess the quality of his palaeontology, and perhaps he succumbed to his desire to please. His presentation of the material, once orally and again in writing, to the RGSI, seems from the reports to have been confident and well able to provoke the interest of the expert audience, and he does not seem to have been unduly shy. However, he did not make much of the opportunity and he was not a regular author known to the geological or palaeontology journals either before or after the event, except for his occasional contributions to local meetings of the RGSI around the mid 1860s. Indeed, he dropped out of the geological community suddenly: on 15 January 1868 he tendered by letter his resignation as a Fellow and Council Member of the RGSI.⁸¹ Why this should be is unknown and unclear, and we can only speculate. He was respected by his peers, as illustrated by their election of him to the Council for four successive years between 1864 and 1868. Perhaps he became upset at the underhand way in which he had been marginalized by Wright in the publication scheme of the Jarrow amphibians. Wright, one will remember, had encouraged his collecting of the material and had also been one of his proposers for Fellowship of the GSD, so probably Brownrigg understandably felt let down in that his opportunity for scientific advancement had been pulled from under his feet. His final action as a geological student was due to take place on 10 April 1867, when he was scheduled to exhibit fossils from the Kilkenny coalfield at a Geological Society meeting; however, he did not attend and no fossils were seen by participants. Three years later he sold his personal collection of Jarrow amphibians and fishes to the British Museum (Natural History),⁸² an action that we suggest ended his interest in the celebrated and important fossil fauna.

Little is known of Brownrigg's subsequent career, but it is likely that he retreated to his estates, where he lived out his days. In the 1880s he published a series of pamphlets in which he discussed the effects of the British Empire falling apart.⁸³ Brownrigg died on 4 October 1906 at his residence Moor Hill, Brannockstown, at the age of 72 years, leaving a large family.⁸⁴ Wright survived him by only four years.

One of the minor roles in the event was played by Henry Beresford de la Poer Wall, who was an undergraduate student at the time. He had attended his father's celebrated Portarlington School,⁸⁵ where Edward Carson was also a pupil. Wall then entered Corpus Christi College, Cambridge, but transferred to Trinity College, Dublin, where he graduated MA. He then emigrated to Australia in 1867, where he became the Warden of Hamilton and Western District College. He wrote the book *Manual of physical geography of Australia*, which ran to two editions.⁸⁶ He died on 11 March 1895,⁸⁷ of inflammation of the bowels.

Baily was well positioned to claim some priority himself with regard to the find, or at least with the description of the fossils, because he had a supervisory role over the fossil collectors of the GSI and was often on site,⁴⁸ and also because he had illustrated some of them in great detail even before Huxley had set eyes on them; however, Huxley was right in suggesting that Baily had not been assertive enough in temperament or thorough enough in his description, effectively letting the opportunity pass. Baily worked under Jukes in the GSI, and their relationship with regard to the delineation of their respective duties was often tense. He was in a constant state of agitation with regard to his Irish job and the salary that he received.⁴⁸ In a letter to Roderick Murchinson, the director general of the Geological Survey, Jukes⁸⁷ wrote:

I am sorry to be obliged to inform you that I can no longer tolerate Mr. Baily's behaviour here. On two or three previous occasions when I have found fault with him, or offered him

advice, or remonstrance, he had broken out into a fit of fury, and made use of such gross insolence of language and manner to me as I never before received from any man.

A tightly written 16-folio letter followed from Jukes to Murchinson,⁸⁸ detailing Baily's offensive behaviour. It says something about Baily's expertise that through Murchinson's good offices, who was friendly with both men, and appreciated their talents, Baily returned to his duty and Jukes accepted his apology.

Jukes himself made some attempt to get involved in the description of the Jarrow fossils. Recognizing that he was unable to describe them, at the meeting of 14 June 1865 he put it to the 'comparative anatomists of Dublin' (of whom Haughton was the most notable) to undertake their description.⁸⁹ Jukes had sent a photograph of one of the fossils to Huxley, who replied saying that he could not work from a photograph. This is very understandable because, given the nature of the material—coal—these fossils are notoriously difficult to photograph even today, the work of an expert geologist with artistic skills being much preferable because the geologist can make a great deal of interpretation that escapes the camera. This also explains why Huxley felt the need to see the fossils himself, thus travelling to Dublin.

Wright seems to have been, at least on this occasion, somewhat opportunistic. He might have felt that by arranging for Brownrigg to receive two grants, of £20 (in 1865) and £25 (in 1866), from the British Association for the Advancement of Science he had bought his rights to the fossils, but he made clear that the grant was to continue the search for fossils, not to 'buy' those already found. The material was not in principle his own, and perhaps not knowing enough palaeontology he felt the need to call on Huxley, certainly a world authority on fossil vertebrates, but not the only one. Samuel Haughton was in the same college as Wright at the time, and Jukes was local director of the GSI, both being geologists in good standing and members of the RIA, and both being interested in fossil vertebrates. Wall, who was then a student, made a good attempt at describing them at the RGS meeting of 8 November,⁹⁰ and Baily had described and illustrated many fossils. But Wright bypassed all his local colleagues, relegating Baily to 'a friend of Brownrigg', whereas he was a colleague of Jukes. Wright also ignored that Baily had already illustrated and presented to the RGS at the meeting of 13 December an original coloured illustration of *Keraterpeton*, which is still extant. In fact Wright agreed with Huxley that he (Wright) would not take any part in the description of the fossils,⁹¹ and that Huxley would be the only describer. Because Jukes and Haughton were present with Wright at the meeting with Huxley in Dublin, it is just possible that they had recommended to call on Huxley to clear up the apparent uncertainties among the men of the Geological Survey, as reported by Baily, even though this was a surrender of their own expertise. Brownrigg's letter to Huxley³⁰ makes it clear that Haughton attempted to get in on the scene, but this was after Wright had made contact with Brownrigg and had obtained a grant from the British Association to enable him to continue collecting fossils. Throughout his life, Wright seems to have been a little insecure as to his calling within the sciences, having tried geology, botany, branches of zoology, and ophthalmology, leaving in all of these a record of competent activity but not real creativity. There is a great gulf between the tone of Huxley's letters to Darwin or Hooker, or even Jukes, and his letters to Wright, where there are no concessions to humour and no small talk, and occasionally clear impatience and displeasure.

Wright's conduct in the production aspect of the *Transactions* paper with Huxley, which was said to have caused delays in the publication, was little short of amateurish. He seems to

have lost his only copy of his own contribution, he caused unnecessary delays, and in his correspondence with Huxley he indirectly blamed the Council of the RIA for the delays that he himself had produced. He seems to have been less than diligent in pursuing Du Noyer's generous offer of free drawings, which eventually required the contribution that Huxley procured from the Royal Society. These were difficult times financially for Irish science, but we cannot cease to consider whether more diligence and concentration on Wright's part would have made things cheaper as well as faster.

Huxley had worked with Wright for several years on the failed project of the *Natural History Review* (1854–65),¹ and it is perhaps through this that Wright found the connection with Huxley facilitated, giving the latter, quite unexpectedly and spontaneously, an opportunity to describe and publish new important fossils. Huxley took to it eagerly, making time for the necessary work in his very busy schedule, and in a matter of eight weeks, between 9 November 1865 and 9 January 1866, the bulk of his share of the work was done and the new genera and species were described and published, in preliminary but sufficient form to secure exclusive priority for himself. In their *Transactions* paper both authors were gracious to Brownrigg, whom they mentioned several times, and Huxley had been careful to clear with Brownrigg by letter the role he was wanted for. Huxley was also careful to keep his work separate from Wright's own contribution, each of them authoring their own part of the work separately, which was a somewhat unusual arrangement. His descriptions of the fossils are meticulous and required good knowledge of fossil vertebrates, but at no point in his *Transactions* paper did Huxley attempt a discussion of the value of the material, or a comparison with similar amphibian fossils dating from the Carboniferous period and reported by other geologists. Baily should take the credit for this, because he reviewed previous citations of amphibians (or Saurobatrachians, as he called them) in Carboniferous marshes, as they were beginning to adapt to aerial respiration and terrestrial locomotion, although he did so while reacting to his interpretation of Etheridge's comments on the find as published in *Geological Magazine*.⁵³ Baily's theological comments at the end of his correspondence, as well as his references to the work of Richard Owen, Huxley's arch-enemy, probably contributed to increasing Huxley's negative disposition towards otherwise inoffensive comments.

By considering that the fossils had come into his hands 'by chance'³⁵ (see above), Huxley was clearly disingenuous. Chance had only played a part in Brownrigg's original finding, but from then onwards the path of the fossils into Huxley's hands had been engineered by Wright, having passed through Baily. Huxley effectively ignored the work of all intermediary contributors, perhaps on the basis that as the undisputed world expert on fossil amphibians, whatever academic advancement could be had from their description was owed to him alone.

Baily never relinquished his interest in the Jarrow fauna and flora, and in 1874 was granted £7 15s by the British Association for the Advancement of Science to aid his research into new forms that had been discovered.⁹² Baily reported on these fossils at two subsequent meetings of the Association⁹³ and later still, just four years before his death, described a new amphibian species, *Anthracosaurus edgei* (named for John Edge, one of the student fossil collectors).⁹⁴

Clearly the Jarrow collection was larger than the seven amphibian species described by Huxley, comprising also plants, elasmobranch fishes (some of them 6 feet in length) and some invertebrates and other amphibians.⁹⁵ The bulk of the collection of amphibians and fish totalling about 100 specimens is stored in the National Museum of Ireland storage facility in Haddington Road, Dublin, but other specimens are in the Natural History

Museum, London, the Manchester Museum, Oxford University Museum of Natural History, and the Sedgwick Museum, Cambridge. Six specimens from Jarrow were purchased by the Warwickshire Natural History and Archaeological Society in 1883, and in 1900 the National Museum received several specimens of Jarrow amphibians from Mr Joseph Dobbs, manager of the Jarrow colliery and the son of Kildare Dobbs mentioned above. In 1889 James George Robertson (1816–1900) of 36 Sandford Road, Dublin (formerly of Shankhill Castle, Co. Kilkenny) presented a suite of 10 specimens to the Royal School of Mines in London. The full collection has never been studied or even catalogued as such, but some partial aspects of it have been documented since Huxley's first descriptions in 1867. Lydekker⁷⁵ studied one of the skulls in particular, and Traquair⁹⁶ described and illustrated the new fish species *Myryolepsis hibernicus* based on specimens in the Manchester Museum at Owens College and in the Museum of Practical Geology, London; shortly afterwards, Herbert Bolton FRSE, Assistant Keeper of the Manchester Museum in Owens College, redescribed this fish along with some plants and fish from Jarrow stored in his institution,⁹⁷ and Sequeira⁹⁸ erected the new temnospondyl amphibian genus *Procochleosaurus jarrowensis*. In the 1980s interest in the Jarrow amphibians and others from Nyrany in the Czech Republic,⁹⁹ Linton, Ohio,¹⁰⁰ and Newsham, Northumberland¹⁰¹ has resulted in several publications. Milner¹⁰² redescribed *Dendrepeton* from Jarrow and underlined the historic importance of the Jarrow amphibians as twofold: first, because the stratigraphic dating indicated that Jarrow was Westphalian A and thus the oldest of the Upper Carboniferous amphibian finds then known, and second, because Jarrow was the first assemblage of small coal-swamp amphibians to be described in detail. The Linton, Nyrany and Newsham assemblages were described subsequently by reference to Jarrow. Linton and Nyrany are Westphalian D, whereas Newsham and another find from Joggins, Nova Scotia,¹⁰³ are Westphalian B. Recently Jennifer Clack¹⁰⁴ has traced earlier tetrapod (amphibian) remains from East Greenland, such as *Ichthyostega* and *Acanthostega*, as far back as the Devonian, and the latest large review of the subject of amphibian palaeontology¹⁰⁵ summarizes many new findings but omits all mention of Jarrow, facts that probably will further deflect attention away from the Jarrow fossils.

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- 35 T. H. Huxley, letter to Sir Charles Lyell dated 27 November (1865); reproduced in L. Huxley (ed.), *Life and letters of Thomas Henry Huxley*, vol. 1, p. 280 (Macmillan, London, 1903).
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