THE LINNEAN

A Biography of Percy Sladen (1849–1900)

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A Biography of Percy Sladen (1849–1900)

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Preface

The publication of this Special Issue of *The Linnean* is most timely since it coincides with the centenary of the Percy Sladen Memorial Fund, a trust endowed by his wife in 1904 as a means of perpetuating her husband's memory, with the express purpose of supporting fieldwork in the earth and life sciences. The trust is administered by the Linnean Society who appoint one of the five trustees. Moreover, it was agreed by our Council that the Linnean Society should provide facilities for the annual meeting of the trust, including staff support.

The trustees of the Percy Sladen Memorial Fund are allowed wide discretionary powers in its administration. However, their policy has been to devote the greater part of the income at their disposal to the maintenance or assistance of field work. Thus the very first scheme that it supported was Mr Stanley Gardiner's exploration of the Indian Ocean (1905) while the second was an exploration under the leadership of Dr W.R.H. Rivers to study anthropology in Melanesia; the third, undertaken by Professor Henry Pearson, investigated the botany of West Africa with special reference to the Gnetaceae. Undoubtedly these intial expeditions set the tone for future awards.

Our first trustee was T. Bailey Saunders (today it is Professor R.J. Berry); that of the Royal Society was Tempest Anderson (today it is Professor C.M. Perrins); the initial trustee from the Natural History Museum was Henry Woodward (today it is Dr Mark Wilkinson). The Universities of Cambridge and Oxford provide the final two trustees. The first Cambridge appointee was Henry Bury, while other appointees have included Professors J. Gray, Pantin and Weis-Fogh (today it is Dr E.V. Tanner). The first Oxford appointee was Professor W.A. Herdman who was followed by Sir A.C. Seward, Drs D. Lack and H. Southern (today it is Dr K. Willis).

As well as setting up the Percy Sladen Trust fund Mrs Sladen decided she would make Exeter a place which no serious student of echinoderms could fail to visit by donating to the museum her late husband's vast collection, while at the same time (1904) providing adequate funds for their curation and display. Today, the Royal Albert Museum in Exeter has a magnificent walk-in mahogany case housing the Sladen Collection, a fitting tribute to an outstanding zoological taxonomist.

BRIAN GARDINER
Editor, *The Linnean*

A Biography of Percy Sladen

INTRODUCTION

Percy Sladen was of independent means, and held no remunerated post throughout his relatively short life (he died at 51). He attended no university or college, but gained his reputation as an academic biologist through his own efforts, association with like-minded friends and casual instruction from a professional biologist in his home-town of Halifax.

By his early 30s his reputation was such that he was selected for the work for which he is best known, a description of the asteroids collected during the voyage of HMS *Challenger*, a task he took so seriously that his health became weakened.

In his early 50s he inherited an estate in Devon, to which he and his wife moved for the last two years of his life. Because of her excellent local relationships, Mrs Sladen left her husband's vast collection of echinoderms to the Royal Albert Memorial Museum at Exeter, with a bequest for its housing and subsequent curation. Since its acquisition, the Museum has respected the integrity of the Sladen Collection. Mrs Sladen also endowed The Percy Sladen Trust to support scientific work, which is administered by The Linnean Society.

During the year 2000, the Exeter Museum honoured Sladen's memory and has received grants and donations to conserve The Sladen Collection and bring it to an accepted level of curation.

SLADEN'S WORKING LIFE

The Yorkshire Years

Walter Percy Sladen was born on 30 June 1849 to a prosperous leather merchant, Ashton Sladen, whose family had resided in Yorkshire for more than 300 years. Upon marriage, his father bought Meerclough House to the south-west of Halifax, and Percy was born shortly after. Ashton lost his first wife, Percy's mother (whose name is not known), when Percy was less than 10 years old, married again (Julia), and moved his growing family to the substantial twin-gabled Exley House, to the south of Halifax, in the chevin between the Calder and Hebble streams. Ashton had a further eight children by Julia, for whose upbringing Percy was to become responsible.

Percy joined Hipperholme Grammar School in January 1861, aged 11 years, under the Mastership of William Edensor Littlewood, recorded in the school history as a very able master. Despite the school's reputation, Percy was moved to Marlborough, under Dean Bradley, in May 1865, to study mainly the classical and modern languages, both of which were to be of great value subsequently, the one for his understanding of zoological nomenclature, the other to enable discourse with scientists from the principal European countries and first-hand experience of their scientific literature. His linguistic ability was envied by his friends, and it is even mentioned in an obituary that he later gained a working knowledge of Persian, the better to study aspects of Middle Eastern art and particularly ancient manuscripts, a separate interest unrelated to his science.

His attraction to science came not from the school curriculum but from private studies. He formed a scientific society at the school, mainly to enjoy astronomy, and this gave rise to his school nickname, 'The Astronomer Royal'. A short biography (Howes, 1900*a*) records that he was Captain of Wrestling and a good rifle-shot; he was also a member of a private Guerilla Club in Yorkshire, and Secretary for a spell.

On leaving Marlborough, he returned to Halifax where, as a gentleman of leisure, he became immersed in his hobby of natural history, joining like-minded young men to visit sites of scientific interest, particularly at the seaside. In 1871, at age 21, he co-founded the Halifax Philosophical and Literary Society, and in the Society's rooms studied the elements of zoology under the Curator, Mr A. Campbell.

The 1871 census for the municipal ward of Southowram describes Sladen as 'Assistant', and gives Ashton's age then as 51 and Julia's as 32. Seven children are mentioned: Ida Constance (10), Florence Gertrude (9), Gordon Stuart (8), Vernon Harcourt (6), Ethel Beatrice (4), Ashton Filey (2) and Isobel Katherine (6 months). Step-brothers Stuart and Vernon were to appear 35 years later at the funeral of Percy Sladen's widow in Exeter. There was a governess and three servants.

Ten years later (1881) the census records Sladen as 'Unmarried', 'Merchant' and '32', and lists five step-brothers and sisters still resident at Meerclough, and includes a new member, Ernest Cecil (8). Two servants are recorded.

The group of like-minded enthusiasts with whom he shared his time at the Halifax Museum were: J.W. Davis (geologist), T. Hick (microscopist), G. Broke (geologist), G.H. Parke, C.P. Hopkirk and W. Cash. Cash was later to write an obituary of Sladen in a local scientific periodical which Sladen had helped to found (Cash, 1901). Together these friends visited places popularised by Philip Gosse and other naturalists, such as Tenby and Milford Haven in South Wales,

Great Cumbrae in the Firth of Clyde, Weymouth in Dorset and Portrush and Belfast Bay in Northern Ireland. They returned to Halifax from such trips with preserved and dried material for study, becoming skilled at dissection and display of zoological specimens, and acquiring a deep knowledge of their anatomy and microscopical structure. In his obituary, Cash referred to these times thus:

> "In all this delightful and happy work every month had its discovery where all was new; and none was more diligent, none expressed clearer ideas, none studied the foreign literature relative to his work more enthusiastically or more profitably than Percy Sladen." (Cash, 1901: 262)

At this time he turned his hand to almost anything scientific, and Cash relates how he prepared thin-slices of rock, using an old saw and a slab of stone, for projection during a lecture to the Society by a Mr Carruthers on the plants of the Coal Measures. He also instructed the group in microscopical techniques, including how to set up a microscope for critical illumination.

It was during this time that he became fascinated with echinoderms, the group that was to become the subject of his life's work. It is interesting to speculate what led him to study exclusively this group of animals. He would have been aware that they perform their life-processes in a unique way in the Animal Kingdom, and he would have known that their fossil history is particularly rich, beginning at the very base of the Cambrian System and being stratigraphically important throughout phanerozoic time. He had also heard of the discovery at the end of the eighteenth century of a living specimen of a sea-lily, a group previously thought to have gone extinct in the Cretaceous System. In one of his few informal passages, Sladen wrote:

> "Few invertebrates have exercised such a fascination over naturalists as the crinoids. Ever since the first living *Pentacrinus* was brought to notice... a feeling not far removed from romance has been almost inseparably associated with the Recent members of this group of animals, a sentiment at first perhaps due to their beauty and rarity; but later, when their relations became known, to the fact that these treasures from the deep bore positive testimony to the existence in our seas of the survivors of a race which had been thought to have long-since passed away, and were known only in the fossil state." (Sladen, 1885: 348)

The discovery of the living *Pentacrinus* was an important factor in the launching of such deep-sea expeditions as those of HMS *Lightning* and *Porcupine*, and these in their turn were forerunners of the most ambitious of them all, HMS *Challenger*, 1872–1876, which was to figure so prominently in Sladen's later life – and may even have contributed to his premature death.

While still a relatively young man, Sladen was given the chance to study material of a group of fossil sea-lilies at that time placed in a single genus, *Poteriocrinus*. Sladen concluded that this single genus did not satisfactorily reflect the true relationships of the species originally ascribed to it, and that they could

better be placed in four separate genera, including a new one, *Dactylocrinus* Sladen, which he erected in his first scientific paper (Sladen, 1877) read to the local Philosophical Society that he had helped to found.

At about this time, a curious echinoderm was dredged from deep water off Madagascar which seemed to share characteristics of the two star-shaped classes, Asteroidea (the starfishes) and Ophiuroidea (the brittle-stars). The specimen was sent to Sladen for description by Anton Dohrn, Director of the Stazione Zoologica di Napoli, and Sladen named it *Astrophiura permira* Sladen n. sp. Such supposed 'intermediate forms' received prominence at the time, less than 20 years after the publication of Darwin's *On the Origin of Species* in 1859. Sladen wrote a brief note for the Royal Society of London (Sladen, 1878), then fuller accounts in the following year (Sladen, 1879, *a, e*), including the erection for it of a new Family, Astrophiuridae Sladen. While working on *Astrophiura*, Sladen amplified his ideas on plate homologies of asteroids and ophiuroids, repeating his opinion on its intermediate position in a paper to his local journal (Sladen, 1881). His new Family did not survive subsequent analysis of stelleroid echinoderms: *Astrophiura* was later placed in the Family Ophiuridae.

The type-specimen of *Astrophiura* subsequently disappeared. In case this dried material had simply been overlooked, a careful search of Sladen's entire collection was undertaken at the Exeter Museum shortly after its accession, but to no avail (Bury, 1909a). Fortunately, other specimens were eventually collected during the voyage of USS *Albatross* in the late 1890s. These were sent to Sladen for description by Professor Alexander Agassiz of Harvard, but his health failed before he could work on them. From 8 December 1878 until 17 February 1879 Sladen occupied the table of the British Association for the Advancement of Science at the Naples laboratory. He had intended to study the young stages of echinoderms, but poor weather precluded collection of eggs and larvae. He tried to rear larvae in the laboratory, but at best could produce only abnormal specimens.

He studied instead the external surface of common Mediterranean echinoderms, in particular the pedicellariae of the large sea-urchin, *Sphaerechinus granularis*, which are modified spines acting to keep the epithelium clear of settling larvae and detritus. Sladen worked particularly on the glandular or globiferous pedicellariae, and described the 'ready position' in which the three valves splay widely open, presenting the 'tactile cushion' on the inside of each jaw by which the organ perceives the touch of an unwelcome larva (Sladen, 1880*b*). He sectioned the pedicellarial head and describes the muscles surrounding the glands and their innervation. He assumed the secretion was mucus.

Following his occupation of the table at Naples, Sladen had remained in touch with its Director, Dr Anton Dohrn, and continued to receive material from him.

Crinoidea *Antedon eschrictii* (M□ller). Drawn by Percy Sladen.
[Plate VI in *Arctic Comatulae,* in, Report of the voyage of HMS *Challenger*.]

A letter from him to an unknown recipient, now in the West Yorkshire Archives, states:

> "I have been away from home for a few days and find your letter awaiting me. As soon as ever the things arrive they shall be sent to you. In a letter I had from Dr. Dohrn at the end of March, he said that some of the specimens could not be got until after April, but that they should be sent off as soon as possible." (Sladen, *in lit.*,14 May 1881)

In 1881 Sladen became Secretary to the Committee overseeing the administration of the Naples Table of the British Association, a post he held for about ten years.

Before he visited Naples, Sladen formed a working partnership with Professor P. Martin Duncan, from whom he gained insight into the international conventions of descriptive taxonomy. Their first joint paper (and Sladen's second publication) gave a preliminary description of collections made by HMS *Alert* and *Discovery*, "...made under no small difficulty, because of frozen rope-tangles on board" (Duncan & Sladen, 1877: 2), from Arctic seas off Grinnell Land. A description in this paper of what he regarded as a new species of starfish, *Asteracanthion palaeocrystallus* Sladen, is attributed to Sladen alone, and it is interesting to note that three years later (Sladen, 1880a) he re-assigns this specimen to a starfish previously described by Michael Sars called *Pedicellaster typicus* Sars. Sladen was later to gain a reputation as a taxonomic 'splitter' because of his sometimes over-zealous claims for new species and even genera.

This short note was followed later by two full memoirs, the first (Duncan & Sladen, 1881) on all the echinoderms collected during the *Alert* and *Discovery* cruises and their geographical distribution, and the second (Sladen, 1889*a*) on the asteroids alone. It is in this second paper that the slight difference of opinion between himself and other authorities over the naming of his supposed new species of *Asteracanthion* (=*Pedicellaster*) is aired. He admits to being confident that *P. palaeocrystallus* is a good species, expressing his intention to return to this taxonomic quibble, but there is no evidence that he did.

The importance of his Naples work on pedicellariae is raised in his account of the starfishes and sea-urchins from Korean waters (Sladen, 1879*b*), in which he draws attention to the use of pedicellarial morphology in starfish taxonomy, pointing out that not all authorities seemed aware of the usefulness of these organs in identification.

A classic piece of fossil identification was published in the same year (Sladen, 1879*d*), describing a fossil sea-lily new to science, *Lepidodiscus lebouri* Sladen, the first European species of the crinoid family Agelacrinitidae Jaekel from the Lower Carboniferous of Northumberland, a family which appears sporadically in many other localities world-wide, and the members of which he describes as:

> "...forms of such rarity that each may well be spoken of as a veritable phoenix amongst fossils." (Sladen, 1879*d*: 744)

This specimen became the type on which the species-name rested, and resided in The Sladen Collection in Exeter (Bury, 1909a), until the Assistant Curator appointed under a grant from the Sladen Trust to catalogue the Collection, Dr F.W.E. Rowe, presented the specimen in 1973 to the British Museum (Natural History), a more suitable repository for type material.

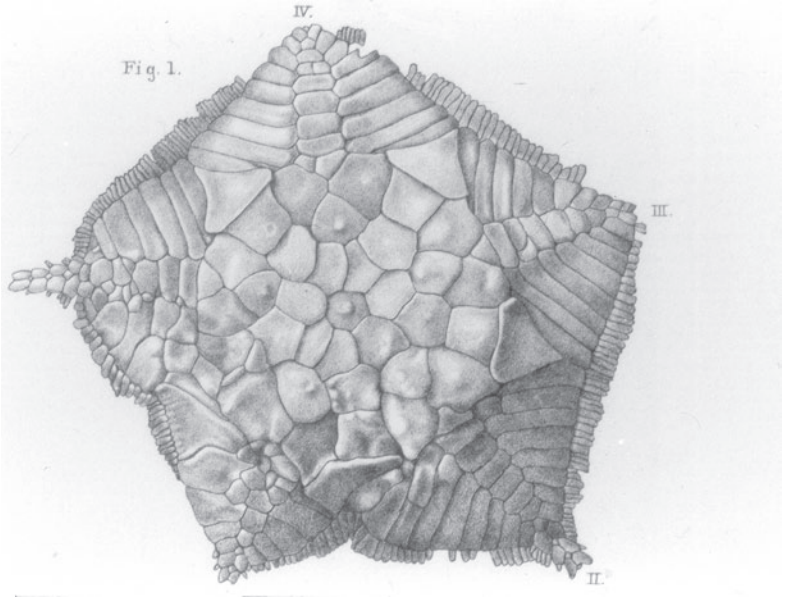
The Middle Years

After his work at Naples had been published, Sladen's reputation as a knowledgeable and careful worker had spread, and one of the most significant events in his life was about to unfold: in 1881 he was approached by Sir Charles Wyville Thomson FRS and Professor William Carpenter, who had organised the ambitious expedition of HMS *Challenger* (December 1872 to May 1876). During the few years following the ship's return they were allocating each taxonomic group to known authorities for systematic description. They would be aware of Sladen's background as the leading authority on starfishes, and the meticulous standards he set himself: there was no serious competition from zoologists elsewhere in the world.

The strength of the *Challenger* voyage was not so much the new and exotic places it had sampled, but the routine and detailed coverage it managed to undertake over a wide area. Much was written about the boredom of the crew, who were required to repeat the dropping, trailing and recovering of sampling gear many times; yet its wide, routine and repetitive coverage, followed by the long and painstaking analysis by experts such as Sladen, was, in scientific terms, one of its most valuable assets.

The preparation Sladen undertook for his part in the task included a tour of the European capitals in 1882, visiting the echinoderm collections in their museums, and, through his skill in languages, forging connections with curators and specialists with whom he subsequently enjoyed frequent correspondence and exchange of literature and specimens. It is possible that during this tour Sladen acquired several important specimens of starfishes and feather-stars, mentioned specifically in the catalogue of Sladen's private collection (Rowe, 1974) as possibly type material from the Berlin, Leiden and Breslau Museums (see Appendix 3).

Writing up all taxonomic groups from the *Challenger* material took about 25 years, and appeared in 50 volumes with a total of nearly 30,000 pages. Sladen contributed nearly 1,000 pages and 118 plates in his monumental account of the *Challenger* starfishes. Several of his associates, writing after his death, commented



Astrophiura, which Sladen named appropriately to signify his opinion that it is intermediate between the starfishes (Asteroidea) and the brittle-stars (Ophiuroidea).

that most of the descriptive work on the C*hallenger* asteroids was done between the hours of nine o'clock in the evening and the early hours of the morning, because of pressure from family affairs, and the opinion is expressed by several colleagues that he may have irreparably damaged his health by such dedication.

Sladen was involved in this project for about 10 years, producing interim papers, first, on some cushion-stars (Sladen, 1882*a*) and, secondly, on the mainly burrowing astropectinid starfishes (Sladen, 1882*c*), both published in the *Journal of the Linnean Society*. Of the cushion-stars, only two of the 34 species had been previously described, and one genus, *Hymenaster* Wyville Thomson, was previously known from only one specimen, yet the *Challenger* voyage created 20 new species of this genus alone. Altogether, Sladen recorded 84 genera (34 new to science), five sub-genera (four new), 268 species (184 new) and 13 varieties (12 new) of living asteroids from the *Challenger* material (Sladen, 1889*a*). He also listed all the other known species of Recent starfishes, including their synonymy, geographical and bathymetric occurrence.

Sladen also described previously-unrecognised features of burrowing starfish which he named cribriform organs, lying in the angles of the arms and acting as pumps to relay sea-water from the actinal to the oral surface, of considerable importance to an animal living within the sediment. During this period he also contributed a summary of the starfish findings from *Challenger* (Sladen, 1885*a*).

The Report itself (Sladen, 1889*a*) includes a revised taxonomic framework for the starfishes. Principally, he proposed that the Class Asteroidea de Blainville should contain two Sub-Classes, Phanerozonia Sladen, for those showing distinct marginal plates, and Cryptozonia Sladen where the plates are less obvious externally. While Phanerozonia ('visible edge') has survived revisions, Cryptozonia has been shown to be polyphyletic, and only the descriptive term 'cryptozone' survives, for the 'hidden-edge' state where the marginal plates are not prominent at the surface.

Following its publication, the Report received very favourable attention, though there was clearly a subliminal concern for his over-zealous 'splitting' of species. He had written, earlier in his career:

> "However seriously the multiplication of frivolous species may embarrass a classification, wholesale grouping... is productive of much more injurious results, in that it curtails the precision of definition and... divests nomenclature of one of its highest and most important qualities." (Sladen, 1879b: 450)

After *Challenger*, there were many more oceanographic voyages, such as that sponsored by the Royal Irish Academy to the south-west of Ireland (Sladen, 1891*b*), and it is sad to recall that he was at work on echinoderm material from the voyage of HMS *Albatross* at the time of his death.

While his work on living forms will remain his principal memorial, there is a substantial body of published monographs of fossil material written jointly with P. Martin Duncan (Duncan & Sladen, 1882; 1883; 1884*a*, *b*; 1885*a*, *b*; 1887; 1888; 1889*a*).

The Later Years

In 1883, when he was well-immersed in the *Challenger* work, Sladen felt that he needed to be closer to the national collections and libraries of the British Museum (Natural History) and to the Zoological, Geological and Linnean Societies of London. He had been elected Fellow of these societies during the early years of the 1880s. In 1883 he made the major decision to move from his home-town of Halifax, where his family had lived for at least 300 years, to Orsett House, Ewell in Surrey. Two years later he was elected Zoological Secretary of the Linnean Society. His responsibilities to the Linnean, Zoological and Geological Societies and his work for the Committee of the British Association for the Advancement of Science took him more and more to Central London, and in 1890 he moved his main base, at least temporarily, to reside in London (Bury, 1909a), almost certainly at the London house of his new wife.

Around 1870, when he was in his early twenties and resident in Halifax, Sladen

had met Constance Anderson, eldest daughter of Dr William Charles Anderson, surgeon and sometime Sheriff of York. Constance was a year older than Sladen, a cultured lady and an artist of some repute whose works were exhibited in galleries in London and the provinces. She was an authority on the archaeology of Yorkshire and contributed articles on York Minster, Selby Abbey and Castle Howard to various collaborative works.

Percy and Constance were married in 1890, the year following the completion of his *Challenger* work. Their relationship was described, in the embroidered style of the time, as:

> "...a union of heart and mind, yielding a bright and tender sympathy which strengthened and stimulated him in his life's work." (Cash, 1901: 267)

and again:

> "Community of tastes in literature and art, together with that rare sympathy which instinctively avoids all sources of difference, rendered their union one of exceptional harmony; the more so, perhaps, because, owing to Sladen's stern sense of duty, the consummation of their devotion had been postponed for nearly twenty years." (Bury, 1909a: xvii)

Constance had two brothers, Dr Tempest Anderson, an authority on volcanoes, and Mr Yarborough Anderson, a barrister. There was also a younger sister, Ellen, who later became Mrs Godfrey Walker, then Mrs Granger, and finally Lady Granger, wife of His Honour Judge Sir Thomas Granger; as Mrs Walker, she inherited Sladen's last home at Northbrook, Exeter, from Constance when she died in 1906.

Sladen held the Secretaryship of the Linnean Society for 10 years, until, in 1895, he felt that he was becoming so involved in family affairs and his health was declining to such an extent that he could not continue. Particularly, from 1894 he helped an uncle, John Dawson, in the management of Dawson's 31-acre estate, Northbrook Park, on the outskirts of Exeter, which Sladen was to inherit from him in 1898. He also became *in loco parentis* to his step-brothers and sisters when his father died.

At some time in the early 1890s, Sladen had a serious attack of what was described as influenza, followed by several similar attacks over the succeeding years. In a letter to Dr (later Sir) John Murray, Sladen wrote:

> "I have been five weeks confined to my room, entirely unable to do anything but attend to doctors and their physic." (Sladen, *in lit*., 4 March 1890)

and later to Dr A.C.L.G. Günther, an authority on fishes, informing him that he had completed the task of labelling all the *Challenger* starfishes, and would be returning them to the British Museum (Natural History). He thanked him for:

> "...not pressing me during my illness. I had a bad time of it and was laid up for nearly two months, unable to do anything." (Sladen, *in lit*., 1 April 1890)

This chronic condition debilitated him so much that, despite his devotion to science, he became too weakened to continue work of the calibre of his *Challenger* monograph or his fossil work with Martin Duncan. He was elected Vice-President of the Linnean Society in 1895, but resigned a few months later as both ill-health and his family duties at Exeter took their toll. After completing major papers on Cretaceous asteroids (Sladen, 1891*a*; 1893), he completed only two brief papers (Sladen, 1895; 1897). His manuscripts for papers on the Cretaceous asteroids remained unfinished, and were eventually completed by another asteroid worker, W.K. Spencer (Sladen & Spencer, 1891–1908). It is ironic that on the day he died there arrived for Sladen (then in Italy) a letter from Professor Agassiz, offering him the asteroid material from an Australian research cruise, to describe for publication (Howes, 1900*a*).

Sladen's Published Work and Collection

Sladen's published output spanned a mere 20 years of his life, from 1877 to 1897. Of the total of 44 papers (Appendix I), 29 were sole-author, 15 with the senior, professionally-trained P.M. Duncan and one with W.K. Spencer as junior author. Of the totality of his papers, 23 were on living forms and 21 on fossils. As sole author, Sladen produced 12 papers on starfishes and 17 on other echinoderms; as joint-authors, he and Duncan published 12 papers on sea-urchins and three on general collections of echinoderms. It is perhaps noteworthy that only his first paper (Sladen, 1877) and one other (Sladen, 1881) appeared in a local journal: all the others were in high-quality national periodicals, which is testimony to his standing among his colleagues.

Sladen started collecting zoological material while still at school, and continued to do so as an adjunct to his work at the museum in Halifax. As his taxonomic work progressed, particularly his descriptions of deep-sea echinoderms, he amassed a huge amount of material principally from the voyages and expeditions that were such a feature of his time, material from places that almost nobody else would have travelled to, let alone collected from.

The collection amounted to 43 cabinet drawers containing Recent and fossil material, nearly 500 glass jars with 4,000 specimens, and 47 cabinets and boxes with nearly 7,000 microscopical preparations, including the valuable collection of Foraminifera and the structure of feather-stars originally collected and prepared by Dr W.B. Carpenter, one of the original directors of the *Challenger* cruise, and sold to Sladen by his son, Dr P.H. Carpenter, a master at Eton College. Philip Carpenter was a personal friend of Sladen's, and was author of the report on another taxonomic Class of echinoderms, the Crinoidea (sea-lilies and feather-stars) from the *Challenger* expedition.

In addition, Sladen had amassed a magnificent library containing 2,200 volumes and 1,500 reprints. Rare works included Aldrovando's *De Animalibus Insectis* of 1602, the 12th and 13th editions of Linnaeus' *Systemae Naturae* and the text of the rare echinoderm treatise of 1733 by Linke, *De Stellis Marinis*. Works on echinoderms dominate his library, particularly the reprint section.

Very few Sladen documents survive. An undated letter has been found among archives in Halifax from the Director of the Naples Station, Dr Anton Dohrn, apologising for his inability to send over some material. Two draft letters on mundane matters were found among his library, where he had used them as bookmarks. Also, a small loose-leaf file has come to light among his books with manuscripts written in connection with his work as Secretary of the British Association Committee on the Occupation of the Naples Table (1894 and 1897). Also typescripts of reviews of papers by Troschel (1872 and 1873) and A. Agassiz (1872 to 1874) and various rough notes on techniques and his interpretation of structures on the tests of echinoids.

The Sladen Gallery, by kind permission of the Royal Albert Memorial Museum at Exeter. Photo: David Garner.

THE EXETER CONNECTION

Sladen inherited his uncle's (John Dawson's) estate of Northbrook Park, Exeter, in 1898, having assisted him in its running since 1894. Despite his ill-health, Sladen and his wife moved in immediately. Percy lived there for a further two years until his death on 11 June 1900, and Constance until she died on 17 January 1906. Having come into the Northbrook fortune, Sladen became a generous philanthropist. For instance, he gave, through the Devon & Exeter Gazette, the not inconsiderable sum of £2,000 to insure the lives of the Devonshire Yeomanry and Volunteers when they left for the front in the Boer War, a generous act that was followed by an additional sum to the same cause from Mrs Sladen after his death.

The mild Devonshire climate proved deceptively beneficial to Sladen's health, and by the winter of 1899/1900 he felt well enough to embark on an extended tour of Italy in April 1900. They spent six weeks in Rome, during which they travelled to Subiaco, in the valley of the Amiene, about 50 km east of Rome, to indulge in Sladen's other interest and examine some early ninth century manuscripts preserved there (Howes, 1900*a*). From here they journeyed to Florence and enjoyed a week of fairly active sight-seeing. While walking back to their hotel on the morning of 11 June 1900, Percy collapsed and was taken to the local hospital. He died a few hours later. His body was returned to Exeter and was buried in the churchyard of St Luke's Church, Countess Wear, Exeter, just a few yards from the boundary of the Northbrook estate.

Constance Sladen, who was to play such an important role in the placing of Sladen's collections, continued to reside at Northbrook and take an interest in natural history. In 1904 the Charter and Bye-Laws of the Linnean Society were changed to allow the election of women to the Fellowship, and Mrs Sladen became one of the first to join the Society under these terms on 15 December 1904.

After Percy's death, she was exercised as to how to promote her husband's memory. At local level, she gifted the choir stalls of St Luke's Church, but nationally, in 1904, she made a most generous benefaction by endowing an initial £20,000 to a trust-fund, the Percy Sladen Trust, for the furtherance of scientific research (Bury, 1909b). The first Trustees were: her brother, Dr Tempest Anderson (geologist), Professor Henry Bury (Sladen's principal obituarist in 1909), Professor William Herdman (Professor of Oceanography at the University of Liverpool and Director of the University's Marine Biological Laboratory at Port Erin, Isle of Man), Professor George Howes, who wrote Sladen's first obituary in *Nature, London*, immediately after his death (Howes, 1900*a*), Mr T.B. Saunders and Dr Henry Woodward. The first meeting of the Trustees took place on 29 June 1904 at Mrs Sladen's London residence, 13 Hyde Park Gate, formerly Percy's London base.

Mrs Sladen wished her husband's collection and library to remain intact as a

memorial, but no national collection receives donations with this condition, so in 1903 she approached the Curator of the Royal Albert Memorial Museum in Exeter with an offer of adequate funds to house and curate the material, on the condition that:

> "...the collection be kept together in a separate room in proper condition and be accessible to students at all reasonable times, and that it be known as The Sladen Collection." (Minutes of the Exeter City Council Museum Committee, 9 March 1903)

A few weeks later, the Curator, Mr F.R. Rowley, wrote to the Committee to underline the significance of the gift:

> "It is not too much to say that the Collection, when properly displayed, will make Exeter a place which no serious student of Echinoderms can afford to leave unvisited." (Minutes of the Museum Committee, 30 March 1903)

The construction of the walk-in mahogany case, by a Plymouth carpenter, took over a year, from June 1903 until about July 1904. Initial cataloguing, curating and mounting of specimens took at least a further five years, but Mrs Sladen did not live to see the opening of The Sladen Collection, which she had done so much to promote (Anon, 1906*b*). There appears to be no record in the Museum archives of the completion of its gallery, but there is circumstantial evidence that the exhibit opened in 1910.

The Northbrook Estate at Exeter

Northbrook Lodge, as it was originally called, was built in 1833. It had three floors above-ground and ample out-buildings to provide laboratory and storage space for Sladen's collections. There were several cottages, stabling for 10 horses, a double coach-house and extensive glass-houses. A press report of Mrs Sladen's funeral (Anon, 1906a) mentions five female and eight male staff.

The southern boundary of the Northbrook Estate is formed by a mill-leat which fed the Countess Wear paper-mill, on the opposite bank. During his second year at Northbrook, 1899, Sladen purchased the mill, which had been disused since 1885, and converted it to a generator to supply electricity to the house and grounds. This system was still in operation until at least World War II, testimony to the quality of the conversion. The remaining mill buildings are now in the care of Exeter City Council, and there is still evidence in the main building of instrumentation from a large electrical installation.

Early in 1905, Mrs Sladen suffered from a severe attack of influenza and, after complications, died on 17 January 1906, aged 57. The local press carried extensive reports of her lavish funeral (Anon, 1906*a*), in which they named other relatives of Sladen's who attended, including his step-brothers Stuart and Vernon.

She was buried on 20 January 1906 in a grave next to her husband's in the churchyard at St Luke's Church, Countess Wear, and a new memorial erected, with identical headstones symbolically linked by a stone rope. This stone is still in place in the north-west corner of the cemetery.

Mrs Sladen bequeathed Northbrook to her younger sister, Mrs Ellen Walker (née Anderson, later Lady Granger) who lived at Northbrook with her first husband Godfrey (also known as Forrester-Walker) until he died in 1908, then as a widow. In 1920, she married His Honour Judge Thomas Granger, who was subsequently knighted. Lady Granger lived on at Northbrook until 1925, when she returned temporarily to Yorkshire, whence her family, the Andersons, had originated. Having no other family, she left the Northbrook estate to her cousin, Mrs Wilmot Kerr, who resided there until 1936. According to Mrs Kerr's son, who still resides in Exeter, Lady Granger's stay in Yorkshire was not entirely satisfactory, so when the Kerrs decided to leave Northbrook for another home in Devon, Lady Granger returned and occupied the house until her death in 1942.

The house was then requisitioned by Exeter City Council, following the disastrous 'Baedeker' raid on the city on 4 May 1942, as a civil defence headquarters for the remainder of World War II. The private electricity supply would have been a considerable asset, in view of the disruption to Exeter's infrastructure by the blitz. The estate was compulsorily purchased by the Council from Mrs Kerr in 1946, converted into flats until 1954, then demolished to make way for the Exeter and Devon Crematorium. The turning-circle and fountain in front of the present Chapel of Rest marks the exact site of Northbrook House. A stream, called the Mincinglake in its upper reaches, and colloquially the "Panny", because local people once panned for minerals from the sediment in its bed, rises in the Stoke Hill area of Exeter, and passes mainly in culverts through the district of Wonford, then becomes the Northbrook Stream, where it divides the Northbrook Estate into two. The western half of the grounds now comprises the Crematorium and Garden of Rest, and the eastern half the Northbrook Approach Golf Course. Where the Northbrook joins the Countess Wear mill-leat at the south-east corner of the Northbrook Estate is marked on the 1889 O.S. map as the highest point penetrated by tidal waters flowing up the Exe Estuary, perhaps a fitting juxtaposition for the home of a marine biologist. Today, flatfish are found in the various streams around the old mill.

Curation of the Sladen Collection

Apart from routine topping-up of spirit material both on display and in the reserve collection, no active curation appears to have been undertaken for about 60 years after the Collection was accessed. Then in October 1972 a temporary

appointment was made, mainly funded by the Percy Sladen Trust, for an Assistant Curator, Dr F.W.E. Rowe, to prepare a catalogue of the Collection. It was indeed fortuitous that Dr Rowe should have accepted the post, since he is a world authority on echinoderms and had worked for some time in the Echinoderm Room of the British Museum (Natural History). The Collection was serviced and all dried and spirit material recorded. His catalogue (Rowe, 1974) was published by the Linnean Society.

During 1973, at the invitation of the Curator of the Exeter Museum, Dr H. Owen of the Department of Palaeontology at the British Museum (Natural History) visited the Sladen Collection to examine fossil material that Dr Rowe felt was beyond his competence. Dr Owen reported that:

> "...the collection is of first class standard by any comparison, although not comprehensive... I would say that the material was particularly important to crinoid workers, especially as it contains the Carpenter Collection. You should now be able to put on probably one of the best exhibitions of fossil, as well as Recent, echinoderms anywhere to be seen in this country." (H.G. Owen, *in lit*., 7 August 1973)

Several Job Creation appointees have serviced the Collection, first in 1976 and again in 1979. The microscopical slides have also received attention. In 1971, Dr J.W. Murray of the Department of Geology, University of Bristol, examined the W.B. Carpenter Collection of Foraminifera that Sladen had purchased from his son, Dr P.H. Carpenter, and produced a general account (Murray, 1971). A partial catalogue was completed by Dr J.M. Thomas of the Department of Geology, University of Exeter. Dr Murray was later appointed to the Chair of Geology at Exeter, and in 1984 he and another worker produced a full catalogue, deposited in the Natural History Museum, London, with an accompanying paper (Murray & Taplin, 1984). Slides from the Carpenter Collection form part of a digital display of photomicrography now housed with the Sladen Collection.

The Sladen Collection's international importance is such that in the late 1990s the Heritage Lottery Fund granted a substantial sum, augmented by other funds including a generous donation from the Friends of the Exeter Museum and Art Gallery, to employ a Conservator, Amanda Sutherland, to undertake a complete overhaul of both the walk-in case and the material displayed and stored in it. The Gallery has been raised to a standard of presentation and conservation appropriate to a modern museum, and background information about Percy Sladen and the Exeter connection is available to visitors. Rare books in his library are now shoed and the catalogues have been revised. Historical storage containers, such as the original French matchboxes used by Sladen, have been retained. During redecoration of the walk-in display in 2000, a Victorian frieze was uncovered round all four walls below the ceiling. This was almost certainly painted over when the room was originally prepared for The Sladen Collection in 1904. It has

The officers and naturalists of HMS *Sealark*,
the first expedition financed out of the Percy Sladen Memorial Fund.

now been restored and reads, appropriately:

> "Look in the frame of this wide universe and therein read the endless kinds of creature which by name thou canst not count, much less their nature's aim, all which are made with wondrous wise respect and with admirable beauty deckt."

WALTER PERCY SLADEN – AN APPRECIATION

During his short working life, Sladen established himself as an international authority on starfishes, both living and fossil. He was entrusted with three principal taxonomic tasks: first, a description of a rare form of echinoderm, *Astrophiura*, thought at the time to be intermediate between two established Classes, the Asteroidea and the Ophiuroidea; secondly, the description of asteroids collected during the historic voyage of HMS *Challenger*; and, thirdly, collaboration with Professor Martin Duncan in the description of fossil starfishes of the Palaeozoic and Mesozoic Eras.

All who wrote of him were impressed by his organisational abilities and discipline, and by his devotion to scientific truth. His life-long friend, William Cash, wrote after his death:

> "Somewhat conservative, he had no great love for popular science... and held that good work is best done alone. All [his friends] who were brought in contact with him appreciated his clear and logical powers of mind and refined nature." (Cash, 1901: 268)

He clearly fostered the best of relationships with his colleagues. Nine years after his death, Professor Henry Bury wrote:

> "Cheerful, humorous and of remarkable even temper, Sladen presented to his many friends a singularly lovable nature, in which unselfishness, sincerity and a generous appreciation of the work of others were some of his leading characteristics." (Bury, 1909a: xvii)

His seemingly comfortable life-style concealed a strong sense of duty both to his colleagues and to his family (Nichols, 2002). Though he had known his future wife for a considerable time, he decided to postpone marriage until after the completion of the major task of his scientific life, his description of the *Challenger* asteroids. In an obituary for the Linnean Society, Professor Geoffrey Howes wrote:

> "To recall his genial presence, the ardour with which he would at times defend and represent others... is to appreciate his worth, and to look back on a prosperous period in the history of the Society... He was a true friend, and no man ever possessed a stronger sense of honour...While the recollection of his inspiring presence within the walls of the Society's apartments will live as long as the present generation of its Fellows endures, his published work and recorded example will remain to future generations a lasting heritage." (Howes, 1900*b*: 48-50)

It is fortunate for science that his widow's generosity and far-sightedness enabled his collection and library to become a lasting memorial to him at Exeter, a collection kept together in magnificent style so that his place in science is not forgotten.

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Appendix 1

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Appendix 2

CALENDAR OF PRINCIPAL EVENTS IN THE LIFE OF WALTER PERCY SLADEN

1849 30 June: Born, Meerclough House, Halifax.
Later, resided Exley House, Halifax.
1876 2 March: Elected Fellow of the Linnean Society.
1877 Elected Fellow of the Zoological Society.
First paper – on *Poteriocrinus.*
First joint paper with P.M. Duncan – on '*Alert*' and '*Discovery*' Arctic material.
1878–9 3 Dec to 17 Feb: Occupied Naples Table of British Association.
1881 Approached by Professors C. Wyville Thomson and W.B. Carpenter to describe '*Challenger*' starfishes.
Paper on aberrant ophiuroid *Astrophiura.*
1881–98 Secretary to the Committee of the British Association Overseeing the Occupation of the Table at Naples.
1882 Elected Fellow of the Geological Society.
European tour to museums, studying echinoderm collections.
1883 Moved to Orsett House, Ewell, Surrey.
1885–95 Zoological Secretary of the Linnean Society.
1889 Final '*Challenger*' Report.
1890 Married Constance Anderson.
1894 Involved in management of Northbrook Park, Exeter.
1895 Elected Vice-President of the Linnean Society.
Resigned from Society due to ill-health and family commitments.
1898 John Dawson died, leaving Northbrook to Sladen.
1900 Extended tour of Italy.
11 June: Died Florence, aged 51.
12 July: Obituary of Sladen in *Nature*, *Lond.* by Prof. G.B. Howes.
1903 9 March: Gift by Mrs Sladen of Percy Sladen Collection reported to the Royal Albert Memorial Museum at Exeter.
22 April: Specimens transferred from Northbrook to Museum.
1903-04 Jan–April: Sladen Collection cases and library shelves made.

1904 Endowment of the Percy Sladen Trust Fund by Mrs Sladen.
1906 17 January: Mrs Sladen died.
1909 March: Definitive obituaries of Sladen and Mrs Sladen by Prof. H. Bury.
1910 Presumed opening of Sladen Collection.
1970 J.W. Murray paper on Carpenter foraminiferans from Sladen Collection.
1971 8 June: Grant from The Percy Sladen Trust for curation of Sladen Collection.
1972–3 30 Oct–30 Sep: Dr F.W.E. Rowe takes up appointment as Assistant Curator (Sladen Collection).
1 November: Type-specimen of *Lepidodiscus lebouri* from Sladen Collection presented to British Museum (Natural History).
1974 September: F.W.E. Rowe 'Catalogue of the Sladen Collection' published in *Biological Journal of the Linnean Society*, **6**(3): 179-243.
1976 Curation of spirit material in Sladen Collection by Keith Westcott.
1979 Further curation of Sladen Collection by Dr K.A. Wright.
2000 8 June: Recognition of Centenary of Sladen's death, Friends of the Exeter Museum and Art Gallery.
2001 Completion of refurbishment and conservation of the Sladen Collection by Amanda Sutherland; the Collection re-opened.

Appendix 3

THE SLADEN COLLECTION – ORGANISATION AND COMPOSITION

Type-Specimens were sent by Sladen to the British Museum (Natural History) – now the Natural History Museum – except for that of *Lepidodiscus lebouri* Sladen, which was still with the Collection when donated to the Royal Albert Memorial Museum in Exeter. This specimen was subsequently sent to the British Museum by Dr F.W.E. Rowe. There are also type-specimens of fossil blastoids exhibited in the Index Collection.

In the case of asteroids and crinoids, some fragments from the type-specimens appear to have been retained by Sladen as lectotypes. Dr Rowe recommended that these should at some stage be matched with the rest of the type-specimens so that there is no doubt about their identification and status. Also, Rowe mentions in his catalogue (Rowe, 1974) that other type material may be present in the Reserve Collection, possibly acquired by Sladen on his 1882 tour of European museums, and mostly identified by notes added to the labels by Sladen.

The case housing the Collection in the Exeter Museum cost £500 when built in 1903; a further sum of £1,000 was also donated by Mrs Sladen 'to augment the salary of the Curator in charge of the Sladen Collection'.

When received by the Exeter Museum (Access Number 263), the material was housed as follows:

43 cabinet drawers of Recent and fossil material
500 glass jars with preserved material
47 cabinets and boxes containing 6311 microscopical preparations.

It was sub-divided by the Curator, F.R. Rowley, into:

Index Collection, mainly dried material, including the better specimens for display and given reference numbers 1 to 512, prefixed by the letter 'I' by Rowe (1974). Other Index Collection material is housed in glazed drawers beneath the sloping display cases.

Reserve Collection, housed in cupboards beneath the displayed material, with reference numbers from 1 to 1827, prefixed by 'R'. A few further numbered specimens were prefixed S by Rowe, since they appear to have been numbered by Sladen himself.

Dr Rowe remarks (Rowe, 1974) that the numbers given to these specimens do not form a complete series, and neither are the specimens numbered in any real order. There are gaps in the sequence of numbers, and the specimens from different Classes are somewhat intermixed; also, some specimens have no Rowley number. The entry for the Sladen Collection in the Accessions Register of the Museum for 1903 also refers to a 'special catalogue', which might explain how Rowley allocated the numbers, but this has not come to light.

A digital display of microscope slides is present in the walk-in case.

The Collection consists of:

3827 Recent specimens
2000 fossil specimens
7186 microscope slides, of which:
- 1047 are Sladen's own material
- 4583 are W.B. Carpenter material, including:
  - 2198 foraminiferans
  - 671 sections of *Antedon*
  - 1405 sections of annelids, ophiuroids, brachiopods and tufa
- 1556 are P.H. Carpenter material, comprising;
  - 1302 crinoids
  - 254 other invertebrates and vertebrates.

Taxonomically, the Collection breaks down thus:

Recent material:	244 genera
	425 species
Fossil:	155 genera
	226 species.

The Sladen Library contains material from the period 1602 to 1900:

Volumes: 2209
Reprints: 1500

The Case (Rowley, 1910) has an arched entrance with glass-sided displays to either side, so the eye is taken beyond the entrance-wall to the rest of the Collection inside. The Index Collection starts on the left on entry, with representatives of each of the five Classes, then gives the structure of each Class in turn.

Tablets holding the specimens are all 8" wide, covered in grey paper with black paper background. Mirrors are set into the tablet when both sides need to be seen. The last part of the exhibit is a series of wax models illustrating embryology.

The glazed drawers have a lock-housing system to prevent complete removal or opening the glass tops. There is a flap beside each set of drawers, revealing a metal strip with two vertical columns of threaded holes for milled-headed coarse screws. Each drawer has a stop-groove closed at each end, while at the front is a threaded hole to take the screw through the hole in the left-hand column when the drawer is to be locked. To permit public viewing of the drawer, the screw is placed in the right-hand hole, where it marries with the stop-groove, so that the drawer can be withdrawn for viewing but not removed or the glass top lifted (Rowley, 1910).

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