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The life and works of Fortescue William Millett (1833–1915), foraminiferologist

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ABSTRACT – The few obituaries that there are of Fortescue William Millett are rather cursory and incomplete. Now, 90 years later, a rather fuller picture of the man – hitherto, a rather enigmatic figure – and his foraminiferal work is presented, concentrating especially on his later years after his retirement to Cornwall. Millett published two substantial studies, on the foraminifera of the Malay Archipelago and the Pliocene St Erth beds of Cornwall, for which he is best remembered, but most of his other projects appear never to have been completed. His extensive collections and library, much of it in a poor condition, were rescued and conserved by Edward Heron-Allen after his death, and are now in The Natural History Museum, London. *J. Micropalaeontol.* **25**(2): 165–174, November 2006.

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INTRODUCTION

The Natural History Museum (NHM) in London houses the foraminiferal collections, letters and library of Fortescue William Millett (1833–1915), rescued on his death from his house, 'Eniscoe' in Brixham, Devon, by Edward Heron-Allen.

F. W. Millett was born in Marazion, Cornwall and spent his working life in London as a Civil Engineer, returning to Marazion on retirement in 1883. There he undertook several major studies on the Foraminifera, most notably of the St Erth Clay, Cornwall (1885b–1902b) and the Malay Archipelago (1896a–1904). His work, however, never expanded on the classical foraminiferal classification of the English School and he remains perhaps a marginal and rather enigmatic figure. Yet, as a Founder Member of the Quekett Microscopical Club, a Fellow of the Royal Microscopical Society and an undoubted repository of specialist knowledge at the time, he was the natural successor to Henry Bowman Brady (after the latter's death) and the link with the era of Heron-Allen & Earland. This paper seeks to provide some background to Millett's publications and his other involvements and, for the first time, to provide a comprehensive biography (and retrospective obituary) of the man.

BIOGRAPHY

The background: a man of his time

Millett became the leading UK foraminiferologist and natural successor to Henry Bowman Brady, after the latter's death. H. B. Brady (1835–1891) and William Benjamin Carpenter (1813–1885) had previously been the two leading taxonomists of the 'English School' (see Adams, 1978). Yet, many of Millett's own projects were never fully completed, neither did he ever produce a classification of his own. However, he had an encyclopaedic knowledge of the Foraminifera and a very good library, which had enabled him to assist Brady in the compilation of synonymies for the *Challenger* Report of 1884 and made him very useful to a whole coterie of foraminiferal workers at the time.

Apart from Brady and Carpenter, so many other famous names in English foraminiferology were living during Millett's formative years: William Kitchen Parker (1823–1890), Thomas Rupert Jones (1819–1911), William Crawford Williamson (1816–1895), Frederick Chapman, Charles Davies Sherborn (1861–1924) and the Irishmen, Joseph Wright (1834–1923), P. Balkwill and Charles Elcock (1834–1910). All were members of one or more of the principal scientific societies of the era.

F. W. Millett: the person

The failure of any of the published obituaries of the time (Anon, 1915a, b; Sherborn, 1915) to provide an in-depth study of F. W. Millett has been the stimulus of this article. Of his life as a young man, relatively little is known. We know him really only after his retirement in 1883 to the West Country (Devon and Cornwall) when we appear to be dealing with, certainly in these later years, a rather reclusive man.

He published only two studies of worth and those were after his retirement, but these were substantial and important. The first was on the Foraminifera of the St Erth clays of Cornwall (Millett, 1885b–1902b) for which he was awarded the William Bolitho Gold Medal by the Royal Geological Society of Cornwall. The second was on the Foraminifera of the Malay Archipelago (Malaysia & Indonesia) (Millett, 1896a–1904), which was also superbly illustrated. Both are constantly referred to over a century later.

Had it not been for one person, however, his name might probably have vanished into almost total obscurity, like so many other naturalists of that time. It so happened he met with a very enthusiastic retired solicitor, Edward Heron-Allen, who cultivated him and, on Millett's death in 1915, preserved his collection of specimens, letters and library for the nation – subsequently housing them in the NHM, London.

Millett was born in Marazion, near Penzance, Cornwall, to Joanna (née Teague) and Fortescue Millett on 20 August 1833. He had a younger sister, Josepha. It is thought that his father was a Registrar of Births, Marriages and Deaths in the St Michael's Mount area of Penzance but, on his father's death, the young man went to live with his mother and uncle, a John Fortescue Millett, in North Street, Marazion. This uncle then died in 1852, leaving a substantial legacy to be his on reaching his majority but, at the age of about 20 (approximately in 1853), just before he officially inherited, he moved to London. He became manager to a hydraulics engineer and was listed in Census returns as a Civil Engineer. Unfortunately, the Institution of Civil Engineers has no record of him.

What turned a young Civil Engineer into a naturalist who became a Founder Member of the Quekett Microscopical Club in 1865 at the age of 32? We may never know. Membership of this Club was on personal recommendation, but his sponsors are also unknown. In 1880 Millett was elected a Fellow of the Royal Microscopical Society of London, but, except for using it as a vehicle for publication and perhaps for contact, no other contribution of his has come to light.

In 1883, Millett left London and returned to Marazion, presumably on retirement, but in those days the age of 50 was early for someone to retire. Because he had bought his Stephenson microscope in about 1881 we must assume that sometime before returning to Cornwall he had begun to study the Foraminifera. Experience in such a group is not an overnight phenomonen and he was indeed generously acknowledged as a helper by Brady in his introduction to the *Challenger* Report of 1884, and therefore a person of some knowledge. It has not been possible to find out where Brady commenced writing up the *Challenger* Report, but the fact that he had a London address in 1879 could have meant that he had a close association with T. R. Jones, W. K. Parker, and with Millett himself (all Londoners). Brady's involvement of Millett was based on the fact that the two were clearly both actively working on the Foraminifera at the time. On the latter's return to Cornwall, he quickly commenced writing up the St Erth material and had been examining Recent material from Mounts Bay, Cornwall; the results of both being published in 1885. On 5 September 1885 Millett wrote to H. B. Brady … 'I need not say that I shall always be happy to render you any service that may be in my powers and hoping that you will not fail to make use of me'.

About this period too, material was collected by a Mr A. Durrand from the Malay Archipelago and sent to Brady in the hope that he might examine it; Brady thought that Millett ought to undertake the study instead. This was fortuitous, for by 1892 Henry Bowman Brady was dead and there was, otherwise, no one else left capable of writing up the results. T. R. Jones had retired and had ceased writing on foraminifera and Joseph Wright was probably considered too parochial. Millett was by now probably the most established active foraminiferologist in the British Isles, and still under 60 years of age.

When Millett returned to Marazion he initially worked in a huge barn attached to 'The Parsonage'. In 1901, however, according to manuscript notes of Heron-Allen, unknown circumstances led Millett to move very suddenly to a house called 'Eniscoe' in Berry Head Road, Brixham, Devon. 'Everything', wrote Heron-Allen, 'all his books, papers, slides and miscellaneous property were carted thither in vans and dumped pell-mellion on the floors of all the rooms where they appeared to have remained in hopeless confusion'. These events clearly affected his health. His eyesight began to trouble him and, with daylight illumination, microscopy became a problem. He even suffered blackouts, falling insensible at the microscope. Heron-Allen reports that so long as his 'brain was functioning normally' he was an extraordinarily patient and conscientious worker, noting and often describing every species as he found it and constantly making and remaking lists 'up to date' for immediate reference. He never destroyed a document of any kind connected with a subject, not even his own duplicated notes and diagnoses. Thus, his life continued with bouts of ill health until, at the age of 83, he was found in a precarious state by his home-helps, from which he did not recover (Anon, 1915b). It is strange that the Royal Geological Society of Cornwall, on the death of a William Bolitho Gold Medallist, failed to publish an obituary when the *Brixham Guardian* did.

The executor of his will was a nephew, Vivian Millett, who, according to Sherborn (1940), retained his collection of Edward Lear drawings. We also know his Catalogue of Foraminifera was bequeathed to Joseph Wright (see p. 3). No correspondence exists to connect the executor with Edward Heron-Allen but Heron-Allen was invited by him go to Brixham in the early part of the Great War to sort and arrange, as far as was possible the … 'confused mass of slides, material, correspondence and literature which littered every room and corner of the house' and remove them for safe keeping. There is mention in Heron-Allen's private War Diaries that for these he paid the Estate the sum of £100.

Thus, through the good offices of Edward Heron-Allen, the NHM, London, acquired the Millett Collection, which now forms part of Heron-Allen's own later bequest (of 1926) to the Trustees (Hodgkinson & Whittaker, 2004). Two portraits of Millett are found within Heron-Allen's collection of photographs of contemporary foraminiferologists and these are shown in Figure 1.

His association with Edward Heron-Allen

His relationship with Edward Heron-Allen, already mentioned several times, deserves further attention. The life and work of Heron-Allen is documented elsewhere (Hodgkinson & Whittaker, 2004) but, as an amateur, starting to examine the Foraminifera, he must have heard of, possibly even met, Millett at Quekett Microscopical Club meetings or at a Royal Microscopical Society soirée. In 1891, Heron-Allen had turned his attention to the Chalk and floundered around for almost a year, before having the good fortune to meet Millett through Charles Elcock (another Quekett member). With additional material and bibliographic help from Millett, who suggested he obtained a good start by consulting d'Orbigny's Craie Blanche, and by using notes on processing from the late H. B. Brady and from Charles Elcock, Heron-Allen's efforts finally led to success (Heron-Allen, 1894). In August 1892 Heron-Allen himself went down to Marazion, probably on holiday with Marianna, his first wife. Sadly, although Heron-Allen kept copious 'holiday journals' over many years there is none that covers this period.

Their relationship was to last well into the second decade of the twentieth century but it appears to have had its 'ups and downs'. Millett, writing to Arthur Earland in 1909, regarded Heron-Allen as '… an universal genius, an admirable Crighton and if only his wings could be clipped it might be possible to make him useful, for at present he is a bit wordy'. Yet, in 1911, when Millett was critical of Heron-Allen & Earland's publications on the Selsey foraminifera (Heron-Allen & Earland, 1908–1911), Earland, rather acidly, wrote to Heron-Allen that Millett was '… out of date and only ever produced one good piece of work, the Malay Archipelago'. When Millett died, it is curious that Heron-Allen (then President of the Royal Microscopical Society) failed to provide an obituary of his old friend for that Society, nor did he mention him in his War Diaries (Harvey & Fitzgerald, 2002). It is possible that he wrote the anonymous

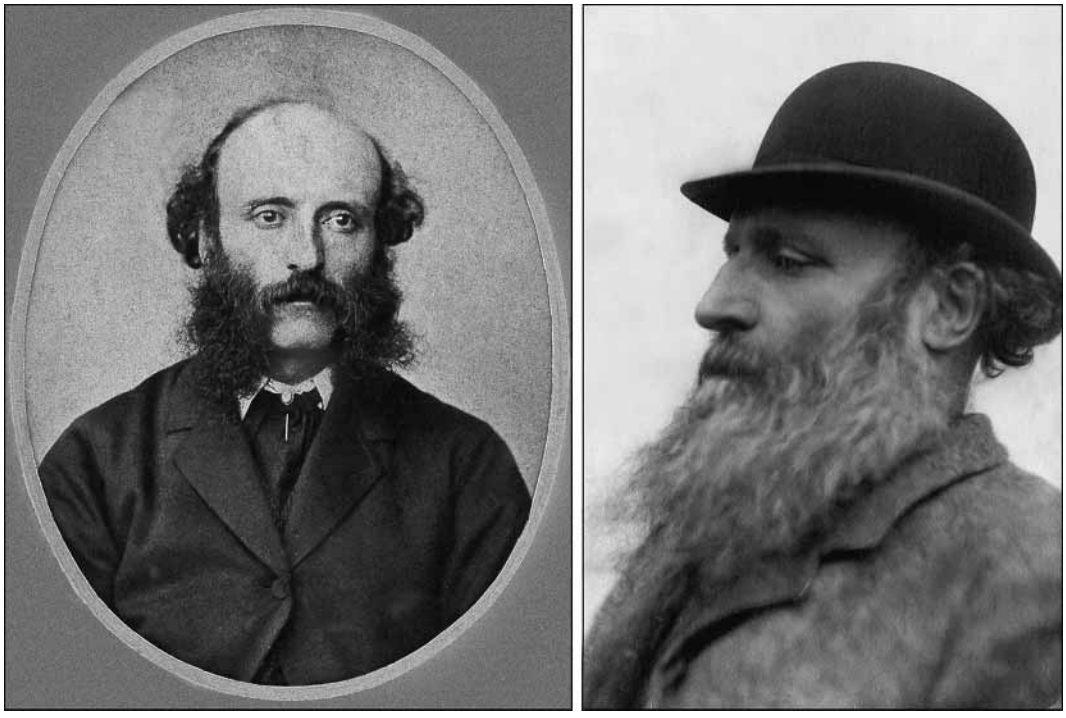

Fig. 1. Fortescue William Millett. The left portrait is dated 1895 (he was then aged 62). It has a note on the reverse '… He always wore the tie pin you can see in photo'. The right portrait is undated, but it is of him in later years. Both from the Heron-Allen Archive, the NHM, London.

obituary for the Quekett Microscopical Club (Anon, 1915a) and thought another unwarranted. If so, it is strange he did not acknowledge this by signing it, a feature most uncharacteristic of the man.

MILLETT'S COLLECTION IN THE NATURAL HISTORY MUSEUM, LONDON

Foraminiferal collection

Heron Allen removed from 'Eniscoe', Brixham, about 10 000 foraminiferal slides which must have contained anything between 100 000 and 200 000 specimens. All had been hand picked by Millett over a period of less than 30 years, an incredible feat for one man who was not in the best of health. They were all to be incorporated with the many other collections acquired by Heron-Allen within the 'Museum of Oceanography and Marine Biology', the ambition of Sir John Murray, but never realized. The specimens, therefore, are to be found catalogued separately as the Millett Collection, but within the Micropalaeontology Collection in the Department of Palaeontology, the NHM, London. A selection of slides is shown in Figure 3.

Catalogue

Being acquainted with the magnificent Heron-Allen Library at the NHM it is easy to forget the difficulties Millett must have encountered, facing a growing literature. He had no Ellis and Messina *Catalogue of Foraminifera* (1940 *et seqq.*) to help him with identifications, so he had to devise his own 'catalogue'. This is now housed in seven large, beautifully bound volumes with the words 'Foraminiferal Figures 1780–1915' and their contents (e.g. 'Volume I, Miliolidae') inscribed in gold on the spines. They contain meticulously copied or cut-out figures (see Figure 2) from publications covering this period (which was right up to his death) and comprise upwards of 200 genera. In the front of the first volume is an unsigned letter (dated 23 June 1915) to Henry Sidebottom. It is written from 10 May Street [Belfast]. From this address and from the handwriting we know it to be from Joseph Wright, the well-known Irish foraminiferologist. The letter makes it clear that the catalogue had been bequeathed by Millett to him on his death and that he had only just received it (on May 1 1915). The benefactor, moreover, was obviously uneasy about receiving it. 'I thought it would be well if he left it to a younger person but he would not do so' [he writes]. 'On two other occasions I wrote asking him after my death to whom he would like it to be left to, but no answer came but do what you would like with it'. Wright worries that '… no suitable person be found to receive it' and concludes the letter by stating that if this were to happen '… it may [be] left to the British Museum'. Wright seems to have constructed an index to the Catalogue (which precedes Volume 1) and, in July 1917, we have a note to the effect that he actually loaned some of the catalogue (which must then still have been loose-leaf) to Sidebottom. Finally, either before of just after Wright's death, the Catalogue did finally find its way to the Museum. There, Heron-Allen not only cleaned it up as best he could, he conserved it and had it bound into the seven volumes we see today. It was obviously a much-valued accession; after all it was Millett's lifetime's work. At a later date it also had labels, marked 'ARP, attached to the spines, meaning that they were to be specially cared for during air raids on London in World War II.

Correspondence

Millett kept copious letters from both British and foreign correspondents, which he pasted into various reprints and

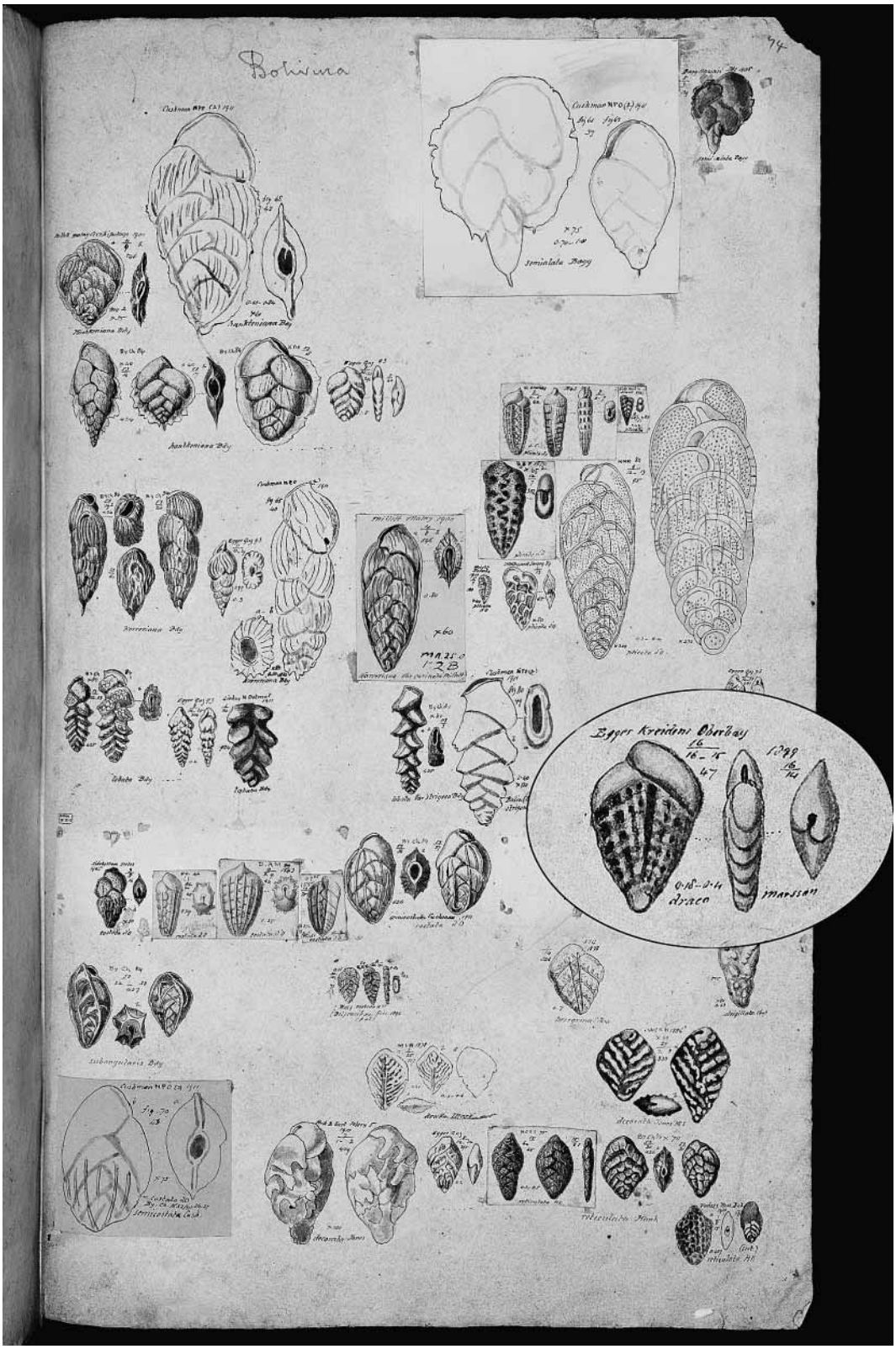

Fig. 2. A page from Millett's Catalogue (Volume 3, p. 74) featuring species of the genus *Bolivina*. The inset shows an enlargement of *Bolivina draco* Marsson, copied by Millett from Egger (1899).

Fig. 3. Examples of Millett's foraminiferal slides. (**A**) *Bolivina beyrichi* var. *alata* Seguenza from Misaki, Bay of Tokyo, Japan; (**B**) *Pulvinulina oblonga* (Williamson) from the Malay Archipelago, showing the characteristic radial lay-out of the specimens from the various stations adopted by Millett; (**C**) *Planispira celata* (Costa), from the Pliocene Marl of Myrtou, Cyprus; (**D**) *Lagena clathrata* (quadrigonal) Balkwill & Millett from Galway, W. Ireland (this may be a syntype of *Lagena quadrigono-clathrata* Balkwill & Millett, 1884); (**E**) *Discorbina turbo* (d'Orbigny) from the Pliocene of St Erth, Cornwall; (**F**) *Faujasina carinata* d'Orbigny also from St Erth, Cornwall. Slides A–E were all rescued, conserved, remounted and re-labelled by Heron-Allen (and assistants). Slide F may be an original Millett slide. × 1.3.

publications. Heron-Allen dutifully bound all these together so that everything relevant is in its rightful place, and these have been kept separately within the Heron-Allen Library in the Department of Palaeontology (Micropalaeontology), at the NHM. These have been catalogued and a full listing is now available on a dedicated Excel spreadsheet.

THE BACKGROUND TO MILLETT'S FORAMINIFERAL COLLECTION AND PUBLICATIONS (FROM PUBLISHED AND UNPUBLISHED SOURCES)

Heron-Allen was well known for adding information to the fly-leaves of documents. Some of this information is published, some not. In other cases letters are extant, retrospectively written. All now serve to open windows on what must have been fascinating twists and turns in the projects that Millett had undertaken.

Foraminifera of Galway (Ireland)

This material was published in 1884 by Balkwill & Millett, having been collected by the former in 1879. In 1908 Millett republished the plates, since the originals were in his opinion, sub-standard. It is interesting to note that the 1884 version appeared just before Brady published the *Challenger* Report and indeed it was Brady who advised the authors what names they should use. The depository of the collection was not given, but possible syntypes from Galway are present in the NHM, London, housed in the Heron-Allen and Earland Collection (ex-Millett Collection). One such slide is shown in Figure 3D.

Foraminifera of Mounts Bay, Cornwall

Information on this material was published in Millett (1885a). In the introduction he implies that Britain had contributed nothing to the knowledge of the Foraminifera since the publication of Williamson's monograph of 1858! The whereabouts of this collection, of over 100 species from the beach at Marazion, may be inferred from the mention in Heron-Allen & Earland (1916: 31) of 'a certain number of specimens found upon dilapidated type-slides from the Millett Collection (which now forms part of our own)', and these should now be in the NHM.

The work started on the living foraminifera of South Cornwall by Millett was continued by Heron-Allen & Earland, who revisited Mounts Bay in 1910 and it is of interest to note that Millett even hired a trawler to collect specimens for them (letter 11 October 1910). However, in addition to commenting on the poor state of Millett's specimens, Heron-Allen & Earland (1916), in return, appear to give him little credit for all his earlier work.

Selsey Foraminifera

Alfred Bell (1893) published notes on a post-Tertiary deposit exposed along the shores of the Selsey Peninsula, West Sussex, and its fauna studied over a period of 25 years. Larger foraminifera were noted: *Nummulites* and *Alveolina* being the principal genera, obviously derived from the older, Eocene deposits in this area. Millett was asked to undertake the identifications and listed four genera and ten species. However, many genera and species were omitted from the original communication by Bell to the Yorkshire Philosophical Society. None is new and there are no illustrations.

The Misaki Collection of Japan

Amongst the muddle at 'Eniscoe', Heron Allen found the Misaki slides, containing specimens of foraminifera picked from 80 grains (5.2 g) of greenish-grey shore sand from the Bay of Tokyo, sent by Dr M. Yokoyama of the Science College, Imperial University of Japan in 1891. They were strewn on the floor of the attic where Millett sometimes sat and worked in his later years (Heron-Allen, 1936: 116). Correspondence accompanying this material, which had originally been sent to H. B. Brady but arrived after his death (1891), was passed by T. Rupert Jones to Millett. This information opens up another line of future research – on the connection between these three people and how Jones often was the middle-man in so many of these projects. The whole Misaki Collection was buried to a thickness of 'feet of rubbish and inches of dust'. Heron-Allen was also appalled to find over 100 wooden slides scattered about the floor, the cells for the most part quite full of dust and dirt. He brought everything to his house, 'Large Acres', in Selsey, Sussex, where he carefully washed many of the surviving tests with alcohol. He then put the slides into outer cases or transferred everything into new slides; one of the latter being illustrated in Figure 3A. The remainder, which would not respond to treatment, were washed and rocked in alcohol until a residue of foraminifera remained and these were mounted into two of his Type-Slides, named by himself (presumably using details from Millett's manuscript) and then indexed (see Hodgkinson, 1989). This information is taken from Heron-Allen's notes in the back of Millett's manuscript together with notes published by Heron-Allen (1936). Millett had requested (in a letter bound in the manuscript, dated June 10 1904) additional material from Japan, but as it was not from exactly the same locality he was not able to use it (Heron-Allen, 1936: 117). The species *Keramosphaera densa*, the type specimen of which has never been found, is diagnosed and illustrated by Heron-Allen from Millett's description and figure and is, curiously, attributed to 'Millett MS' in the *Catalogue of Foraminifera* (Ellis & Messina, 1940 *et seqq*.).

Foraminifera of the St Erth beds (Pliocene), Cornwall

It is for this work that Millett (1885b–1902b) received his greatest public accolade, the William Bolitho Gold Medal awarded by the Royal Geological Society of Cornwall, together with honorary membership, in 1899. In 1905 he donated 20 slides of St. Erth specimens to the Society, but a recent search of their archive in Penzance has failed to trace them (Vaughan Tregenza, pers. comm.). He remained associated with the Society until at least a year before his death, for he was present at their Centenary Celebration in July 1914.

Jenkins *et al*. (1986) noted that the first mention of the St Erth beds was by Whitley (1882), but the first study of their stratigraphy and fauna was by S. V. Wood (1884), and later by Kendall & Bell (1886). Millett (Royal Geological Society of Cornwall, 1900), in his reply to the President of the Society at the time of the Bolitho Medal presentation, expands on his involvement. Initially, Searles Wood (S. V. Wood), a noted mollusc worker, required some encouragement to examine the St Erth material

since he did not believe that Mr Cornish (the Society's Secretary) had found the shells, that he had sent to him, in the deposit. He was swiftly convinced. The foraminiferal samples were offered to Millett who immediately contacted H.B. Brady, but Brady considered that Millett, who lived on the spot and had some considerable experience, would be better able to carry out the work. Retrospectively, this was a sound move since by the time the work was completed in 1902, Searles Wood, Gwyn Jefferies, David Robertson, Robert Bell and Henry Brady were all dead. There are several letters from Robertson over the 1884–1886 period and from his wife, Hannah. In one of them, Robertson assures Millett that he is scrupulous in cleaning his sieves and utensils and there is no way that the *Haplophragmium* (the only agglutinating foraminifer ever found at St Erth) could be a contaminant, as suggested by the latter. G. S. Brady (H. B.'s brother) also recommends in a letter, dated 14 July 1884 that Perkiss, the man who drew the *Challenger* ostracods, be asked to draw the St Erth ostracods, as he himself had not got the time.

Bell, in 1885, wrote that S. V. Wood (whom he called P. V. Wood), his co-worker on the Mollusca, had just died and it had been his wish to carry on the study. He wonders if Millett has any more material. He writes that he has seen all the material at Cambridge and the Survey [Geological Survey of Great Britain] and, later in October, asks if the upper and lower beds at St Erth contain foraminifera; he also would like to know the numbers of foraminifera and ostracods, for he needs to mention them in his monograph. He also mentions in a letter of 25 June 1886 that the Royal Society [of London] has granted money for St Erth exploration. This clearly underlines the great interest shown at the time in the St Erth beds.

In 1887, Millett (1896b: 43) recorded that the Geologists' Association visited St. Erth in order to give members some idea of the nature of the deposit, its limited extent, its isolation and character of its organic content. He ventured to suggest that such a similar deposit might have been attained '.... if in far away times before so-called head had spread itself over the district some large ship returning from southern Italy in ballast had been stranded and gone to pieces at St Erth'. In 1894, he recorded that the fossiliferous portions of the clay were no longer accessible, but in 1898 there was still much interest being shown in these beds. Time has passed by a century, and our increase in the knowledge of dating, using planktonic foraminifera, caused Jenkins *et al.* (1986) to re-examine Millett's original slides together with their own additional material. From this they concluded that the St Erth clay is of Late Pliocene age (between *c.* 2.1 Ma and 1.9 Ma), with the current placement of the Plio-Pleistocene boundary at *c.* 1.8 Ma. Jenkins & Houghton (1987) published more information on the age, correlation and palaeoecology.

Millett's correspondence relating to the St Erth foraminifera is contained mostly between the covers of a very dirty file labelled 'St Erth. Drafts–Lists–Notes. Might be collated with the papers then destroyed'. There are 180 St Erth microslides in the collection. Most are beige-coloured cavity slides, some red (examples of each are shown, respectively, in Figures 3E and F). All look as if they were once rather dirty. There is very little original material stored at the museum. There is a bottle each from the 'blue' (the lowermost deposit, see S. V. Wood, 1884) and the 'brown deposits' (this could be the yellow clay of Kendall & Bell, 1886: 202) and a tube of floatings, all catalogued within the Heron-Allen & Earland Pliocene Collection and re-examined by Jenkins *et al.*, 1986. Whether Millett had access to the material in Cambridge and at the Geological Survey, mentioned by Bell above, is unknown.

Heron-Allen bound together a series of reprints which contain all Millett's relevant information on the geology and micropalaeontology of St Erth: it is labelled 'F.W. Millett &c 1885–1902' on the spine. He annotated the fly-leaf in November 1915, accordingly.

> The late F. W. Millett commenced to make a sketch book of the outlines of the species recorded by him from the St. Erth Clay which I acquired with his library and papers after his death in 1915. The list of species which he intended to draw is inserted in this volume, together with the drawings which he actually made.

Millett (1885b) had written that:

> the amount of time required to work out the fauna of a deposit as diverse in microzoa as the St Erth Clay is so considerable, that it has been judged advisable to take this opportunity of calling attention to the subject rather than to wait for the completion of an exhaustive report.

So he left new and doubtfully placed forms for further consideration. He made a few comments, as for example, he had not found any agglutinating forms (but see the comment by Robertson, above and in Millett, 1894: 2), that the fauna indicates that which might be found in shallow seas of a sub-tropical climate, and that T. R. Jones (*in* Kendall & Bell, 1886) thought the foraminifera to be Mediterranean in character.

Foraminifera of the Malay Archipelago

Perhaps more than anything else, F. W. Millett is best remembered for his extensive, beautifully illustrated and much sought-after work on the Foraminifera of the Malay Archipelago (1896a–1904), based on material provided by a Mr A. Durrand (F.R.M.S.).

From the forceful signatures on his letters Durrand seems to have been someone of authority, possibly in the Colonial Service. He was clearly an enthusiastic microscopist and had been collecting mainly anchor mud in 1884 and several times subsequently, whilst on voyages around (present-day) Malaysia and Indonesia (see Durrand (1898: 253–257, for localities). These initial casual results led him to '... getting the Netherlands India Steam Navigation Company to instruct the commanders of their fleet plying about the islands of the Archipelago to collect bottom from each port of call as I was able to do in other parts of the globe' (see letter 23 August 1898 in the Millett file). He (it is assumed) cleaned the material himself, then picked it over. Subsequently, it was picked again and examined by Millett who finally determined the species and whose careful elaboration speaks for itself.

This series of samples, about 4 lb (1.8 kg) each in weight, was taken from shallow water, more or less close inshore, generally in about 12–14 fathoms (22–26 m) and is very rich in marine life. Durrand's Area 1 was not touched by the *Challenger*

Expedition, but the *Gazelle* (Egger, 1893) did collect from there. Today, great store is set by the precise location and depth of samples for ecological work and here fate sadly intervened. A number of the labels on the flasks were illegible through becoming wet by leakage, but Durrand had so packed the samples that Millett could pretty well determine the section of the Archipelago from whence they came. The result of this misfortune, nevertheless, is that the printed locality list (1898) is rather short of detail and many stations unfortunately cannot be identified.

Durrand would have liked to visit the area himself, but needed a qualified person to assist him and also sponsorship, neither of which he obtained. It is possibly fair to assume that Durrand, having heard of Brady, wanted his samples examined by the person most fitted to do so. But he was too late, as Brady had died. How he came to hear of Millett is not presently known (it could have been through T. R. Jones or through the aegis of the Royal Microscopical Society) but, in May 1891, Durrand wrote to Millett saying he would like to visit him. Something must have come of this meeting and Millett must have agreed to undertake the project after possibly a very brief examination of the potential of the material, for, in about 1893, Durrand – now living in Aberdeen – wrote telling Millett to retain the slides and show them to Heron-Allen.

Millett continued with his determinations but, in July 1898, he received an unwelcome shock in the form of a letter from W. H. Burrows (better known for his work on the Crag Foraminifera of East Anglia). Both he and his collaborator, R. Holland, were unaware that Millett had been working on the Malay material, for they had also been examining over 200 soundings samples from much the same area over some years. How Millett reacted to this information is unknown. There is no record of a publication on the Malay region by Burrows & Holland. Perhaps they were persuaded that Millett was so far advanced with his studies and already into publication that duplication was undesirable.

Further correspondence between Millett and secretaries of the Royal Microscopical Society deals with such irritations as postponement of the reading of the paper, unsatisfactory plate reproduction (for all Millett's drawings were in pencil) and failure to allow him to obtain quick publication for certain species. In a bound volume Heron-Allen has retained all these original pencil drawings and correspondence. In spite of the quality of the paper and the grime (see above) the illustrations are still in surprisingly good condition, the detail on small drawings is particularly clear and species are easily recognizable; in the author's opinion they are superior to those of Egger (1893). In 1904 Margaret Durrand replied to a letter from Millett, in which he indicated the work was almost complete, with the sad news that her husband had died very suddenly in the September whilst recovering from a slight attack of influenza. This must have been a shock to Millett, who had been corresponding with him for a decade.

There are up to 300 Malay Archipelago slides (it not being always easy to determine which are originals) curated in the Palaeontology Department (Micropalaeontology) of the NHM, but registered with Zoology Department numbers. They are mostly red slides in red jackets, exactly as rescued by Heron-Allen. Unfortunately, the specimens are very difficult to handle. Each slide normally contains a single species, but from all the stations in which it is found (an example is shown in Figure 3B). Around the circumference of the cavity are written the station numbers and the specimens from these stations radiate out from the centre, like the spokes of a wheel. Although the glue used to hold them is still good and fungus-free, specimens are difficult to move and, have in the past, been replaced incorrectly; moreover, the identification of figured specimens is almost impossible. Nevertheless, lectotypes have been designated, remounted and many re-illustrated by subsequent workers. Although Heron-Allen added his own labels, they do not deface the originals.

Even before and after the collections by Durrand and Egger, the Malay Archipelago had been the subject of other publications, some of the more important being: Harting (1863) on the Banda Sea; F. W. O. Rymer Jones (1872) on the Java Sea lagenids; H. B. Brady (1884) in the *Challenger* Report; J. Hofker (1927–1951) in the Siboga Expedition (of 1897) Report, and Loeblich & Tappan (1994) on the Sahul Shelf.

The ill-fated Torres Strait project

This is a story with a beginning and no end. It accrued much hard work on the part of both Millett and Heron-Allen but there is little to show for it except a very grimy set of notes and letters in the Millett file.

It began with a letter from Professor A. C. Haddon in August 1886, just three years after Millett returned to Marazion from London. Haddon was writing from the Science and Art Museum, Leinster House, Kildaire Street, Dublin. At that time he was a perfect stranger and had written to Millett to complain to him for publishing a new species in a little-known journal of limited circulation – in the 1884 Balkwill & Millett Galway paper, in the *Journal of Microscopy and Natural Science*.

What followed from this is undocumented but there must have been communication between the two again for, in February 1892, a letter exists in Millett's file from Haddon indicating how delighted he is that Millett can work on the Torres Straits material he had collected. He sets no time limits since there had been, for various circumstances, already too many delays. He concludes by saying that he will ask Professor Howes to send the material at once. In a follow-up letter in March 1892 he asks Millett to retain all the non-foraminiferal material in case anyone else wishes to study it.

Five years pass before there is further record of correspondence when Millett (in 1897) complains that he has had a '… most unsatisfactory assistant' [could he have been referring to Heron-Allen?]. He also mentions his continuing eye trouble and the time it will take to study the 28 bags of material thoroughly, even if he were to examine only the coarse sand and the rich fine material. He points out that the *Challenger* Report (Brady, 1884) covers most of the species he has found and, as there will be few new species, the collection will be of limited interest. The file contains the list of localities and the faunas recorded from each.

In 1897, Haddon returned to New Guinea, Borneo and the Torres Straits to undertake anthropological research; that same year he was most surprised to hear that Frederick Chapman was also in possession of some of the Torres material, which he planned to publish separately. Haddon thought that Chapman should hold fire until Millett had published and even suggests

that publication should be in the *Proceedings of the Royal Society of Dublin*. However, in the end this almost certainly refers only to specimens attached to coral, which Chapman indeed was to publish in 1897 as the new genus *Haddonia*, collected by and named in honour of the same Professor Haddon.

Millett became involved with the Torres Straits project in about 1892, but working from letters between Millett and Heron-Allen muddies rather than clarifies the situation. Apparently Millett lent Heron-Allen some of the material, some to keep, the remainder he wished to return to Haddon; he was still requesting its return as late as 1904 and again in 1908, whilst also imploring Heron-Allen not to smother specimens in glue but to dry the glue first before mounting a specimen. Millett again wrote to Heron-Allen in 1908 that he had found the collection tedious to work up, like 'doing a penance' and nothing like as good as the Malay Archipelago material. It had wasted years of his life. He proposed to return the slides and notebook to Haddon under separate cover. Who finally received the material is unknown as is its whereabouts. Sadly, nothing was ever published.

A tenuous connection with the Crag Monograph

In his introduction to the foraminiferal part of the Crag Monograph (of East Anglia), T. Rupert Jones (1895) mentions courteous and obliging friends namely, C. D. Sherborn, F. W. Millett and F. Chapman, for '… determining relationships of the forms and for their help with the bibliography and synonymy'. On p. 393 (Jones, 1897) is the indication that the work has been '… supplemented by notes of additional species kindly supplied to us by Fortescue William Millett who has further added to our obligations to him by kindly furnishing the records of "size" and "frequency" of the species met with in this rich deposit at St. Erth'.

Foraminifera of Cyprus

In 1905, C. V. Bellamy and A. J. Jukes-Browne published a paper on the Geology of Cyprus. Dr G. J. Hinde supplied information on the foraminifera found in the yellowish white shell limestone from Paralimni (p. 70) but these specimens are not housed in the NHM, London. In addition, Millett (1905, op. cit.; Appendix 3, pp. 71, 72) provided a list of over 150 species from the Pliocene marl of Myrtou. Of these, only 67 slides are housed in the NHM, each one usually containing only one species. Such a slide is shown in Figure 3C. The rest cannot now be found.

Foraminifera of Java

He examined specimens from Java and reported to a Dr Karl Martin. The Millett file contains lists of determinations. No formal publication, however, ensued.

Foraminifera of Somaliland

This was probably his last project. He examined 12 slides of Recent foraminifera submitted by Ernest Heath and sent sometime in 1908 (indicated in a letter dated 24 December 1908 from F. A. Parsons of the Royal Microscopical Society). From this Millett wrote an unpublished report, entitled 'Notes on two Soundings taken about 35 miles South by East of Obiat, Somaliland, East Coast of Africa'. In a letter dated October 3 1910 the same Mr Heath had heard from Joseph Wright that Millett had been very ill, but was still extremely interested in the material. As late as 23 March 1913 they were still corresponding but Millett's ill-health continued to dog him. No record of a formal publication in the *Journal of the Royal Microscopical Society* has been found, but the specimens are in the NHM, London (Heath Collection).

FORAMINIFERA NAMED AFTER F. W. MILLETT

His name has been used for three new genera: *Millettia* Schubert (1911), *Millettiana* Banner, Pereira & Desai (1985) and *Millettella* Rhumbler (1904) (but now regarded as a testate amoeba). The name *milletii* has been used for species, subspecies and varieties no fewer than 33 times, whilst Millett himself erected 55 species and varieties during his life.

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