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James Edwin Duerden (1865–1937): zoological polymath

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1. Introduction
 2. Early life and education
 3. Dublin 1888-1895: bryozoans and hydroids
 4. Jamaica 1895-1901: anthropology, sea anemones and corals
 5. USA 1901-1905: corals
 6. South Africa 1905-1932: ostriches, wool and eugenics
 7. Retirement and later life
 8. Assessment and legacy
- Acknowledgements
- Appendix: early publications largely on bryozoans, hydroids and corals

1. Introduction

James Edwin Duerden (1865–1937) (Figure 1) was a zoologist of considerable ability who published on many diverse topics: tortoises, ostriches, wool, corals and bryozoans (Table 1). Given such a varied research output it is surprising that these contributions are not well-known today, and the man remains an enigmatic character.

2. Early life and education

Duerden was born on 7th April 1865 (some sources¹ quote 1869) in the family home, 4 Byerden Lane, Briercliffe, northeast of Burnley, Lancashire, England. His parents were John Duerden (born Burnley 1841, died 27 December 1915) a cotton power loom weaver (and later market gardener) and Margaret (née Simpson) (born Roughlee Booth, Lancashire 1840, died 11 February 1892).² The Family was non-conformist and attended the Ebenezer Baptist Church, Hill Lane, Briercliffe.³ The fourth of twelve children, eight of whom survived infancy (Figure 2), James Edwin (known in family circles as Eddie) was the eldest son.⁴ He received his early education at the Ebenezer Baptist School, and from the age of twelve worked in a local mill⁵ as a cotton weaver, as did his elder sisters Mary,



A close-up of a handwritten signature in dark ink on a light-colored paper. The signature reads "J. E. Duerden" in a cursive script. The first letter "J" is large and loops back. The "E" is also cursive. The name "Duerden" follows in a similar cursive style.

Figure 1. James Edwin Duerden c. 1935 (Photograph courtesy of Albany Museum, Grahamstown) with his signature below (From a letter in the Geological Museum, Trinity College, Dublin).

Table 1. J.E. Duerden's research output, by major topic, numbers of publications, and dates.¹¹⁵

Topic	Number of publications	Dates spanned
Hydroids	11	1892-1895
Bryozoans	9	1893-1896
Sea Anemones	14	1895-1905
Corals	27	1896-1906
Anthropology and Eugenics	4	1897-1925
Ostriches	56	1905-1924
Tortoises	4	1906-1907
Wool	25	1923-1939

Priscilla, and brother Samuel,⁶ and most of their neighbours.⁷

During the 1800s Lancashire was the center of the cotton industry which employed over 600,000 people.⁸ However, competition from mills operating on the Continent intensified at the end of the century which saw a 20% decline in the value of British cotton exports.⁹ This might explain why John Duerden moved from the mill to set up his own business as a market gardener, or perhaps this was for health reasons.¹⁰

Given Duerden's working class background it is perhaps surprising that he rose to an elevated academic position in later life; that he did is surely testifies his great determination. A full Professor at age forty, he was nominated (albeit unsuccessfully) for election to Fellowship of the Royal Society.¹¹ As a young man Duerden attended night classes at the Burnley Mechanics' Institute¹² (Figure 3) after a full day at work.¹³ In 1885 he obtained an Exhibition at the Normal School of Science (renamed Royal College of Science from 1890), London. This institution was one of a number established as part of the late 19th drive to broaden educational opportunities. Primarily offering courses in applied sciences and technology to working and lower-middle class males (and later women), it was hoped that such institutions would expedite industrialization.¹⁴ At the Normal School (NSC) Duerden enrolled in courses in Inorganic Chemistry, Physics, Mathematics and Freehand Drawing (in the first year – 1885-86), Biology, Geology and Astro-Physics (in 1886-87), and sat Advanced Zoology in 1889 gaining a mark of 75% in the examination.¹⁵ He was taught by Thomas George Bond Howes (1853-1905) then Assistant Professor of Zoology.¹⁶ Concurrently he attended lectures at Kings College, London where he gained an Associateship in Zoology in 1890. He was also conferred with the degree of B.Sc. from the University of London at around this time. Later in his life he was awarded a Ph.D. by Johns Hopkins University, USA, and an M.Sc. from the University of Capetown in South Africa. His sister Margaret went on to become a teacher in a local Board School and his brother Samuel eventually became a mechanical engineer; in 1911 he was working in a paper works in Bristol.¹⁷



Figure 2. Duerden Family Portrait, c. 1892-1895. Standing (from left): John Rawson (possibly) (1861-1895), Jane Duerden (née Rukin) (wife of Samuel) (1886-1944), John Duerden (1882-1939), Samuel Duerden (1868-1950), Mary Jane Duerden (née Haworth, wife of James Edwin) (1866-1950), James Edwin Duerden (1865-1937), Frank Duerden (1880-1930). Sitting (from left): Margaret Duerden (1875-1939), Mary Jane Rawson (née Duerden) (1860-1933), John Duerden (1840-1915), Priscilla Duerden (1863-1948). On Floor: Martha Duerden (1876-1957). It is possible that this family group photograph was taken just before James Edwin and Mary Jane travelled to the West Indies in early 1895 (From Ancestry.co.uk).

3. Dublin 1888-1895: bryozoans and hydroids

In 1888 James Edwin moved to Dublin on his appointment as Demonstrator in Biology and Palaeontology at the Royal College of Science for Ireland. Like its London namesake, this institution provided a strongly practical-based education. Duerden was to hold an additional post from 1890 with the Irish Fisheries Survey. While in Dublin Duerden most likely lived in rented accommodation; in 1893 he is listed as living at 3 Great Charles Street.¹⁸

During his time in Ireland he became interested in locally-collected bryozoans and hydroids from the coast of Co. Dublin.¹⁹ He also collected from the west and south-west coasts and around Bundoran, Co. Donegal,²⁰ at the behest of the Fauna and Flora Committee of the Royal Irish Academy. Established in 1893, this Committee, of which



Figure 3. Burnley Mechanics' Institute (Photograph © Dave Bevis 2011 and reused under the Creative Commons Licence; <http://www.geograph.org.uk/more.php?id=2638980>; accessed 17 January 2014).

Duerden was a member, provided small grants for biological and geological fieldwork, and did much to foster understanding of biodiversity in Ireland. Its first grant, made in 1893 allowed Duerden and others to survey Berehaven, Co. Cork.²¹ Perhaps its most significant contribution resulted from the celebrated Survey of Clare Island, Co. Mayo organized between 1909 and 1911 by Robert Lloyd Praeger. By the time this survey was undertaken Duerden had left Ireland—the bryozoans were surveyed by Alfred Russell Nichols.²²

During the summer of 1894, some of the material collected during excursions of the Dublin Naturalists' Field Club,²³ including the bryozoan *Crisia ramosa* from Dublin Bay, was exhibited at meetings of the DNFC and the Dublin Microscopical Club.²⁴ These two groups fostered close links between amateur and professional naturalists and scientists in the city. They were responsible for generating quantities of biological data and publicizing them through meetings and via publications. In due course Duerden served as a Committee member of the DNFC.

Details of Duerden's findings, notably new and unusual bryozoans, were published by the Royal Irish Academy (1893) and the Royal Dublin Society (1895). Between 1893 and 1896 many short papers, and reports of various society activities, appeared in *The Irish*



Figure 4. *Membranipora aurita* (Hincks) [accepted name *Callopora aurita* Hincks, 1877] on crab. Collected 13 August 1887 in Dublin Bay; donated by Duerden to Natural History Museum, Dublin 1895 (Photograph by Antoinette Kelso).

Naturalist, a local but important natural history monthly. An example is one by William Swanston (1841-1932) and Duerden,²⁵ which lists bryozoans dredged from various depths of up to 72 fathoms around Belfast Lough from Larne in the north to Donaghadee in the south. This was based on collections made in 1876 and 1877 by Swanston, a leading light of the Belfast Naturalists' Field Club. Thomas Hincks had identified the bryozoans

soon after their collection: Duerden augmented the list with information on species' distributions. Swanston and Duerden noted that this was the first major listing of Irish bryozoans: the junior author took the opportunity to ask the scientific community to send him additional specimens, particularly from the north and west of Ireland.

He recorded over 30 bryozoan species from shorelines in north County Dublin in a number of papers,²⁶ including *Alcyonidium mytili* which was new to Ireland, while he recorded the rare species *Triticella boeckii* from the eye stalks of crabs collected from the southwest, as well as *Hippuraria egertoni*.²⁷ Duerden's last contribution on Irish bryozoans, published by the Royal Dublin Society, comprised results of collecting undertaken in 1890 and 1891 in the west of Ireland as part of his duties for the Irish Fisheries Survey.²⁸

His hydroid work, reported in several papers and summarized in that of 1895 and 1896,²⁹ added 33 species to the Irish records and one to the British records, of these, two were new: *Perigonimus gelatinosus* (now accepted as *Leuckartiara octona* (Fleming, 1823)³⁰) and *P. (?) inflatus* (now not recognized).³¹

In the seven years Duerden spent in Ireland he made significant contributions to bryozoological recording and he remains one of only a small number of researchers who have focused their attention on Irish marine bryozoans over the last 180 years.³² His work on bryozoans and hydroids increased awareness of their diversity (recording over 50 bryozoan taxa – Table 2) and distribution.

At the end of the 19th century, Dublin was a centre of excellence in scientific research. It was home to various learned, professional and amateur societies, universities and colleges, and possessed an excellent natural history museum. Working in the city would have brought any young biologist into contact with several naturalists with major international reputations: it was an ideal environment for Duerden to begin making his name. His abilities as a collector³³ and research scientist were to find fruition over the next ten years of his life when he turned from bryozoans to corals. In 1895, just before he departed for the West Indies, his collection of bryozoans and hydroids, together with some

Table 2. Bryozoans recorded or collected by J.E. Duerden from around Ireland. Taxa are listed alphabetically as given by Duerden in his publications and not updated to accepted modern nomenclature [except in a few cases†]

Taxon – Locality and date collected – Notes

- Alcyonidium mytili* – Rush, Co. Dublin 1894 – New to Ireland
Alcyonidium parasiticum – Laytown, Co. Meath 1894
Amathia lendigera – Laytown, Co. Meath 1894
Bicellaria alderi – Skelligs, Co. Kerry 1890
Bicellaria ciliata – Rush, Co. Dublin 1894
Bowerbankia imbricata – Laytown, Co. Meath 1894
Cellaria sinuosa – Laytown, Co. Meath 1894
Cellepora armata [= *Turbicellepora avicularis* (Hincks, 1860)] – *Laytown, Co. Meath 1894
Cellepora avicularis Hincks, 1860 – Laytown, Co. Meath 1894
Cellepora pumicosa – Laytown, Co. Meath 1894
Cribrilina punctata – Rush, Co. Dublin 1894
Crisia aculeata – Killiney, Co. Dublin 1893, Laytown, Co. Meath 1894
Crisia cornuta – Dublin Bay, Co. Dublin 1893
Crisia eburnea – Glandore Harbour, Co. Cork 1885/6, Berehaven, Co. Cork 1893, Dublin Bay, Co. Dublin 1893, Laytown, Co. Meath 1894
Crisia geniculata – Glandore Harbour, Co. Cork 1885/6, Berehaven, Co. Cork 1893, Dublin Bay, Co. Dublin 1893
Crisia ramosa – Dublin Bay, Co. Dublin 1893
Diastopora patina – 45 miles west of Blackrock island (12 miles west of Blacksod, Co. Mayo)
Diastopora suborbicularis [= *Eurystrotois compacta* (Norman, 1866)] – *Kilkieran Bay, Co. Galway 1894
Eucratea chelata – Rush, Co. Dublin 1894, Laytown, Co. Meath 1894
Flustra barleei – Skelligs, Co. Kerry 1890
Gemellaria loricata – Laytown, Co. Meath 1894
Hippothoa divaricata – *Kilkieran Bay, Co. Galway 1894
Hippuraria egertoni – Berehaven, Co. Cork 1893
Idmonea serpens – Laytown, Co. Meath 1894
Lepralia pallasiana [= *Cryptosula pallasiana* (Moll, 1803)] – *Berehaven, Co. Cork 1894
Lepralia pertusa – *Roundstone, Co. Galway 1894
Lichenopora hispida [= *Disporella hispida* (Fleming, 1828)] – *Valentia Island, Co. Kerry 1890, Laytown, Co. Meath 1894
Membranipora aurita – *Dublin Bay, Co. Dublin 1887
-

Table 2 continued

- Membranipora lineata* [= *Callopora lineata* (Linnaeus, 1767)] – *Roundstone, Co. Galway 1894
- Membranipora membranacea* – Laytown, Co. Meath 1894
- Membranipora pilosa* – Laytown, Co. Meath 1894
- Microporella ciliata* – *Roundstone, Co. Galway 1894
- Microporella impressa* – *Bundoran, Co. Donegal 1894, Howth, Co. Dublin 1894
- Mucronella coccinea* – *Kilkieran Bay, Co. Galway 1894, Howth, Co. Dublin 1891, 1894
- Mucronella variolosa* – 45 miles west of Blackrock island (12 miles west of Blacksod, Co. Mayo)
- Pedicellina cernua* - Rush, Co. Dublin 1894
- Retepora beaniana* – off Co. Kerry, 1886
- Retepora couchii* – Glandore Harbour and Dursey Head, Co. Cork, 1885/6
- Schizoporella hyalina* – Laytown, Co. Meath 1894, *Roundstone, Co. Galway 1894
- Schizoporella linearis* – *Kilkieran Bay, Co. Galway 1894, 45 miles west of Blackrock island (12 miles west of Blacksod, Co. Mayo)
- Schizoporella unicornis* – *Roundstone, Co. Galway 1894
- Scrupocellaria reptans* – Laytown, Co. Meath 1894
- Scrupocellaria scruposa* – Laytown, Co. Meath 1894
- Smitta landsborovii* – *Berehaven, Co. Cork 1893
- Smitta reticulata* – 45 miles west of Blackrock island (12 miles west of Blacksod, Co. Mayo)
- Triticella boeckii* – Berehaven, Co. Cork 1885, Kenmare River, Co. Kerry
- Triticella flava* – off southwest Ireland 1885/6
- Triticella koreni* – Berehaven, Co. Cork 1885
- Triticella pedicellata* – Skelligs, Co. Kerry 1890, Slyne Head, Co. Galway 1890
- Tubulipora flabellaris* – Laytown, Co. Meath 1894
- Umbonula verrucosa* – *Dursey Point, Co. Cork 1893, Rush, Co. Dublin 1894
- Valkeria uva* – Rush, Co. Dublin 1894, Laytown, Co. Meath 1894
- Vesicularia spinosa* – Bundoran, Co. Donegal 1894, Laytown, Co. Meath 1894

†taxonomic identifications updated by Mary Spencer Jones 2006

*specimen(s) in Natural History Museum, Dublin, Ireland

The bryozoans recorded in Swanston and Duerden (1893)²⁴ are not listed here as the identifications of Swanston's material were provided by Rev. Thomas Hincks. Duerden contributed notes about the Irish distributions of the taxa.



Figure 5. Ebenezer Baptist Chapel (right) and adjoining School (left), Hill Lane (Courtesy of Briercliffe Society; www.briercliffesociety.co.uk).

molluscs was donated to the Museum of Science and Art (now the Natural History Museum), Dublin (Figure 4): it continues to be of research value to the present day.

Duerden found personal happiness in Dublin. At the Ebenezer Chapel, Hill Lane, Briercliffe, Burnley (Figure 5), on 12 July 1893, he married. His fiancée, Mary Jane (Pollie) Haworth (daughter of John Haworth, a master shoemaker), then living at 4 Gunsmith Lane, Burnley (Figure 6), was a teacher at his old primary school. Both were 28 years old at the time of their marriage.³⁴

CERTIFIED COPY OF AN ENTRY OF MARRIAGE GIVEN AT THE GENERAL REGISTER OFFICE

Application Number: G259062

No.	When Solem.	Place and Persons.	Age.	Condition.	Rank or Profession.	Birthplace at the time of Marriage.	Father's Name and Residence.	Rank or Profession of Father.
18,921	12 July 1893	James Edwin Duerden Mary Jane Haworth	28 28	Single Single	Commercia Burnley	Great Harbo Burnley	John Duerden John Haworth (deceased)	Gardener (mother)

Married in the presence of the Minister of the Gospel by the Rev. J. H. ...

This Marriage was solemnized between us, James Edwin Duerden in the presence of us, Mary Jane Haworth by James H. ... I, Albert ... Registrar

CERTIFIED to be a true copy of an entry in the certified copy of a register of Marriages in the Registration District of Burnley
Given at the GENERAL REGISTER OFFICE, under the Seal of the said Office, the 28th day of October 2004

MXB 798135

CAUTION: THERE ARE OFFENCES RELATING TO FALSIFYING OR ALTERING A CERTIFICATE AND USING OR POSSESSING A FALSE CERTIFICATE. VIOLATION CONSTITUTES A CRIME.

WARNING: A CERTIFICATE IS NOT EVIDENCE OF IDENTITY.

Figure 6. Marriage certificate of James Edwin Duerden and Mary Jane Haworth, 12 July 1893 (Kindly supplied by Mary Spencer Jones).

4. Jamaica 1895-1901: anthropology, sea anemones and corals

In 1894 Sir William Flower was asked to recommend a suitable candidate for the position of Curator of the Museum in the Institute of Jamaica, Kingston,³⁵ (Figure 7): Duerden was chosen from a group of thirty-three candidates at salary estimated to have been between £400 and £600 per annum.³⁶ Assuming the post on 12 March 1895,³⁷ he also served as Acting Secretary and edited the scientific portion of the *Journal of the Institute of Jamaica*.

As funds for the Museum were initially absent or very low, collecting and curation were limited, but in the second year Duerden received an extra grant of £100. The scope of his employment freed him to pursue his developing interests, as he spent one day a week engaged in fieldwork and gave a lecture course at the Institute on ‘Philosophy of Biology’.³⁸ He wrote on the island’s marine resources, studied its caves (subject of a paper to *Nature* in 1895), and was the first to illustrate their rock carvings. In 1897, in collaboration with a former Dublin colleague, Alfred Cort Haddon (1855-1940), he reported on anthropological finds partially based on collections made by the wife of Jamaica’s Governor General. Sixty years later, his anthropological work was described as being ‘the best published summary to date on Jamaican archaeology.’³⁹

His study of Jamaican sea anemones and corals attracted American interest. The research on madreporarian corals (published in a monograph in 1902) came to the attention of William Keith Brooks (1848-1908), Chairman of Biology at Johns Hopkins University, Baltimore (1894-1908). Brooks and his colleagues had been visiting Jamaica since 1891 as they organized the annual “Chesapeake Biological Laboratory”.⁴⁰ The laboratory was established in 1891 at Port Henderson (Figure 8) at the mouth of Kingston Harbour and later occupied rented premises at Port Antonio on the island’s northern coast.⁴¹ Hopkins’ physical presence in Jamaica ended in tragedy with the 1897 visit: the botanist James Ellis Humphrey (1861-1897) who worked on palms, wild ginger and boring algae, and the zoologist Franklin Story Conant (1870-1897) who studied the cubomedusae, both died of yellow fever contracted on the island.⁴² Following these sad events John Hopkins ceased to visit the island.⁴³ Participants on these trips, including Caswell Grave who collected brittle stars, and Edward William Berger who collected false scorpions and later completed Conant’s work, received field training. Duerden, an experienced marine



Figure 7. The Institute of Jamaica letterhead (from one of Duerden’s letters to Grenville Cole, August 1895) (Geological Museum, Trinity College, Dublin).



Figure 8. Johns Hopkins Marine Biological Laboratory, Port Henderson, near Kingston, Jamaica (from Windle 1894).⁴¹

zoologist was a valuable local source of knowledge and specimens, aided in the field teaching, and studied the sea anenomes. Brooks was undoubtedly impressed, and arranged for Duerden to submit a Ph.D. thesis entitled *West-Indian Madreporarian Polyyps* to his university, and following its review by Brooks and Ethan Allen Andrews (1858-1956), also of the Zoology Department, the degree was conferred on 12 June 1900.⁴⁴

Duerden assisted others in obtaining Jamaican material. Notably, for Ray S. Lankaster, he procured numerous specimens of the onychophore *Peripatus*: this rare “living fossil” had eluded earlier collectors. Duerden maximized returns by displaying some specimens in the museum and offering a reward for others; as a result, the locals brought in 130 individuals and a further 50 were offered. These were later reported on by Andrews.⁴⁵ Duerden kept in touch with several former Dublin colleagues. He sent a collection of Jamaican rock specimens (mainly volcanics and metamorphics) to Grenville Cole (1859–1924), Professor of Geology at the Royal College of Science for Ireland.⁴⁶ The shipment included spiders, centipedes and slugs for Francis Scharff and George Carpenter of the Natural History Museum.⁴⁷ At James Edwin’s request, Cole reported on a specimen of volcanic ash containing a granite fragment from Montrose, Jamaica, to members of the Dublin Microscopical Club.⁴⁸ His letter to Cole announced the birth of a son, Edwin Noel, on 30 March 1896 and described as, ‘a promising little boy, who is now the joy of his ma and pa’.⁴⁹

In 1900 the Government grant provided to the Institute was halved, and as a result the salary offered by its Board to its Museum Curator was lowered to £100 per annum. The committee that had overall responsibility for the museum argued that Duerden undertook numerous tasks and implied that he should be kept on, but this did not happen and his appointment was reluctantly terminated.⁵⁰ News of these difficulties reached the scientific press. *Nature* published a letter by the zoologist Hubert Lyman Clark (1870-1947), a Hopkins' alumnus, later curator of echinoderms at the Museum of Comparative Zoology, Harvard.⁵¹ Clark asserted that ever since Duerden's 1895 arrival he had been the target of "local jealousy" stemming from a belief that a local candidate for the Institute's position had been overlooked. Clark speculated that Duerden's willingness to help fellow scientists, e.g., himself and his Hopkins' colleagues and Robert Thomas Hill (1858-1941) of the US Geological Survey was being criticized. Had such assistance, combined with Duerden's own coral research, led to a perception that curatorial duties had been neglected? Such a sentiment would have been surprising given Duerden's many positive contributions to the Institute.⁵² Clark seems to have misread the fiscal condition of the Institute which, after Duerden's removal in March 1901, appointed no replacement (local or otherwise) until 1939.⁵³ We wonder how James Edwin felt as he and his family sailed away from Port Antonio – whose marine life he knew so well – on 12 May 1901.

5. USA 1901-1905: corals

Arriving in Philadelphia the Duerdens moved on to Baltimore. As a Bruce Fellow at Johns Hopkins University he researched Palaeozoic corals and expanded his interests into madreporian biology. Fifteen papers on the latter topic, dated between 1902 and 1906 were published by the University, the *Journal of Natural History and Science*.

In June 1902 Duerden was appointed Acting Professor of Biology at the University of North Carolina, Chapel Hill (UNC) to replace Professor Henry Van Peters Wilson during his leave of absence to study sponges at a Berlin museum.⁵⁴ Tragedy visited the family with the death of six year-old Edwin Noel on 24 September 1902; the child was buried at the Old Cemetery on the UNC campus (Figure 9). His parents endowed "The Edwin Noel Duerden Memorial Trust" with the Chapel of the Cross Episcopal Church, Chapel Hill to ensure an annual sermon on the benefits of a continuing friendship between the British and American peoples. The endowment is puzzling given that at the time Duerden was neither a financial contributor to the church nor was he listed as a communicant.⁵⁵ Perhaps the Duerdens



Figure 9. Headstone over grave of Edwin Noel Duerden, Old Cemetery, Chapel Hill, North Carolina (Photograph by Bill Burk, Chapel Hill).

were occasional congregants or perhaps they were acknowledging Rector William Meade's funeral service. These events may have been the beginning of Duerden's life-time role as a lay Anglican although he and his wife returned to their "chapel roots" at the time of their deaths.

At UNC Duerden taught general biology, mammalian anatomy, vertebrate embryology and histology, and zoology (comparative anatomy of invertebrates and vertebrates). He joined UNC's Elisha Mitchell Scientific Society (established in 1883 "to promote scientific studies and publication"), and in 1903 published a short paper on Palaeozoic corals in its journal.

When his UNC contract ended Duerden applied unsuccessfully for posts in Charleston, South Carolina, and Bryn Mawr, Pennsylvania. In 1903, as Honorary Curator of Coelenterates at the American Museum of Natural History in New York City, he assembled an exhibit on the biological characteristics of corals. He used the large collection of West Indian material (including type specimens) that he had donated that year.⁵⁶ Working in the recently established Department of Invertebrate Zoology he was perhaps hopeful of securing permanent employment, but this did not happen and he moved on to Michigan.

In July 1903 he was appointed Acting Assistant Professor of Zoology at the University of Michigan in Ann Arbor, for one year on a salary of \$1,150.57 as a replacement for George Wagner,⁵⁸ but didn't take up residency until late September of that year. Reappointed in May 1904 for a further year with a raise of \$50 per annum,⁵⁹ he resigned in 1905. While at Ann Arbor he also served as a Vice-President of the Michigan Academy of Sciences.

Duerden's coral research caught the attention of the Carnegie Institution in Washington. They gave him access to their research facilities and appointed him leader of a 1904 expedition to Hawaii in 1904 to study Pacific corals. He made extensive collections of shallow-water forms, and used the newly-constructed aquarium at Waikiki Beach, Honolulu,⁶⁰ during his studies of their post-embryonic development and soft-part anatomy and the effects of mucus on their growth.⁶¹ Later T.W. Vaughan utilized a number of Duerden's specimens which had been deposited in the United States National Museum in Washington and in the American Museum of Natural History (having originally come from the collections of the Carnegie Institution), and erected the two species named for Duerden: *Porites duerdeni*⁶² – a coral of irregular appearance that could reach a height of 3m (Figure 10).

Undoubtedly Duerden made valuable contributions to coral and sea anemone taxonomy, anatomy and development. He wrote many papers, and named the actinarian genera *Mitactis* Haddon & Duerden, 1896 (although this is now considered to be a synonym of *Anthothoe* Carlgren, 1938)⁶³ and *Homostichanthus* Duerden, 1900. However, following his subsequent move to South Africa in 1905 he gave up his cnidarian work and his research took completely different directions.

Did he seek a position in Britain during this period? While we have no evidence of any applications made by him, he must have contacted fellow researchers when he attended the 1903 British Association for the Advancement of Science (BAAS) meetings in York.



Figure 10. *Pavona duerdeni* Vaughan, 1907 'Duerden's coral' or 'Pork Chop coral', Northwest Hawaiian Islands. (Photograph by Dwayne Meadows, July 2004; http://en.wikipedia.org/wiki/File:Pavona_duerdeni.jpg; accessed 17 January 2014).

Although not then a BAAS member, he presented a paper on his coral work⁶⁴ and no doubt made his availability known to the academic community. It seems probable that in York he first met his fellow Lancastrian, Walter Garstang (1868-1949), a rising star in British marine biology.⁶⁵ Garstang was to assume the Chair of Zoology at Leeds University in 1907 where, as will be discussed later, Duerden spent the years before his death.

6. South Africa 1905-1932: ostriches, wool and eugenics

In May 1905 Duerden assumed the position of Professorship of Zoology at Rhodes University, Grahamstown, Eastern Cape Province, South Africa (Figure 11) at an annual salary of £500 per annum, a portion of which was paid (until 1910) by the Albany Museum.⁶⁶ As it was considered appropriate that the post should carry a University of Capetown qualification, he was conferred with the degree of M.Sc. *ad eundem* in 1906.⁶⁷ Duerden was the first to hold this Chair, and for many years he was Department's only staff member. His teaching load eventually decreased when in 1924 Gertrude T. Brock was

Figure 11. Duerden in academic dress, Rhodes University, 1911 (Photograph courtesy of the Department of Zoology and Entomology, Rhodes University, PIC M 3893).



appointed Demonstrator of Zoology (on his 1932 retirement, she succeeded him as Acting Professor). Rhodes offered several Zoology courses: intermediate (1st year), advanced (2nd and 3rd year) and honours (4th year), and a course in Applied Biology (Figure 12). In collaboration with the Professor of Botany a Biology course was offered: unsuccessful, it was discontinued in 1914. Later M.Sc. students were enrolled.



Figure 12. Zoology class of 1921 with Duerden in the centre of the front row. The beheaded and pipe 'smoking' skeleton also appears in a class photograph of 1928 (Photograph courtesy of the Department of Zoology and Entomology, Rhodes University, PIC M 3957).

Soon after his arrival at Rhodes, Duerden began to study tortoises, naming a new species *Homopus boulengeri* in 1906. However, by December 1905, he had identified a research problem with potential economic benefits: defects in ostrich feathers (Figure 13).

The ostrich industry was flourishing, meeting the demands of European and American fashion. The many farms in the Albany district generated over £3 million per annum. Duerden befriended many of the farmers who provided a steady supply of research material for his laboratory: a useful symbiosis between the farmers who had organized the “Ostrich Farmers’ Association of South Africa” and the research scientist. Much of the

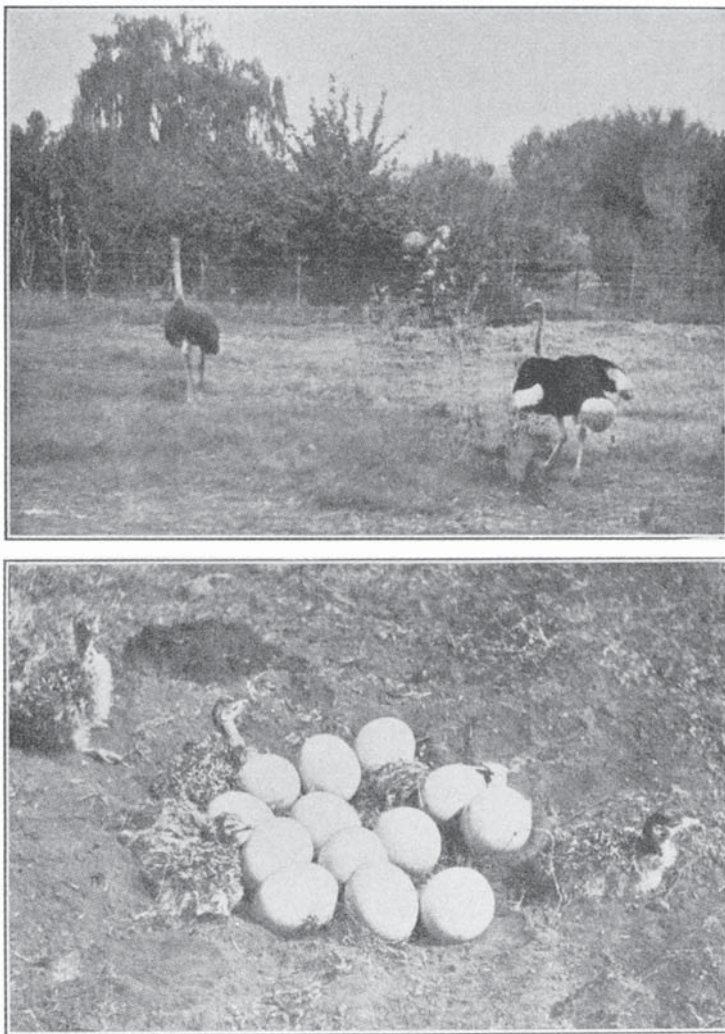


Figure 13. Photographs of ostriches from Duerden’s 1920 paper ‘Ostrich farming in South Africa’, text of a lecture delivered in London. Top: A pair of breeding birds; Bottom: Chicks hatching in nest.

ostrich work was carried out at Grootfontein College of Agriculture, Middelburg (established in February 1911) where he was appointed Officer-in-Charge of Ostrich Investigations. Duerden was keen to promote his work and just two years after his appointment to Rhodes was contributing a paper on the effects of domestication in ostriches to the 7th International Zoological Congress in Boston in September 1907.⁶⁸ Some members of his audience – especially several junior faculty and graduate students, known to one another from summers spent in various East Coast marine laboratories, were perhaps unimpressed by this “promotion.” As documented by Riddle (1908),⁶⁹ in his 1906 paper, Duerden had inaccurately and without permission, misattributed Riddle’s preliminary experiments aimed at explaining the origin of “fault bars”. The rapidity of production of Duerden’s numerous papers on feathers - many merely transcriptions of lectures to farmers’ groups, coupled with idiosyncratic citation formats, gives the canon of some fifty-six papers,⁷⁰ a mixed flavor with regard to quality. A series concerning cross-breeding between South and North African birds is of some interest. Some of this canon appeared in international journals and gave Duerden a global reputation.

As the ostrich feather industry began its decline just before World War I, Duerden continued his research in the field for a short time. On a 1920 visit to London he gave a well-received lecture at the Imperial Institute, South Kensington on 28 May.⁷¹ This was well-received, but the industry was in terminal and rapid decline and never recovered.

Nevertheless, the industry was dying leaving many farmers in economic distress. Amid considerable agitation blame for its demise was variously attributed to other commercial and trading interests and groups, groups such as the Royal Society for the Protection of Birds (RSPB) concerned for the protection of birds, and government legislation of 1913 and 1914.⁷² On his return to South Africa, Duerden turned his attention to reptilian limbs and pelvic girdles but, after publishing a few papers he applied his talents to wool research.

Why did Duerden turn to wool as a research topic? Certainly he recognized that the South African wool industry was growing and he knew that research was required to enhance the product’s marketability. Equally he may have been drawn by a sentimentality that reflected his early years working in the Lancashire textile industry. From his ostrich work he had acquired a knowledge of skin biology so that intellectually it was not a great jump from feathers to wool.

Much of the work was carried out at Grootfontein College which switched its focus from ostriches (this institution is still active today in wool research)⁷³ and the veterinary laboratories at Onderstepoort. Donations from local farmers had largely paid for the excellent facilities at Grootfontein. With his new research team, Duerden soon became such an authority on wool that the Department of Agriculture appointed him Director of Wool Research, and he became a Fellow of the Textile Institute. He devised a method for cutting wool into lengths whose diameter could be measured, and in 1929 he established the ‘Duerden Crimp Scale’ for assessing the quality of Merino wool. This scale was long used by the industry.⁷⁴ Although largely replaced by that of ‘Fibre Diameter’, in South Africa, the ‘Duerden’ remains a commonly used measure.⁷⁵ His studies on the embryology and evolution of the merino fleece lasted into his post-retirement years.

Highly regarded in scientific circles in South Africa, Duerden served the national Association for the Advancement of Science (SAAAS) in many roles. Having helped organize the Grahamstown meeting in 1908,⁷⁶ he worked subsequently as Council Member and Honorary Secretary, and on several committees. His peers elected him President of the SAAAS for the Durban meeting in 1921. At its close, he was thanked for ‘the masterly fashion and charming manner in which the various meetings had been conducted ... to which to a large extent was to be attributed the success of the Session’.⁷⁷ He represented the SAAAS at the 1932 British Association for the Advancement of Science meeting in York. At the meeting he was appointed Vice President of Section D (Zoology),⁷⁸ and contributed to a discussion on conservation of wild life and national parks.

While in South Africa Duerden’s attention turned to eugenics. Now universally discredited due to its association with Nazi atrocities during World War II, this topic was widely and approvingly discussed in academic circles in the early 20th century.⁷⁹ During his American sojourn, Duerden must have either met, or at least became aware of, Charles Benedict Davenport (1866-1944), a contemporary whose life and career were remarkably, indeed uncannily, similar to his.⁸⁰ Well-known in the world of Eastern marine laboratories, Davenport became Director of the Carnegie Institution of Washington’s Cold Spring Harbor (CSH) laboratory in Long Island, New York in 1904. Research on bryozoans for his 1892 Harvard Ph.D. had resulted in five papers between 1890 and 1899.⁸¹ An early proponent of Harvard’s “post-Agassi quantitative biology”, Davenport soon embraced the new Mendelian genetics. He and his wife Gertrude first studied color inheritance in birds and mammals, and then addressed human skin. In 1910, Davenport established the Eugenics Record Office at the CSH richly funded through 1940 by the widow of the railroad magnate, E.H. Harriman.⁸² It is unclear how much influence Davenport had on Duerden’s thinking on eugenics. A common interest in eugenics is but one topic touched upon in a fourteen year correspondence and reprint exchange between the two.⁸³

Duerden had published on Jamaican anthropology as far back as 1897. His ideas on eugenics in the period 1910-25 were probably influenced by his ostrich work which had considered the interactions between genetics and environmental factors such as climate and feeding. For his 1921 presidential address to the important and powerful SAAAS Duerden partially returned to anthropology,⁸⁴ Other papers, based on addresses delivered to the Grahamstown Social Welfare League,⁸⁵ discussed the affects of environment on what he referred to as the ‘poor white’ in South Africa.⁸⁶ Noting that their ancestors were ‘the two most virile nations of Europe, the industrious, adventurous, sea-faring Dutch and British’ he concluded that the diminished status of their descendents had resulted from the isolated geographical locations in which they worked, far from ‘centres of activity’. He felt that education could improve their status given the agricultural and industrial revolution that was sweeping the country.⁸⁷ Duerden firmly believed that his ostrich and wool research was contributing to this economic and social recovery. In his final 1925 foray into this controversial area, he emphasized the interaction between environmental factors and human heredity.⁸⁸

7. Retirement and later life

After his retirement from Rhodes University in March 1932 Duerden moved to England arriving at London on 8 May on the White Star Line's ship *Ceramic*.⁸⁹ However, he maintained his professional association with Grootfontein Agricultural College for some time. This institution still awards the annual Duerden Shield, to a student who demonstrates proficiency in examinations and in practicals on sheep, goats and wool. On retirement James Edwin wanted to continue research. In May 1932, in furtherance of this aim he joined the Woollen and Worsted Industries Research Association (WIRA - now the British Textile Technology Group) at Headingley, Leeds in an unpaid, honorary capacity. An appointment as Honorary Fellow of the University of Leeds on 21st December 1932 required residence in the city. The Association provided appropriate accommodation *gratis* – one of the several flats in Ashwood House, 46 Headingley Lane, Leeds 6. This imposing residence had been built by the wool stapler Joseph Austin (1803-1857) and was the childhood home of Alfred Austin who succeeded Alfred, Lord Tennyson as Poet Laureate in 1896.

WIRA, established after World War I, no doubt benefited from close links with the University where Walter Garstang (1868-1849) served as Professor of Zoology from 1907 to 1933.⁹⁰ Garstang perhaps owed his Chair to the “practical importance” of his early career in fisheries research. As teacher and administrator he fostered interests in both applied and basic skin research. Of several students, two are important in tracing the history of, and evaluating, the relationship between Garstang and Duerden – William Francis Dry (1891-1979) and Ann Hosker (1908-1965).⁹¹ Their Leeds' education, Dry's status as the father of Australasian sheep genetics, and Hosker's feather studies through 1936, are discussed elsewhere.⁹² Hosker's later career as founder of the University of Leicester's Zoology Department, as a medical student in London during WWII, and work as a general practitioner in Leeds until her death in 1965 are now known.⁹³ Her career raises two questions. First, what led Garstang (a marine biologist and, by the 1930s, an important theorist in evolution) to propose a study of feather regeneration to his last graduate student? Second, why do Hosker's publications make neither reference to Duerden's feather research, nor even his presence in the Leeds' Zoology Department between 1932 and 1937 when she left for Leicester?

As noted earlier, Duerden and Garstang (the younger by three years, a member of BAAS since 1894⁹⁴) probably knew of one another's work in marine biology since early in their careers. They may have first met at the 1903 BAAS meeting. Did they discuss employment prospects in the UK or elsewhere, heavy teaching loads, or the relative merits of pure versus applied research? It is unlikely they spoke of feathers: Duerden states in a 1906 paper that he began pursuit of this literature *after* his May 1905 arrival in Grahamstown. From this we may infer that if Duerden planted the seeds of feather-related questions in Garstang's mind, he did so later than 1903. Garstang may have heard of James Edwin's “feather interests” as late as the late 1920s when his old student Dry, by then in New Zealand, was communicating with Duerden on sheep genetics.⁹⁵ Hosker's apparent



Figure 14 (left). Haggate Baptist Chapel and graveyard (Courtesy of Briercliffe Society; www.briercliffesociety.co.uk).

Figure 15 (right). Duerden family burial plot, Haggate Baptist Chapel graveyard (Photograph by David Barker; Courtesy of Briercliffe Society; www.briercliffesociety.co.uk).

unawareness of Duerden's presence around the Leeds' Zoology Department is puzzling in light of the similarities of their interests. Throughout his retirement he was studying hair follicle patterns in embryos from different British sheep breeds. Later, at his widow's request, the findings were collated by a WIRA colleague and published.⁹⁶

Aged 72, Duerden died 4 September 1937 in the General Hospital, Nottingham. He had sustained a spinal fracture and subsequent chest complications following a fall while he and his wife were travelling to attend that year's BAAS meeting in Nottingham. As he was taking his seat, their bus moved forward and he was thrown to the floor. He appeared to have sustained no injury, but later complained of feeling unwell: his wife gave him some brandy. On reaching Nottingham it was found that his legs were paralysed. At a subsequent inquest, his widow and family agreed that the fall was accidental and that no blame was apportioned to the driver or conductor.⁹⁷

His ashes and those of his wife (who died 27 April 1950 at 56 Park Road, Southport, Lancashire⁹⁸) are interred at Haggate Baptist Chapel, Nelson Road, Haggate, just north of Burnley (Figures 14 and 15).⁹⁹ They lie in the family plot beside his parents, three siblings who died in infancy (Sarah, Thomas and Maria), and his sisters Margaret (born 1876, died 21 January 1939, aged 63 years) and Priscilla (born 1863, died 14 November 1948 aged 85 years).¹⁰⁰

The provisions of his will, published in *The Times* on 13 October 1937 reveal an estate valued at just over £8,502 11s 7d (nearly half a million in 2014 pounds). Rhodes University and Grahamstown were eventual beneficiaries. Following his wife's life interest, he left the university £1,000, St Michael and St George's Cathedral (where he had served as an Sidesman¹⁰¹) £500, and the Diocesan School for Girls £250.¹⁰²

8. Assessment and legacy

James Edwin Duerden was a man of considerable ability. Despite humble origins, early eking out of a meager existence as London student, then peripatetic scientist and lecturer in Ireland and the New World, he rose to the top of his profession in South Africa. His career involved continuous hard work and dedication to research (Table 3). He became a noted expert in several fields, especially the biology of corals and bryozoans, ostriches and their feathers, and the nature of wool: on these and other topics, he published extensively (Table 1). After his 1937 death, an anonymous assessor wrote in *Nature*: “His enthusiasm and personality made him a delightful colleague and an inspiration to all who worked with him.”¹⁰³ At the same time, the *Burnley Express* encapsulated his achievements in the headline ‘Famous Burnley Scientist. World Authority on the Growth of Wool’ and went on to remark that he was ‘one of the most notable of Burnley men who have achieved renown in the realm of science’.¹⁰⁴

In 2014, this remarkably versatile researcher is formally remembered in two ways. First, Rhodes University awards the annual Duerden Scholarship to an outstanding undergraduate student in the Department of Zoology and Entomology who will continue to postgraduate studies: this Department also hosts an annual Duerden Lecture. Second, his name is perpetuated in both common names and formal nomenclature. ‘Duerden’s sun anemone’ (*Homostichanthus duerdeni* Carlgren, 1900) perhaps reflects the memories of those who knew him, while the scleractinian corals, ‘Duerden’s coral’ (aka Pork Chop coral) (*Porites duerdeni* Vaughan, 1907) and ‘Knobby Finger Coral’ (*Pavona duerdeni* Vaughan, 1907) are regrettably listed as threatened in the IUCN Red List.¹⁰⁵ ‘Duerden’s Burrowing Asp’ (aka the ‘Beaked Burrowing Asp’) (*Atractaspis duerdeni* Gough, 1907) enshrines his name in herpetology.

Although it has been noted that some of Duerden’s research is still of scientific, commercial and agricultural value today,¹⁰⁶ such statements apply strictly to the period between the end of World War I and his death in 1937. The present essay addresses his early life covering his educational background and research in marine biology. A detailed appraisal of the scientific merit of his “ostrich-wool canon”, mentioned here only briefly, is planned. At this point, what can we say about the career and accomplishments of the author?

Because Duerden’s eclectic interests might elicit comment by a 21st century reader, it is important to emphasize that eclecticism in biological research *per se* was not unusual until the late 20th century. What makes Duerden’s record extraordinary is the rate of output of publications (Table 1) compared to where and when the work was carried out (Table 3): the man was a prodigious researcher and traveller. We have sparse documentation of the reasons behind and/or causes of his choices of research topics and place of employment: which drove which? Ironically the absence of such written data may be attributed to his frequent moves. Knowing so little of his childhood, we cannot identify what amateur interests in the Natural Sciences he might have entertained in his native Brierfield, a tiny industrial town nestled amid the hills of the Western Pennines.¹⁰⁷ It is difficult to imagine

Table 3. J.E. Duerden's employment history and honorary positions.

1890-1895	Demonstrator Royal College of Science for Ireland, Dublin, Ireland
1895-1901	Curator of Museum, Institute of Jamaica Kingston, Jamaica
1901-1902	Bruce Fellow, Johns Hopkins University, Baltimore, USA
1902-1903	Acting Professor of Zoology, University North Carolina Chapel Hill, USA
1903-1905	Acting Assistant Professor of Zoology, University of Michigan Ann Arbor, USA
1903	Honorary Curator of Coelenterates American Museum of Natural History New York
1905-1932	Professor of Zoology, Rhodes University, Grahamstown, South Africa
1932-1937	Honorary Staff Member, Wool Industries Research Association Leeds, England
1932-1937	Honorary Fellow, University of Leeds, Leeds, England

how the 20 year old James Edwin felt when he left home in 1885 to pursue his academic studies in London.¹⁰⁸ To visit the many available, free cultural activities and to travel between the Normal School of Science in South Kensington and Kings College in the Strand, he probably used the “Metropolitan/District Line” (completed in 1884) of the emerging “Tube.”¹⁰⁹ While Duerden was a student, most of London’s museums and art galleries still relied on natural light: lecture halls were still gaslit and underground cars were steam-driven. During the late 1880s, systems for public and domestic electrification were emerging. He probably did not ride an electrified subway car until his 1907 visit to Boston, as his New York City sojourn in 1903 was one year too early for him to avail himself of this new technology.¹¹⁰ This brief comment on the history of transport and electrification makes a point concerning Duerden’s professional life: as he moved from position to position (Table 3), his chances of availing himself of emerging research technologies changed constantly. Contemporaries who remained in one geographic location had the opportunity to learn how to work within its constraints: Massachusetts’ climate permitted Davenport to collect Bryozoa during the long hot summers, and investigate their anatomy using “advanced microscopic techniques” when winter chills permeated Harvard’s laboratories.¹¹¹ Throughout his early career in Ireland and Jamaica, Duerden lacked access to advanced research techniques: indeed had he had them, he would have lacked the physical environment to employ them.¹¹² Duerden’s strategy was to become a professional exponent of the established, British, Natural History tradition – first in Ireland and later in Jamaica. He familiarized himself with prior research, concentrated on identifying new species of bryozoans and cnidarians, and accurately documented their distribution. He thus made himself indispensable as a collector assisting others who sought material for anatomical and physiological studies as he simultaneously

ensured his own legacy in systematics, zoogeography and ecology. Did James Edwin want to be a “modern research zoologist”? In Jamaica, his “Philosophy of Biology” lectures suggest he was building on his Dublin experiences for interactions with amateur societies and the proselytization of science. His simultaneous excursions into anthropology, using material collected by the Governor General’s wife, reveal scholarly interests and a social “savoir-faire” acquired beyond his formal university education: lauded 20 years after his death, this was work of high academic standard. Duerden’s curatorial duties, begun *en passant* in Dublin, were developed in the Institute of Jamaica. His construction of a new exhibit at the American Museum of Natural History in 1903, using personally-collected coral specimens, suggests a natural talent for museology, a speciality first defined in the 1880s as museums assumed a role in public education.¹¹³ When we examine Duerden’s research output of approx 25 papers on cnidarians between 1902 and 1905, we should note that throughout this period he was teaching a diversity of topics in various universities. Once he had reached North America where he had greater access to equipment he added the microscopic examination of thin-sections to advance his coral studies.¹¹⁴

Did Duerden leave the United States in 1905 because he had been unsuccessful in finding a permanent position? Perhaps he and his wife chose to begin a new life in South Africa to ameliorate the loss of their infant son. It seems strange that James Edwin abandoned research on bryozoans and cnidarians having established a level of international renown in their biology. As a result of those studies and involvement in other areas of marine biology he had come into contact with many rising and senior American academics from whom he learned a lesson: the desirability of finding rich sponsors. Armed with social graces, administrative skills, and unflagging enthusiasm, within six months of his arrival in Grahamstown, he responded to enquiries from the rich ostrich farmers and thereafter followed paths of applied research that benefitted both him and Rhodes University.

James Edwin Duerden was a remarkably versatile researcher from Burnley, Lancashire whose range of interests covered invertebrates and vertebrate zoology from biogeography and marine diversity, to coral morphology and development to feathers and latterly wool. He is an example of a working-class Victorian who embraced educational opportunities and rose from humble origins to reach the top of his chosen academic field.

Acknowledgements

PNWJ first encountered Duerden when he embarked on a study of Irish bryozoologists over twenty years ago. We are grateful to Jim O’Connor (formerly of the Natural History Museum, Dublin) for permission to use some information contained in his 1991 paper. The authors also thank all those who have supplied information about Duerden and his work, copies of correspondence, or images: Mary Spencer Jones (Natural History Museum, London), Bill Burk, Michael McVaugh and Alan Feduccia (University of North Carolina, Chapel Hill), Adrian Craig, Alan Hodgson, Shirley Stewart (Rhodes University), Fleur Way-Jones (Curator of History, Albany Museum, Grahamstown), William Jervois

(Albany Museum), Antoinette Kelso (Trinity College, Dublin), Sylviane Vaucheret, Nigel Monaghan (National Museum of Ireland), Diarmaid Ó Foighil (University of Michigan), Sandy Baker (University of Leeds), and Tracy Commock (Institute of Jamaica). We are particularly grateful to Ray Duerden (Lancashire) who shared his findings about Duerden's early life and family and to Bill Burk who located Noel Edwin Duerden's gravestone when a prior search for it by the Wyse Jackson family while on a fleeting visit had failed to find it.

PNWJ's understanding of aspects of Duerden's ostrich and wool research was greatly enhanced in corresponding with, and subsequently meeting, PFAM. This current paper recalls Duerden's life and work from cotton-weaver to professor, and touches on areas of his early research, but we hope to expand our study in due course to include an in-depth critical analysis of the major facets of his later (ostrich and wool) output.

Endnotes

- 1 Document in the American Museum of Natural History, Bill Burk, personal communication 25 July 2004.
- 2 Duerden's date of birth is confirmed as 7 April 1865 on his birth certificate and the same date is also given on the family headstone. This memorial also provided the death dates of his parents and two sisters and the names of three siblings that died in infancy. <http://www.briercliffesociety.co.uk/Grave%20Stones/Haggate%20Chapel/Duerden/Duerden9.htm> (accessed 27 December 2013).
- 3 This church was erected in 1860 and could accommodate over 860 worshipers (*Barrett's Directory of Burnley and district*, 1896, p. 15). It is still in use today as a church.
- 4 Letter James E. Duerden [nephew] (Brierfield, Lancashire) to J. Omer-Cooper, 11 April 1965 (Cory Library, Rhodes University).
- 5 Possibly in Byerden Mill. This was burnt down on 22 October 1905 (see <http://www.briercliffesociety.co.uk/Photo%20Archive/Local%20Disasters/Lodge%20Mill%20Fire.htm>; accessed 17 January 2014)
- 6 Details of family largely provided by Ray Duerden, 7 September 2004. See also www.ancestry.co.uk.
- 7 In 1891 there were 6 mills in Briercliffe which contained 2,293 looms, while in the village of Brierfield half a mile away, seven mills operated 5,953 looms. Most produced printed cottons, with some capable of producing twills, jacconettes, denim, oxford cloth and striped mexicans (Details in *The Cotton Spinners and Manufacturers' Directory*, 8th edition, 1891, John Worrall, Oldham, pp. 77-79). Just 3 miles away in Burnley approximately one hundred cotton spinner and manufacturing firms were in business.
- 8 Rodgers, H.B. (1962) The changing geography of the Lancashire Cotton industry. *Economic Geography* **38** (4), 299-314.
- 9 Brown, J.C. (1995) Imperfect competition and the Anglo-German trade rivalry: markets for cotton textiles before 1914. *Journal of Economic History* **55** (3), 494-527 (Table 1, p. 496).
- 10 In the 1871 Census his occupation is given as 'Cotton Weaver' while in that of 1881 it is given as 'Market Gardener'. The market garden business remains in the 4th generation of the family, with John being joined in the business by his youngest sons Frank and John and then in turn by his grandson James Edwin, and latterly his sons (Census 1901; Letter J.E. Duerden [nephew])

- (Brierfield, Lancashire) to J. Omer-Cooper, 11 April 1965 (Cory Library, Rhodes University). The business, known since 1900 as 'Duerden Brothers', was a well-known supplier of watercress which was moved out of the area by rail. The company quit Brierfield in 1986 but is still in operation at Great Ecclestone, Preston in Lancashire.
- 11 Duerden was nominated for election to Fellowship between 1921 and 1925 (see Home, R.W. (2003) *The Royal Society and the Empire: the Colonial and Commonwealth Fellowship Part 2. After 1847. Notes and Records of the Royal Society of London* **57** (1), 47-84. Of the fifteen persons nominated between 1905 and 1932 six were elected (Home 2003, Appendix 4, pp. 78-79).
 - 12 The Institute was similar to many around Britain at the time in that it provided an opportunity for further education for young working-class men, see Tylecote, M.P. (1957) *The Mechanics' Institutes of Lancashire & Yorkshire before 1851*. Manchester University Press. The Burnley Mechanics' Institute opened in 1834; the building now serves as a theatre.
 - 13 While some mills in Lancashire had established on-premises schools for their child workers prior to 1840 (see Sanderson, M. (1967) Education and the Factory in Industrial Lancashire, 1780-1840. *Economic History Review*, new series, **20** (2), 266-279) there is no evidence that such an educational facility was available to Duerden or his siblings.
 - 14 These bodies included the City and Guilds of London Institute for the Advancement of Technical Education (1878), Mechanics' Institutes (of many cities across Britain), the Normal School of Science (1881), and the Royal College of Science for Ireland (1867) funded in part from tax paid on hard liquor. See: Argles, M. (1962) English education for technology and science: the formative years. *History of Education Quarterly* **2** (3), 182-191; Gowling, M. (1977) Science, technology and education: England in 1870: The Wilkins Lecture, 1976. *Notes and Records of the Royal Society of London* **32** (1), 71-90; Donnelly, J.F. (1986) Representations of Applied Science: academics and chemical industry in late nineteenth-century England. *Social Studies of Science* **16** (2), 195-234.
 - 15 Details of courses from letter H.R. Hewer to J. Omer-Cooper, 25 February 1965 (Cory Library, Rhodes University).
 - 16 Howes was an excellent practical zoologist and teacher, and primarily interested in vertebrates. See *Proceedings of the Linnean Society*, 117th session (1904-1905), p. 36. Perhaps Howes influenced and fostered Duerden's early interest in invertebrates.
 - 17 Census returns for 1901 (Margaret) and 1911 (Samuel).
 - 18 Address given on his marriage certificate.
 - 19 Why did Duerden turn his attention to bryozoans and hydroids? Perhaps he was influenced or encouraged to do so by staff members of the Museum of Science and Art, such as George Carpenter, who would have recognised that such groups were largely under-studied in Ireland at the time. Duerden, being a junior staff member at the Royal College of Science for Ireland, probably was delighted to receive such encouragement.
 - 20 For records of this work see Duerden, J.E. (1895) The rock pools of Bundoran. *The Irish Naturalist* **4**, 1-7; Duerden, J.E. (1896) Notes on the rock pools of Bundoran. *The Irish Naturalist* **5**, 153-155.
 - 21 Praeger, R. Ll. (1903) Ten years' work of the Fauna and Flora Committee. *The Irish Naturalist* **12** (5), 124-131.
 - 22 See Kelso, A. this volume.
 - 23 See Duerden, J.E. (1894) Hydroids and Polyzoa collected between Laytown and the mouth of the Boyne. *The Irish Naturalist* **3**, 169-170; and Duerden, J.E. (1894) Notes on the marine

- invertebrates of Rush, Co. Dublin. *The Irish Naturalist* **3**, 230-233.
- 24 *Crisia ramosa* was shown at the DNFC meeting held on 21 March 1893 (*The Irish Naturalist* **2**, 146) and the hydroids *Plumularia haleciodes* (new to Ireland) at the Dublin Microscopical Society meeting held on 20 October 1892 (*The Irish Naturalist* **1**, 193), *Canpanulina turrita* at the meeting held on 15 March 1894 (*The Irish Naturalist* **3**, 110), and *Plumularia similis* at the 21 June meeting of the same organisation later that year (*The Irish Naturalist* **3**, 201).
- 25 Swanston, W. and Duerden, J.E. (1893) Some north of Ireland Polyzoa. *The Irish Naturalist* **2**, 165-168.
- 26 Duerden, J.E. (1894) Hydroids and Polyzoa collected between Laytown and the mouth of the Boyne. *The Irish Naturalist* **3**, 169-170; Duerden, J.E. (1894) Notes on the marine invertebrates of Rush, Co. Dublin. *The Irish Naturalist* **3**, 230-233.
- 27 Duerden, J.E. (1893) Proceedings of Irish Societies: Dublin Microscopical Society. *The Irish Naturalist* **2**, 50.
- 28 Duerden, J.E. (1895) Survey of fishing grounds, west coast of Ireland, 1890-1891. Notes on the Hydroida and Polyzoa. *Scientific Transactions of the Royal Dublin Society*, new series, **8**, 325-336.
- 29 Duerden, J.E. (1895) *ibid.*; Duerden, J.E. 1896. Hydroids of the Irish coast. *Scientific Transactions of the Royal Dublin Society*, series 2, **8**, 405-420.
- 30 Schuchert, P. (2007) The European athecate hydroids and their medusae (Hydrozoa, Cnidaria): Filifera part 2. *Revue suisse de Zoologie* **114**, 195-396 (p. 323).
- 31 Schuchert, P. (2013) World Hydrozoa database. Accessed through: World Register of Marine Species at <http://www.marinespecies.org/aphia.php?p=taxdetails&id=509903> (accessed 20 January 2014)
- 32 For an assessment of bryozoological research in Ireland see Wyse Jackson, P.N. (1991) Distribution of Irish marine Bryozoa, together with biographical notes relating to the chief researchers in the group. *Bulletin of the Irish Biogeographical Society* **14** (2), 129-184.
- 33 Aside from bryozoans and hydroids Duerden collected other invertebrate groups which he passed over to the Museum of Science and Art, Dublin or to colleagues expert in those groups. As such his collecting efforts found outlets in publications other than his own; see for example: Carpenter, G.H. (1894) Further Irish localities for pycnogons. *The Irish Naturalist* **3** (9), 202; Lyster Jameson, H. (1901) Notes on Irish worms: 1. The Irish Nemertines with a list of those contained in the Science and Art Museum, Dublin. *Proceedings of the Royal Irish Academy* **5**, 34-39.
- 34 Details from marriage certificate.
- 35 *Annual Report on the Institute of Jamaica, for the year ended 31st March, 1895*, p. 2.
- 36 Letter Thomas H. Farr (Kingston) to J. Omer-Cooper, 8 February 1965 (Cory Library, Rhodes University).
- 37 *Annual Report on the Institute of Jamaica, for the year ended 31st March, 1901*, p. 2; Farr, T.H. (1985) Early years of the Natural History Division. *Jamaica Journal* **18** (2), 19-28 (p. 22).
- 38 Letter J.E. Duerden (Kingston) to G.A.J. Cole, 12 April 1896 (Geological Museum, TCD).
- 39 Howard, R.R. (1956) The archaeology of Jamaica: a preliminary survey. *American Antiquity* **22** (1), 45-59.
- 40 Conklin, E.G. (1913) William Keith Brooks 1848-1908. *Biographical Memoirs of the National Academy of Sciences* **7**, 1-67.
- 41 Windle, W.S. (1894) Notes from a Marine Biological Laboratory. *Popular Science Monthly* **44**, 449-458; Brooks, W.K. (1897) The expedition of Jamaica, in the summer of 1897. *Johns*

- Hopkins University Circulars* **17** (132), 1-2; Brooks, W.K. (1897) Expedition of Jamaica of the students of the Johns Hopkins University. *Journal of the Institute of Jamaica* **2** (5), 465.
- 42 Brooks *ibid.* (1897) **17**, 2; Anon. (1897) Scientific News. *The American Naturalist* **31** (372), 1067. Several participants became seriously ill while in Jamaica or on the voyage home. Humphrey died at Port Antonio on 17 August and the leadership of the party was assumed by Conant but he died on 13 September the day after he had returned to the United States.
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- 44 Leaflet *Conferring of Degrees at the close of the Twenty-fourth Academic Year, June 12, 1900*. The Johns Hopkins University of Baltimore, p. 4.
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- 47 Letter J.E. Duerden (Kingston) to G.A.J. Cole, 5 August 1895 (Geological Museum, TCD).
- 48 Cole, G.A.J. (1897) Volcanic ash from Jamaica. *The Irish Naturalist* **6**, 136.
- 49 Note 47.
- 50 Note 37, p. 20, 22.
- 51 Clark, H.L. (1901, 7 February) The Museum of the Institute of Jamaica. *Nature* **63**, 347.
- 52 *Annual Report on the Institute of Jamaica, for the year ended 31st March, 1901*, p. 2.
- 53 Note 37, p. 20.
- 54 *The Daily Journal*, 5 June 1902, p. 1, Chapel Hill, North Carolina.
- 55 Personal communication from Michael McVaugh to PFAM, 24 April 2004.
- 56 Annual Report of the President for 1902, American Museum of Natural History, New York (1903), p. 23.
- 57 *Proceedings of the Board of Regents* (1901-1906), July meeting 1903, p. 220. [www. http://quod.lib.umich.edu/u/umregproc/ACW7513.1901.001?rgn=main;view=fulltext](http://quod.lib.umich.edu/u/umregproc/ACW7513.1901.001?rgn=main;view=fulltext); accessed 23 December 2013.
- 58 Letter Elaine D. Cline (Ann Arbor) to J. Omer-Cooper, 11 May 1965 (Cory Library, Rhodes University).
- 59 Note 57, May meeting 1904, p. 349.
- 60 Duerden, J.E. (1905) Marine Zoology in the Hawaiian Islands. *Science*, new series **21** (545), 897.
- 61 Information in Vaughan, T.W. (1907) Recent Madreporaria of the Hawaiian Islands and Laysan. *Bulletin of the United States National Museum* **59**, 1-427; Duerden, J.E. (1906) The role of mucus in corals. *Quarterly Journal of Microscopical Science* **49**, 591-614.
- 62 Note 61, p. 193.
- 63 <http://www.marinespecies.org/aphia.php?p=taxdetails&id=741017> (accessed 29 December 2013)
- 64 Duerden, J.E. 1903. Some results on the morphology and development of Recent and fossil corals. *Report of the British Association for the Advancement of Science* 1903, 684-685.
- 65 Baker, R.A. and Bayliss, R.A. (1984) Walter Garstang (1868-1949): zoological pioneer and poet. *Naturalist* **109**, 41-53.

- 66 Hodgson, A.N. and Craig, A.J.F.K. (2005) A century of Zoology and Entomology at Rhodes University, 1905 to 2005. *Transactions of the Royal Society of South Africa* **60** (1), 1-18. Albany Museum dates to 1855 and is associated with Rhodes University.
- 67 *ad eundem* 'of the same rank'. It was common for universities to award such degrees (not based on submitted work) to staff or others who graduated from other institutions. See *Report of the University of the Cape of Good Hope for the year ended 31st December 1906*, Capetown, p. 8.
- 68 Parker, G.H. (1907) Preliminary list of Scientific Communications to be presented at the seventh International Zoological Congress, Boston, August 19 to 23, 1907, *Science*, n.s. **26** (657), 154-158.
- 69 Riddle, O. (1908). The genesis of fault bars in feathers and the cause of alternation of light and dark fundamental bars. *Biological Bulletin* **14**, 328-371. Riddle noted (p. 338) that Duerden had wrongly attributed his, Riddle's, experimental work on producing fault-bars in feathers to R.M. Strong and C.O. Whitman.
- 70 Number listed in manuscript 'A bibliography of the works of James Edwin Duerden' (compiled by M. Fouché, 1968) (Cory Library, Rhodes University, Grahamstown, South Africa, MS 17 756).
- 71 Text of the lecture was published in Duerden, J.E. (1920) Ostrich Farming in South Africa. *Journal of the Royal African Society* **20** (77), 19-24
- 72 For a full discussion of these issues see Pinto, R.G. (2011) *Activist globalization: how markets, societies and states empower cause-orientated action in transnational relations*. Ph.D. dissertation, University of Maryland; Stein, S.A. (2008) *Plumes: Ostrich Feathers, Jews, and a Lost World of Global Commerce*. Yale University Press, New Haven.
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- 75 Oliver, W.J. and Oliver, W.J. (2005) The effect of nutritional stress on the wool production potential of strong and fine wool Merino sheep. *South African Journal of Animal Science* **35** (4), 273-281.
- 76 Duerden, J.E. (1908) The South African Association for the Advancement of Science. *Nature* **78**, 395-397.
- 77 Anon. (1922) Report of the nineteenth annual meeting of the South African Association for the Advancement of Science. *South African Journal of Science* **18**, xxiv.
- 78 Anon. (1932) Foreign guests of the British Association at York. *Nature* **130**, 303; BAAS, *Report of the annual meeting, 1932 (102nd Year)*, York, p. xi.
- 79 Black, Edwin (2003). *War Against the Weak: Eugenics and America's Campaign to Create a master Race*. Thunders Mouth Press, New York, 550pp.
- 80 Riddle, O. (1948). Charles Benedict Davenport, 1866-1944. *Biographical memoirs of the National Academy of Sciences* **25**, 75-110.
- 81 See listing of Davenport's papers in Nickles, J.M. and Bassler, R.S. (1900) A synopsis of American Fossil Bryozoa including bibliography and Synonymy. *Bulletin of the United States Geological Survey* **173**, p. 482.
- 82 According to Black, note 76, page 46, Davenport pursued this profitable link with the Harrimans after meeting their undergraduate daughter Mary at a CSH summer school. Mary was:- "so enthusiastic about eugenics (that) her classmates at Barnard College had nick-named her 'Eugenia'.

- 83 Duerden wrote to Davenport irregularly over a period of fourteen years between 1907 and 1921 (letters in American Philosophical Society), and also sent him papers. For a listing of eighteen Duerden offprints (1906-1927) in Davenport's personal collection see: <http://archives.cshl.edu/R/BMRVS2XE17X4J7QI878GDMU28N59NBHFHID6HILT58DE1JECXQ-00232>; accessed 17/1/2014.
- 84 Duerden, J.E. (1921) Social anthropology in South Africa: problems of race and nationality. *South African Journal of Science* **18**, 1-31.
- 85 Information from Alan Hodgson, 22 August 2004.
- 86 Duerden, J.E. (c. 1917) *The betterment of the human race: a paper read before the Grahamstown Social Welfare League*. Grocott & Sherry, Grahamstown; Duerden, J.E. (1923) Genesis and reclamation of the poor white in South Africa. *Eugenics Review* **14** (4), 270-275.
- 87 See Dubow, S. (1995) *Scientific Racism in modern South Africa*. Cambridge University Press, pp. 137-140 for a fuller discussion of Duerden's views.
- 88 Duerden, J.E. (1925) Genetics and eugenics in South Africa: heredity and environment. *South African Journal of Science* **22**, 59-72.
- 89 www.ancestry.co.uk: UK, Incoming Passenger Lists, 1878-1960 (accessed 20 January 2014)
- 90 See Baker and Bayliss, note 65.
- 91 Maderson, P.F.A. (2004) Born in a follicle — a historical perspective. *Differentiation* **73**, 466-473.
- 92 See Maderson, note 91.
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- 97 Details of accident and inquest from *Burnley Express* September 1937.
- 98 <http://trees.ancestry.co.uk/tree/18153783/person/20005526089> (accessed 10 January 2014)
- 99 The chapel which had been erected in 1865 was demolished in about 2001. Source of image: <http://www.briercliffesociety.co.uk/Grave%20Stones/Haggate%20Chapel/Duerden/Duerden9.htm> (accessed 10 January 2014)
- 100 See note 2.
- 101 A Sidesman is a volunteer, generally in the Anglican tradition, whose would have included assisted the Church Warden in collecting the offerings of the congregation, and showing worshipers to their pew.
- 102 His estate is valued at nearly £489,861 in today's value. Of the bequests £1000 in 1937 is equivalent to £57,613 today; £500 = £28,806; and £250 = £14,403. See <http://www.thisismoney.co.uk/money/bills/article-1633409/Historic-inflation-calculator-value-money-changed-1900.html> (accessed 16 January 2014)
- 103 Anon. (1937) Prof. J.E. Duerden. *Nature* **140**, 576.
- 104 *Burnley Express*, September 1937.
- 105 See <http://www.iucnredlist.org/details/133702/0> for information on *Pavona duerdeni*, and <http://www.iucnredlist.org/details/132891/0> for *Porites duerdeni* (accessed 28 December 2013)
- 106 Alan Hodgson (Rhodes University) summed up Duerden's contribution in one research field thus: "Much of the research work initiated ... at Rhodes ... has been of inestimable value to the

sheep farmer and wool industry as a whole.” (Personal communication to PNWJ, 22 August 2004).

107 In 1944-1945, when PFAM was a WWII evacuee living on a “modern estate”, i.e., *circa* 1930, on the North-East corner of Brierfield, a 2 mile walk across open fields, traversed by streams, would have taken one to the Ebenezer Baptist Church in Briercliffe. In 2014, Google maps reveal new construction along the roads, but much open land remains. Duerden undoubtedly knew these fields still only yards from the sturdy stone terrace houses where he and his neighbours lived.

108 The time he spent studying at London University, 1885-1889, was a critical period in the history of the institution as the metropolis itself underwent a major reorganization, rebuilding and expansion. See Negley Harte (1986) *The University of London 1836-1986*. The Athlone Press Ltd., London, 303 pages. For overviews of the history of the metropolis in the second half of the 19th C, Linda Nead’s (2000) *Victorian Babylon: people, streets and images in nineteenth century London*. Yale University Press, Newhaven and London, 251 pages, begins a story that culminates in Jonathan Schneer’s (1999) *London 1900: The Imperial Metropolis*. Yale University Press, Newhaven and London, 336 pages.

109 http://en.wikipedia.org/wiki/Metropolitan_Railway#Inner_Circle, accessed 24 March, 2014.

110 http://en.wikipedia.org/wiki/History_of_rapid_transit, accessed 24 March, 2014.

111 Davenport’s doctoral years (1889-1892) produced six papers containing exquisite illustrations of cell and tissue organization in bryozoans [see bibliography in Oscar Riddle’s (1948) Charles Benedict Davenport: 1866-1944. *Biographical Memoirs National Academy of Sciences* **125**, 75-11).

112 As late as the early 1960s, PFAM experienced annual problems with histo-technique in a junior post in a Commonwealth University because “air-conditioning”, while considered essential for efficient administration, was deemed an expensive luxury for research workers.

113 See Lewis, Geoffrey D. (2014) <http://www.britannica.com/EBchecked/topic/398827/history-of-museums>, down-loaded 24th March 2014.

114 See for example his papers ‘Primary hexamerism in the Rugosa’. *Science* **15** (1902), 577, ‘Aggregated colonies in madreporarian corals’. *American Naturalist* **36** (1902), 461-471, and ‘The coral *Siderastrea radians* and its postlarval development’. *Carnegie Institution of Washington Publication* **20** (1904), 1-130.

115 Data derived from the Appendix herein, personal information, and ‘A bibliography of the works of James Edwin Duerden’, see note 70.

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Biographical Etymology of Marine Organism Names. D: <http://www.tmbi.gu.se/libdb/taxon/personetymol/petymol.d.html>
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American Philosophical Society, Philadelphia, Pennsylvania, USA: Correspondence (seven items, 1907-1921) with Charles B. Davenport, the prime mover on eugenics in the USA until the 1940s (Catalogue number: B D27).

Geological Museum, Trinity College, Dublin: Catalogue of Jamaican materials sent by Duerden to Grenville Cole (Royal College of Science for Ireland), and three associated letters.

Cory Library, Rhodes University, Grahamstown, South Africa:

Biographical information (compiled by Joseph Omer-Cooper, 1970)

A bibliography of the works of James Edwin Duerden (compiled by M. Fouché, 1968) (MS 17 756)

Various letters, notes lectures, publications and newspaper cuttings relating to ostrich and feather research.

Smithsonian Institution, Washington, DC

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**Appendix: J.E. Duerden's early publications largely on bryozoans,
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- Duerden, J.E. 1893. [On *Triticella boeckii* and *Hippuraria egertoni*] Proceedings of Irish Societies: Dublin Microscopical Society. *The Irish Naturalist* **2**, 50.
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