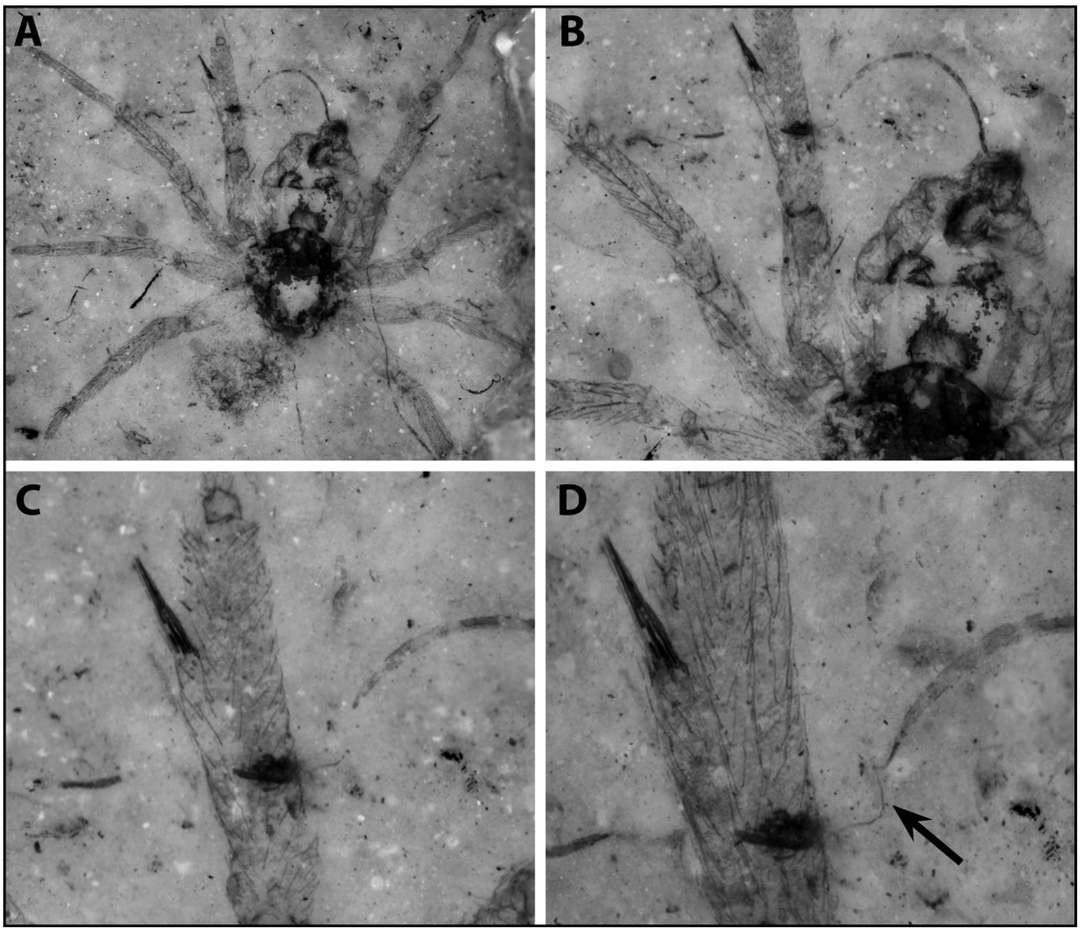
GEOLOGICAL CURATOR

Volume 10 Number 2



GEOLOGICAL CURATORS' GROUP

Registered Charity No. 296050

The Group is affiliated to the Geological Society of London. It was founded in 1974 to improve the status of geology in museums and similar institutions, and to improve the standard of geological curation in general by:

- holding meetings to promote the exchange of information
- providing information and advice on all matters relating to geology in museums
- the surveillance of collections of geological specimens and information with a view to ensuring their well being
- the maintenance of a code of practice for the curation and deployment of collections
- the advancement of the documentation and conservation of geological sites
- initiating and conducting surveys relating to the aims of the Group.

2014 COMMITTEE

ISSN 0144 - 5294

Cover: Photograph of a fossil plectreurid spider from the Jurassic of China. See paper by Selden inside.

THE GEOLOGICAL CURATOR

VOLUME 10, NO. 2

CONTENTS

GEOLOGICAL CURATORS' GROUP - December 2014

EDITORIAL

As I touched on in my editorial at the end of Volume 9, we live in changing times, with multiple media routes for delivering things like this journal and the other services that GCG members should expect as paid-up members and part of our community. The results of a survey of members and others concerned with geological curation are presented and discussed in a paper here by the entire Committee of GCG, led by the Chairman Giles Miller. It makes for interesting reading and has given the committee many pointers as to how to take GCG ahead in the next few years.

Some of the questions that arise from this survey are things that can be easily addressed. The survey results, along with trends in technology and the way people access information, indicate the *Coprolite* newsletter is no longer as effective as we would wish. Along with the significant cost of printing and posting it, a decision has been made to cease production in its present format. It will continue as an electronic publication (with paper copies still available on request), but issued more frequently and therefore more useful in keeping members alerted to forthcoming meetings in good time.

Many of the other issues raised by members and others in terms of training and information needs will be addressed through a new set of *Guidelines for the Curation of Geological Materials*. The original version was published in 1985 and was a major milestone for GCG. However, it has been planned to produce a second edition for some years now, but various delays have occurred. In 2015 you will see the new *Guidelines* appear in a new format. It will be provided as downloadable pdfs on separate topics within a flexible structure that allows it to grow and be added to with revised versions and new topics as it develops. The emphasis will be on really practical assistance, rather than a theoretical best practice approach.

The future of *The Geological Curator* journal was also part of the survey, but the results were less clear in guiding the Committee as to what people wanted and where financial savings might be made. Clearly many people would be happy to accept electronic delivery of the journal in future, but the financial savings to GCG are not in a linear relationship to the numbers not taking print copy, and many people still want print. In addition the survey was mostly responded to by individuals, and our subscriber base includes many institutions. There are also many technical issues to be addressed relating to effective delivery to members of electronic copy, and how to manage that and balance the pressures for completely open access versus the benefits for members of paying their subscription.

Consequently we have decided that a more detailed survey relating solely to the future of *The Geological Curator* would be helpful in making difficult decisions. We especially need to canvas the institutional members for their views. I would urge every reader to complete the enclosed paper questionnaire and return it. It can be posted or a scan emailed to geologicalcuratorsgroup@gmail.com.

This volume also includes the text of a Memorandum of Understanding signed at the 2014 Annual Meeting of the Society for the Preservation of Natural History Collections (SPNHC). This year it was held in Cardiff in partnership with the Natural Sciences Collections Association (NatSCA) and the GCG. At the meeting we agreed that a small group of our members would correspond and identify three key areas that this collaboration would take. This group met in December 2014 and used the GCG strategy document published here as a basis for establishing collaboration. We look forward to hearing from this group and for future closer collaborations between ourselves, SPNHC and NatSCA.

Matthew Parkes
December 2014

CHALK OR EOCENE ECHINOIDS? IMPLICATIONS OF A CHANCE OBSERVATION

by Stephen K. Donovan

Donovan, S.K. 2014. Chalk or Eocene echinoids? Implications of a chance observation. The Geological Curator 10 (2): 67-70.

Accurate and complete data concerning provenance, both locality and horizon, of geological specimens is naturally considered essential by curators, researchers and other collectors. But, accidentally, specimens can end up with the wrong information. Two 'chalk' echinoids purchased by the author in the Isle of Wight are actually Cenozoic; one, probably both, is Eocene and from the Caribbean region, most likely, the southeastern USA. Accidents happen, as these specimens would have sold for more if correctly labelled. An expert second opinion on the provenance of purchased specimens is never wasted.

Stephen K. Donovan, Department of Geology, Naturalis Biodiversity Center, Darwinweg 2, 2333 CR Leiden, the Netherlands. Email Steve.Donovan@naturalis.nl. *Received 7th August 2014. Accepted 14th August 2014.*

Introduction

Rocks and fossils for sale are part of the scenery of the retail 21st Century. Most museum gift shops sell geological specimens to their visitors, some of which may actually be of research interest (Donovan and Lewis 2004). Rock and fossil shops are specialist outlets that may be found, particularly, but not exclusively, in areas of noteworthy geology, such as the Lake District and the Jurassic Coast. International rock and mineral shows may attract curators from wealthier museum, like the Natural History Museum in London, in search of new material for research and/or display. Other sources of specimens may only be available from online catalogues. Specimens for sale may be local or imported from exotic locales such as Morocco and Madagascar, among others. Details of locality and horizon provided with these specimens are commonly minimal, but, in my experience, rarely erroneous. I discuss a notable exception to this general rule below.

In July 2014 S.K.D. was visiting James Isted's shop, 'Jurassic Jim', in Shanklin, Isle of Wight, in search of research specimens. For example, the previous year a fragment of bored wood from the Lower Greensand Group of the island, found at the bottom of a basket of Greensand plant remains, had led to a joint publication (Donovan and Isted 2014). It is always tempting to contemplate what treasures might lay in wait in the baskets and boxes of less glamorous material. Among the specimens that intrigued S.K.D. on this latest visit was a small collection of polished irregular echinoids, labelled as coming from the Chalk. This provenance was not unexpected for the island, but the specimens were immediately recognizable as being in disagreement with this information. Two specimens (Figures 1, 2) were brought back to the Naturalis Biodiversity Center for further investigation because their age and provenance appeared highly debatable. These specimens are now registered in the collections of the Naturalis Biodiversity Center, Leiden, the Netherlands (prefix RGM).

Two echinoids

Both specimens are now identified as Cenozoic, probably from the Caribbean or south-east USA. Presumably, neither was well preserved, otherwise they would not have been polished. Polishing has not improved their systematic identity and neither is confidently identifiable below the level of genus. But their white limey infill is certainly chalk-like in appearance.

RGM [791 7731**] is the most revealing specimen, belonging to *Oligopygus* sp. (Figure 1), a genus of limited stratigraphic and geographic distribution. Polishing has obliterated surface detail, such as most of the tuberculation, but, of the diagnostic features listed by Smith and Kroh (2011), the following are still identifiable:

· "Test of medium size, elongate to subcircular in outline; margin and adoral surface rounded, sunken towards peristome" (Figure 1).

· "Apical system subcentral, monobasal, with

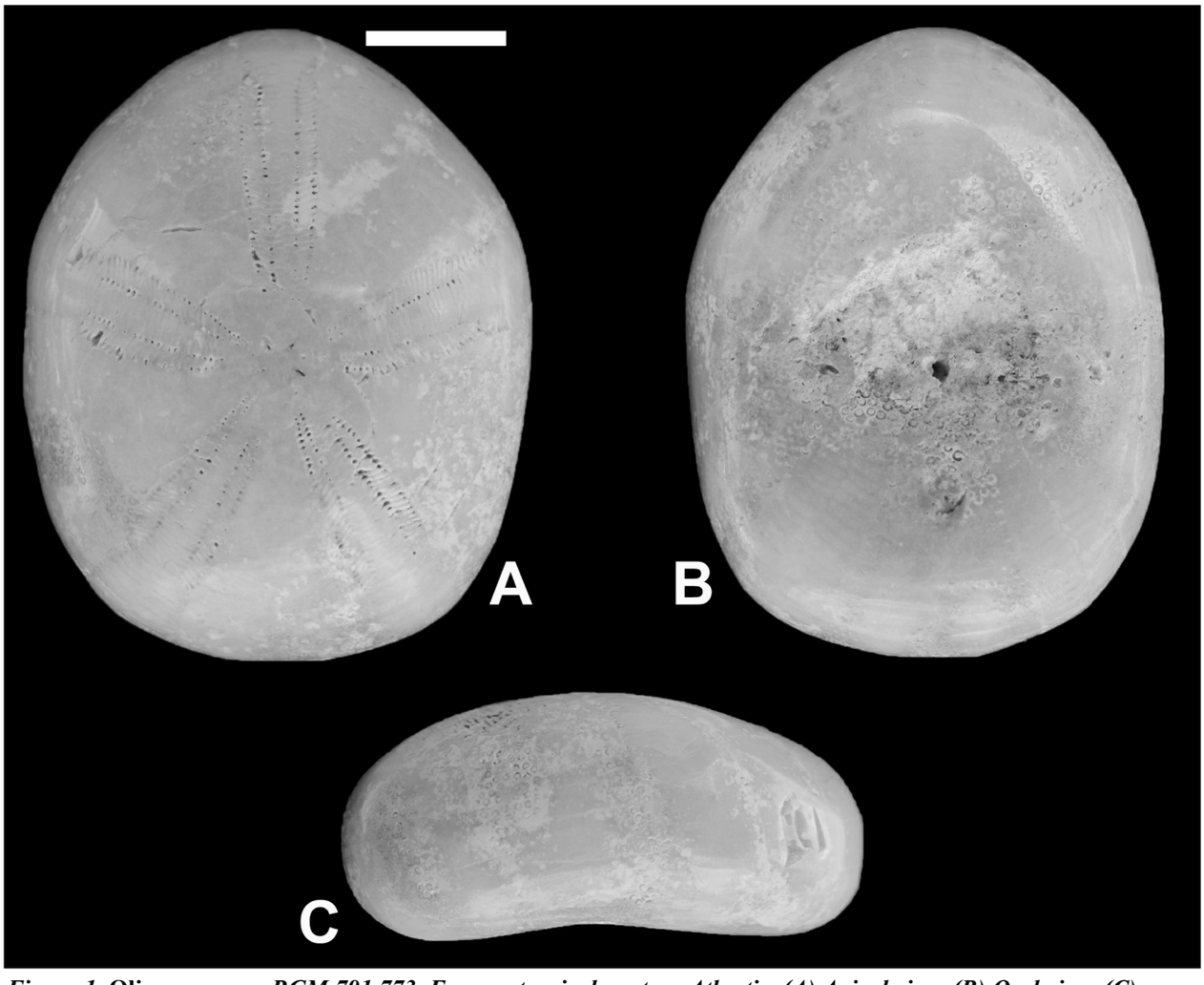


Figure 1.* Oligopygus *sp. RGM 791 773, Eocene, tropical western Atlantic. (A) Apical view. (B) Oral view. (C) Lateral view; anterior to right. Scale bar represents 10 mm. Specimens uncoated as this would have masked much of the remaining morphological data still apparent after polishing.

four gonopores" (Figure 1A).

· "Petals well developed, open distally, anterior petal III longest, posterior pair (V & I) shortest" (Figure 1A).

· "Peristome subcentral … in deep transverse depression or trough" (albeit largely obscured by limestone; Figure 1B).

· "Periproct inframarginal, midway between peristome and posterior margin" (Figure 1B).

· "Tubercles small, irregularly arranged both adorally and adapically" (best seen in Figure 1B, C).

The oligopygids are an extinct sister group to the clypeasteroids, such as the sand dollars (Mooi 1990), that are limited geographically to the Caribbean, south-east USA and Peru (Kier 1967, figure 23). They are similarly stratigraphically limited and are only known from the Eocene, having gone extinct during the Eocene-Oligocene extinction events (McKinney *et al.* 1992). Examination of Smith and Wright (1989-2012) revealed no British Cretaceous echinoids that were close in morphology to RGM 791 773. Although, for example, the test outline of *Globator pratti* (Woodward) is similar, features including the position of the periproct on the posterior margin, the lack of a transverse trough about the peristome and inflated test demonstrate that it is unrelated (Smith and Wright 1999, pl. 119, figs 13-16).

The second specimen, RGM 791 774, is also presumed to be Eocene, although it represents a genus with a range of Eocene to Recent. However, it is conservative to assume that it comes from the same locality or area as RGM 791 773. *Eupatagus* sp. (Figure 2) is a spatangoid (heart urchin) genus with a global distribution at low to mid latitudes (Smith and Kroh 2011); it is particularly common in the Eocene of the Caribbean and southern USA (see, for example, Arnold and Clark 1927; Cooke 1959). The posterior is broken and the periproct was situated in this region. The following diagnostic features listed by Smith and Kroh (2011) are identifiable despite the loss of surface detail due to polishing:

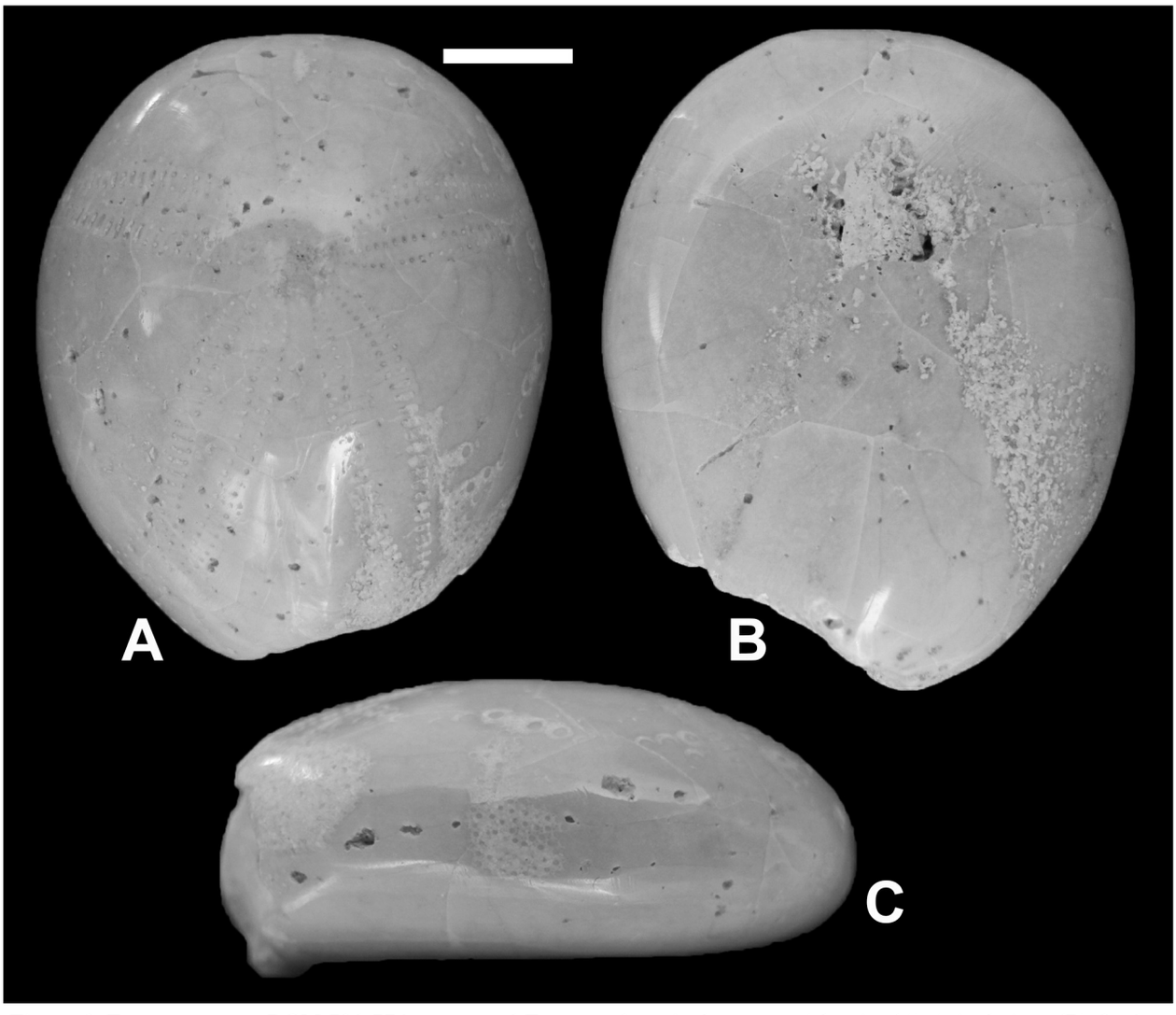


Figure 2. **Eupatagus** ***sp., RGM 791 774, presumed Eocene of tropical western Atlantic. (A) Apical view. (B) Oral view. (C) Lateral view; anterior to right. Scale bar represents 10 mm. Specimens uncoated as this would have masked much of the remaining morphological data still apparent after polishing.***

· "Test ovate without anterior sulcus" (Figure 2).
· "Anterior ambulacrum narrow and flush; pore-pairs small, simple isopores" (Figure 2A).
· "Other ambulacra petaloid and flush. Petals distinctly bowed and tapering adapically" (Figure 2A).
· "Peristome large and kidney-shaped" (imperfectly seen in Figure 2B).
· "Some large primary tubercles differentiated within peripetalous fasciole in interambulacral zones" (compare small primary tubercles with those between petals; Figure 2C).

Again, comparison with the British Cretaceous echinoids revealed no close morphological similarity to any spatangoid taxon. For example, similarities to *Miotoxaster* cf. *obtusus* Lambert (Smith and Wright 2008, pl. 183, figs 1-4) are superficial, the latter taxon having a more flattened anterior, shallow anterior sulcus, a moderately broad anterior ambulacrum and a more inflated test which is narrower posteriorly.

Discussion

These specimens are demonstrably not from the Upper Cretaceous chalk. They bear no close comparison with any of the many irregular echinoids known from the Cretaceous of the British Isles (Smith and Wright 1989-2012) and are undoubtedly Cenozoic. One specimen is undoubtedly Eocene (*Oligopygus* sp.), the other probably so. If this is the case, they are most probably from the southeastern USA, where collecting, trading and selling fossils is more common than in the Antilles. That Jim Isted, a vertebrate palaeontologist, did not recognize this discrepancy is not surprising; it may be that the polisher was similarly misled. Indeed, if the true provenance has been recognized, they could have

been sold for more than the local chalk echinoids! Rather, the mistaken identity created an interesting holiday investigation for S.K.D. and no harm was done. Even though the stratigraphic information was faulty and the implied locality (Isle of Wight) out by several thousand kilometres, anyone purchasing one of these echinoids did gain an exotic specimen for their collection, but most probably unknowingly.

The relevance of this tale to museums is obvious. Specimens that are being bought for display need to have the best possible evidence of provenance. Reference to a recognized expert would be an extra check that the associated documentation of locality and horizon is at least plausible. This cautionary conclusion should apply equally to specimens bought for sale in your museum's gift shop.

Acknowledgements

I thank Mike Simms (National Museums of Northern Ireland) for his supportive review.

References

ARNOLD, B.W. and CLARK, H.L. 1927. Jamaican fossil echini. *Memoirs of the Museum of Comparative Zoology, Harvard* **50**, 1-75.

COOKE, C.W. 1959. Cenozoic echinoids of eastern United States. *U.S. Geological Survey Professional Paper* **321**, iii+106 pp.

DONOVAN, S.K. and ISTED, J. 2014. *Teredolites* Leymerie in the Lower Greensand Group (Cretaceous) of the Isle of Wight and the problematic ichnology of reworked clasts. *Proceedings of the Geologists' Association* **125**, 252-254.

DONOVAN, S.K. and LEWIS, D.N. 2004. Palaeoecology in the museum gift shop. *Proceedings of the Geologists' Association* **115**, 367-370.

KIER, P.M. 1967. Revision of the oligopygoid echinoids. *Smithsonian Miscellaneous Collections* **152** (2), 149 pp.

McKINNEY, M.L., McNAMARA, K.J., CARTER, B.D. and DONOVAN, S.K. 1992. Evolution of Paleogene echinoids: a global and regional view. *In* Prothero, D.R. & Berggren, W.A. (eds), *Eocene-Oligocene Climatic and Biotic Evolution.* Princeton University Press, Princeton, New Jersey, 349-367.

MOOI, R. 1990. Paedomorphosis, Aristotle's lantern, and the origin of the sand dollars (Echinodermata: Clypeasteroida). *Paleobiology* **16**, 25-48.

SMITH, A.B. and KROH, A. (eds). 2011. *The Echinoid Directory*. World Wide Web electronic publication. http://www.nhm.ac.uk/research-curation/projects/echinoid-directory. Accessed July 2014.

SMITH, A.B. and WRIGHT, C.W. 1989-2012. British Cretaceous echinoids. In nine parts. *Monograph of the Palaeontographical Society*, London, 754 pp.

RECONSTRUCTING RESEARCH NETWORKS: THE IMPORTANCE OF SIGNED OFFPRINTS

by Stephen K. Donovan

Donovan, S.K. 2014.. Reconstructing research networks: the importance of signed offprints. The Geological Curator 10 (2): 71-76.

The offprint is in decline as a means of scientific communication in the age of the pdf, but signed offprints are important sources of data in curatorial and historical research. In the example of Dr Charles Taylor Trechmann (1885-1964), a researcher who published only single author papers, with one exception, signed offprints reinforce our knowledge of his research network and ask questions. Recipients include authorities entrusted with describing certain specimens collected in the Antilles (L.F. Spath, T.S. Westoll, T.H. Withers), fellow conchologists (R.B. Newton) and Caribbean geologists (C.A. Matley), an F.R.S. who may have nominated Trechmann for fellowship and a seventh individual of unknown relationship.

Stephen K. Donovan, Department of Geology, Naturalis Biodiversity Center, Darwinweg 2, 2333 CR Leiden, the Netherlands. Email Steve.Donovan@naturalis.nl. *Received 8th July 2014. Accepted 14 August 2014*

Introduction

The offprint has been an essential part of late 19th and 20th century academic communication, although it has now largely been superseded by the pdf (Petroski 2014). The pdf has many advantages, including ease of storage and distribution. However, a pdf, or a hard copy printed from it, lacks the personal touch. Many authors (myself included) would, and still do, mail offprints with an embellishment, such as "To [you] with compliments, [signature of author]" or similar appellation. Apart from the loss of this personal touch that is the mark of the signed offprint, there is also a loss of information about networks between experts that a signed copy may provide. This is particularly felt by the curator and the historian of science, both of whom may gain valuable data on collections from the recognition of former academic research networks. Of the many potential ephemeral and marginal sources of information available to the historian (see, for example, Wyse Jackson 1999; Donovan and Riley 2013), the signed offprint is one of the most concrete.

Charles Taylor Trechmann (1885-1964), D.Sc., F.G.S., was a noted amateur geologist and archaeologist who lived in north-east England, and who was actively contributing to the scientific literature between about 1910 and 1960 (Donovan 1999, 2001a, b). Trechmann's principal research interests were the archaeology, and Permian and Quaternary geology, of north-east England, and the geology of New Zealand and the Antilles. Trechmann was independently wealthy, which enabled him to fund his fieldwork in exotic locales, and enabled him to buy adequate offprints of his papers published in leading journals, particularly *Geological Magazine* and *Quarterly Journal of the Geological Society*. He also wrote and privately published monographs on his own theory of mountain uplift.

I have been collecting Trechmann's papers and monographs for over 20 years as part of my study of the history of geological research in Jamaica. I have photocopies of many papers and some separates cut from the pages of journals by second-hand booksellers. But I also have some original offprints that were signed by Trechmann. These give clues to his geological network and provide insight into scientific associations of one prolific author, mainly between the two world wars.

Charles Taylor Trechmann - a biographical sketch

Dr. Carl Otto Trechmann (1851-1917), C.T. Trechmann's father, owned the Warren Cement Works, Hartlepool, County Durham, and was an amateur mineralogist. Charles Taylor Trechmann (Figure 1) studied chemistry and geology at Armstrong College, Newcastle-upon-Tyne, and at the Universities of Basel and Paris. He developed a research interest in the Zechstein of northeast England, particularly the reef palaeoenvironments,

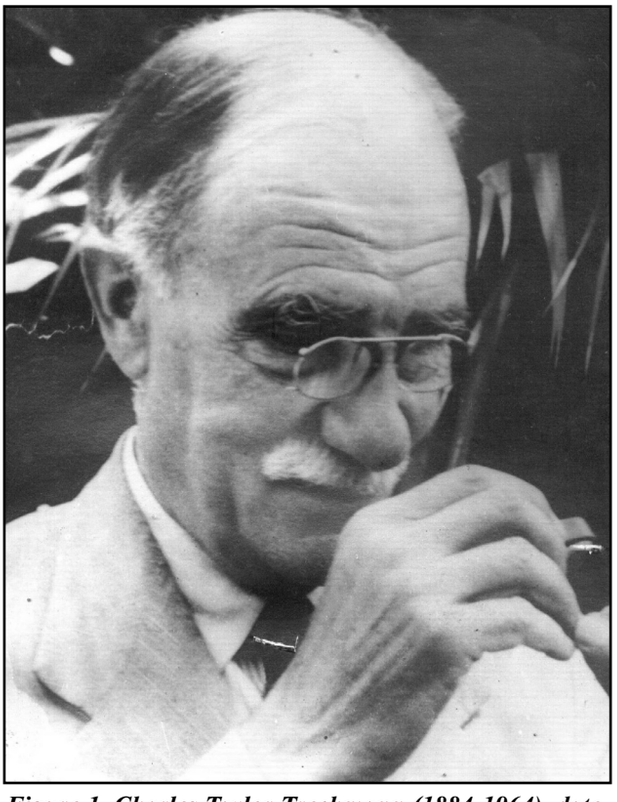


Figure 1. Charles Taylor Trechmann (1884-1964), date of image unknown (after Donovan 2008, fig. 1). Image provided by Mr. Ian Brown, former Curator, Geological Museum, UWI, Mona. Other images of Trechmann were published with an obituary in the British Northern Daily Mail, 20th February, 1964, p. 9, in Gage (1993, p. 10) and Donovan (2010, figs 3, 7, 8).

for which work the University of Durham conferred the degree of D.Sc.

Trechmann sold the family business to Imperial Chemical Industries about 1924. His research programme in the 1920s and 1930s involved work on the archaeology and geology of north-east England during the summer months. As winter approached, he returned to the geologically interesting islands of the Antilles.

Trechmann published over 80 books and research papers on geology and archaeology, including at least 40 on the Caribbean (Donovan 2001b). His individuality often led to an unorthodox approach to geology. The words of his obituarists - "refreshing lack of orthodoxy", "scholarship, character, and individuality" (Fleming and Westoll 1965), "stimulating and amusing", "unorthodoxy" and "humour" (Coates 1965) - give a glimpse of the character of the man. His acts of philanthropy to scientific institutions were many. Fuller published accounts of Trechmann's life include Donovan (2003, 2004, 2008, 2010).

Trechmann's signed offprints

Signed copies of Trechmann's offprints in the author's collection are addressed to seven recipients (Figure 2). Two are in a different handwriting from the others (Figure 2A, E) and it may be that these were signed by the recipient rather than Trechmann. Examples illustrated herein will be deposited in the archives of the Natural History Museum, London.

Fowler. The first on the list (Fig. 2B) remains a mystery. A. Fowler is not listed by Cleevely (1983), has not been exposed by web search and, if a geologist, I have been unable to discover any of his papers.

Matley. Dr. Charles Alfred Matley (1866-1947) was a career civil servant and worked in various departments within the Empire until he retired (Donovan 2010). He attended evening classes at the Birmingham and Midland Institute, and Mason Science College (=the new University of Birmingham from 1900); geology at Mason College was taught by Charles Lapworth. Matley graduated with an external B.Sc. with first class honours of the University of London in 1894 and subsequently researched local geology at the weekend; he is best remembered for his work on the Precambrian and Lower Paleozoic of northwest Wales (Anon 2006).

Matley retired in 1920. In 1921 Matley was appointed to be geologist to the second geological survey of Jamaica (1921-1924). He had no previous experience of Antillean geology and no previous experience as a full-time geologist. But Matley had a demonstrated expertise in mapping complicated terrains. The principal purposes of the survey, in which enterprise Matley was later joined by G. M. Stockley, seems to have been investigations of water supply and economic geology. Matley's principal contributions to Jamaican geology were published after the demise of the survey, namely his map and memoir of the geology of the Kingston district (Matley 1946, 1951), and his postulation of a Basal Complex in Jamaica and the Antilles (Matley 1929). The concept of the Basal Complex envisaged a geological structure analogous to that of the island of Anglesey and the nearby Lleyn peninsula. Such a theoretical extension of British geology across the Atlantic Ocean was not unique (Donovan 2013). Trechmann directly opposed the Basal Complex hypothesis with his Theory of Mountain Uplift in several papers and monographs (e.g., Trechmann 1936b, 1945, 1955, among others; Donovan 2008, 2010).

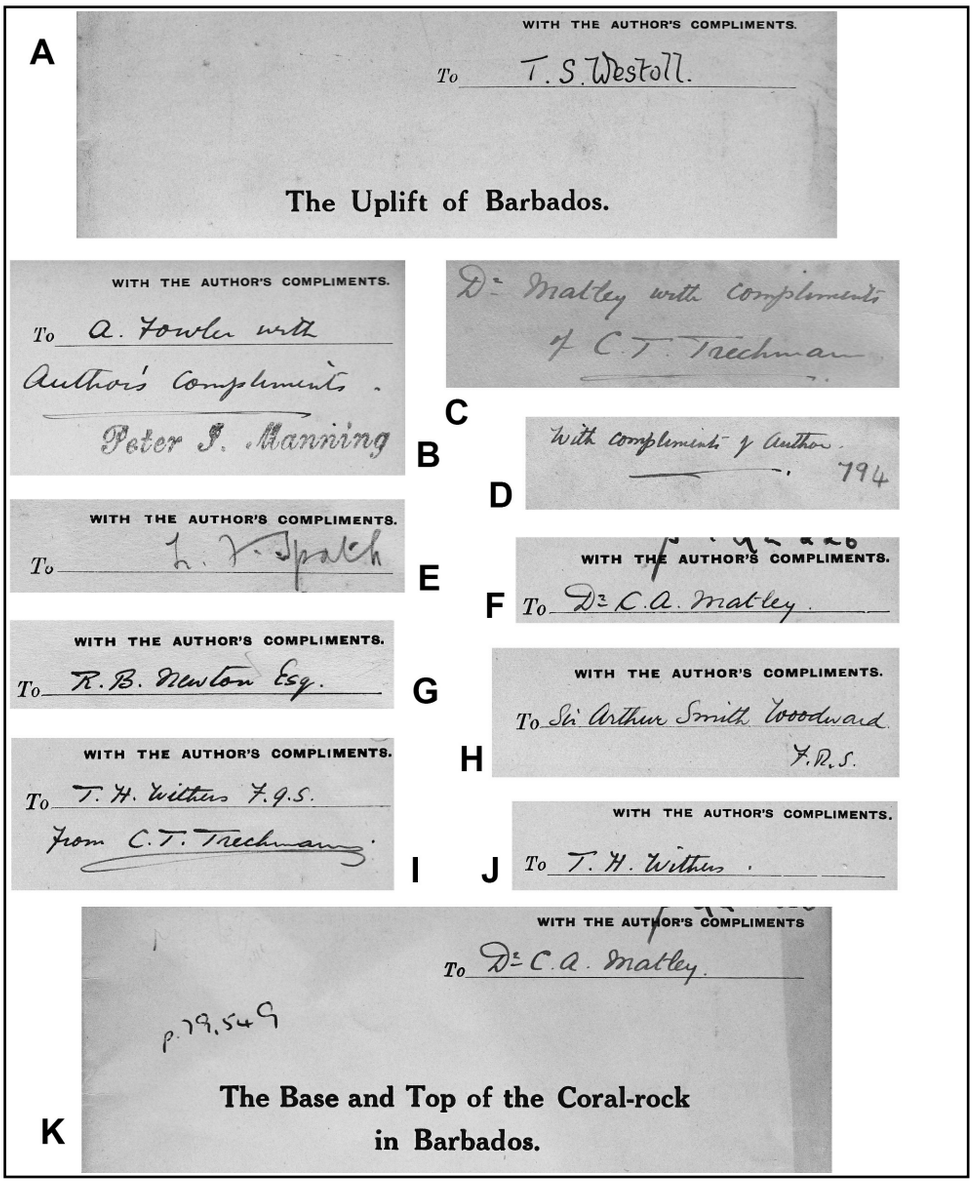


Figure 2. Details of signatures, etc., from offprints of C.T. Trechmann in author's collection. (A) Trechmann (1933). (B) Trechmann (1932); note that this paper had an appendix by T.S. Westoll (1932). (C) Trechmann (1936a). (D) Trechmann (1927). (E) Trechmann (1948). (F) Trechmann (1925b). (G) Trechmann (1923). (H) Trechmann (1925a). (I) Trechmann (1922). (J) Trechmann (1934). (K) Trechmann (1937).

Newton. Mr. Richard Bullen Newton (1854-1926), ISO, was an expert on Cenozoic molluscs and foraminifers (Cox 1926; Woodward 1926) who worked for the Geological Survey (1868-1880) and the Geology Department of the British Museum (part of the British Museum (Natural History) after the move to South Kensington) (1880-1920). He was a president of the Malacological Society (1910-1912) and Conchological Society (1913-1915). Trechmann's (1923; Fig. 2G herein) paper on the Eocene molluscs of the Yellow Limestone Group would presumably have informed Newton's own research interests.

Smith Woodward. Sir Arthur Smith Woodward, FRS (1864-1944), was one of the most notable palaeoichthyologists of the 20th Century. He was appointed an assistant at the British Museum in 1882, before graduating from Owens College, Manchester, and rose to become Assistant Keeper (1892) and Keeper of Geology (1901), retiring in 1924, the year he received the Wollaston Medal of the Geological Society. He received many other awards and served many scientific societies, most notably being on the Council of the Geological Society for 33 years (President 1914-1916) (Woodward 1915; White 1946). But "His time [both before and after retirement] … was spent not only on fossil fishes … but also on other vertebrates, about which he knew much less" (Stearn 1998, p. 235). This refers mainly to Smith Woodward's notorious duping by Charles Dawson in the Piltdown Man hoax (Millar 1972; Russell 2003). Trechmann may have been nominated by Smith Woodward for Fellowship of the Royal Society, albeit unsuccessfully (Donovan 2010, p. 66). It may be in this connection that Smith Woodward received at least one offprint for reference (Trechmann 1925a; Fig. 2H herein) as an account of the Scotland Beds of Barbados seems outside his interests.

Spath. Dr Leonard Frank (Franz) Spath, FRS (1882-1957), was a leading expert on Mesozoic ammonoids. He was employed part-time by the British Museum (Natural History) and lectured at Birkbeck College, University of London (Wright 1958; Cleevely 1983, p. 272; Stearn 1998, p. 243). He described Upper Cretaceous ammonites from eastern Jamaica that were collected by Trechmann (Spath 1925). Trechmann (1927, pp. 33-34; Fig. 2E herein) included cephalopods in a tabulation of fossils (mainly molluscs) in the Upper Cretaceous shales of Jamaica.

Westoll. Professor Thomas Stanley Westoll, FRS (1912-1995), was a distinguished vertebrate palaeontologist, anatomist and geologist (Patterson and Fortey 1999; Turner 1999). He was J.B. Simpson Professor of Geology at the University of Newcastle from 1948, and a Murchison Medallist and president of the Geological Society (1972-1974). Yet he first knew Trechmann when a schoolboy at West Hartlepool Grammar School. Trechmann was a frequent visitor to the school, taking groups of students into the field for an afternoon in his Rolls Royce (Patterson and Fortey 1999, p. 534). Westoll's (1932) petrological appendix to Trechmann (1932) was his first publication, written while Westoll was an undergraduate at Armstrong College, Newcastle upon Tyne.

Withers. Mr. Thomas Henry Withers (1883-1953) worked as a palaeontologist at the British Museum (Natural History) from 1898 to 1944 (Stearn 1998, pp. 239-240). He was an expert on fossil crustaceans, particularly barnacles. Trechmann supplied Withers with fossil crustaceans from the Antilles which led to a series of pioneering papers (Withers 1922, 1924a, b, 1926a, b, 1927).

Discussion

This list of recipients of Trechmann's offprints is undoubtedly incomplete; rather, I prefer to emphasize how much information is provided. Most of the names on the list were notable palaeontologists, some of which received specimens from Trechmann which were described, or, in the case of Matley, significant figures in the history of Caribbean geology (Donovan 2010). To this list may be added Denys B. Smith (1929-2007), who was a noted expert on the Permian of north-east England and is known to have received a full set of Trechmann's offprints from the author (McClean 2008).

Further concrete data on Trechmann's research network are provided by authorities who described significant specimens that he collected, additional to those mentioned above (Spath, Withers). Other notable recipients of Trechmann's munificence were Herbert Leader Hawkins, FRS (1887-1968) (University College Reading), who described Jamaican fossil echinoids (Hawkins 1923, 1924, 1930; Donovan and Lewis 1993), and Henry Dighton Thomas (1900-1966) who documented sponges and a coral from the Upper Cretaceous of northern Trinidad (Thomas 1935).

One source of information for the associations of most authors is co-authorship, but Trechmann was unusually independent in his studies, writing but one joint paper (Trechmann and Woolacott 1919; Donovan 2001b). When he worked closely with another researcher, such as Westoll (see above), they published separately, albeit in close juxtaposition (such as Trechmann 1932; Westoll 1932). In this example, Westoll's paper forms a petrological 'appendix' to that of Trechmann.

To these records must be added Trechmann's undoubted myriad, but now anonymous, acquaintances at the Geological Society and British Association. Trechmann was also well known to, but not necessarily well-liked by, the officers of the post-war Geological Survey Division in Jamaica (Chubb and Williams 2010). He made generous bequests to, for example, the Geological Society and the British Museum (Natural History) (Donovan 2010, p. 66). That he was generous with specimens was demonstrated to the author when, as a lecturer in geology at the University of the West Indies in Jamaica, I was amazed when I found a tray of pluricolumnals of the British Permian crinoid '*Cyathocrinites*' *ramosus* (Schlotheim) in the collections, donated by Trechmann; I had redescribed this taxon a few years earlier (Donovan *et al.* 1986).

Conclusions

The known recipients of Trechmann's offprints are a mixed bag. Four are predictable, either as co-workers who published on material that Trechmann had collected in the Antilles (Spath, Thomas, Westoll) or a fellow worker on Jamaican geology (Matley). Sir Arthur Smith Woodward may have been expected to nominate Trechmann for fellowship of the Royal Society. Newton was a fellow worker on fossil molluscs. Only Fowler remains unknown, for now, but, in the way of such enquiries, is always likely to be exposed if not by research, then by serendipity. All add detail to our knowledge of a notable amateur

geologist and archaeologist who worked mainly on his own, not in a research group.

Acknowledgements

I thank Mike Simms (National Museums of Northern Ireland) for his supportive review.

References

ANON. 2006. The Harlech Dome. *Geology Today* **22**, 95, 97.

CHUBB, L.J. and WILLIAMS, J.B. 2010. Professor Verners Aleksandrs Zans (1904-1961). *In* Donovan, S.K. (ed.), *Jamaican Rock Stars, 1823-1971: The Geologists who Explored Jamaica.* Geological Society of America Memoir **205**, 79-101.

CLEEVELY, R.J. 1983. *World Palaeontological Collections*. British Museum (Natural History) and Mansell Publishing, London, 365 pp.

COATES, A.G. 1965. Obituary of Dr. Charles Taylor Trechmann, D.Sc., F.G.S. *Journal of the Geological Society of Jamaica* **7**, 48-49.

COX, L.R. 1926. Obituary. Mr. R.B. Newton, I.S.O., F.G.S. *Geological Magazine* **63**, 144.

DONOVAN, S.K. 1999. An annotated bibliography of papers on the geology of northeast England by Charles Taylor Trechmann: Part 1 - Quaternary. *The Vasculum* **84** (3), 4-18.

DONOVAN, S.K. 2001a. An annotated bibliography of papers on the geology of northeast England by Charles Taylor Trechmann: Part 2 (conclusion) - mainly Permian. *The Vasculum* **86** (1), 37-43.

DONOVAN, S.K. 2001b. The publications of Charles Taylor Trechmann (1885-1964), a notable amateur geologist from the northeast of England. *The Vasculum* **86** (3), 21-25.

DONOVAN, S.K. 2003. Charles Taylor Trechmann and the development of Caribbean geology between the wars. *Proceedings of the Geologists' Association* **114**, 345-354.

DONOVAN, S.K. 2004. Trechmann, Charles Taylor, pp. 249-250. *In* Matthew, H.C.G. & Harrison, B. (eds), *Oxford Dictionary of National Biography*, *Volume 55, Tonson-Usher*. Oxford University Press, Oxford.

DONOVAN, S.K. 2008. The 'Forbidden Theory of Mountain Uplift' of Charles Taylor Trechmann (1884-1964): a tectonic theory of the 1950s in context. *Geological Journal* **43**, 605-619.

DONOVAN, S.K. 2010. Three points of view: Wendell P. Woodring (1891-1983), Charles A. Matley (1866-1947), Charles T. Trechmann (1884-1964), and Jamaican geology in the 1920s and 1930s. *In* Donovan, S.K. (ed.), *Jamaican Rock Stars, 1823-1971: The Geologists who Explored Jamaica*. Geological Society of America Memoir **205**, 59-78.

DONOVAN, S.K. 2013. Misinterpreting by localism: transposing European geology and tectonics onto Jamaica and the Antilles. *Proceedings of the Geologists' Association* **124**, 530-535.

DONOVAN, S.K., HOLLINGWORTH, N.T.J. and VELTKAMP, C.J. 1986. The British Permian crinoid *`Cyathocrinites' ramosus* (Schlotheim). *Palaeontology* **29**, 809-825.

DONOVAN, S.K. and LEWIS, D.N. 1993. The H.L. Hawkins collection of Caribbean fossil echinoids: annotated catalog of rediscovered specimens from the University of Reading, England. *Caribbean Journal of Science* **29**, 186-201.

DONOVAN, S.K. and RILEY, M. 2013. The importance of labels to specimens: an example from the Sedgwick Museum. *The Geological Curator* **9**, 509-514.

FLEMING, C.A. and WESTOLL, T.S. 1965. Charles Taylor Trechmann. *Proceedings of the Geological Society*, London **#1628**, 207-208.

GAGE, M. 1993. Charles Taylor Trechmann. *Newsletter of the Geological Society of New Zealand - Historical Studies Group* **6**, 10-12.

HAWKINS, H.L. 1923. Some Cretaceous Echinoidea from Jamaica. *Geological Magazine* **60**, 199-216.

HAWKINS, H.L. 1924. Notes on a new collection of fossil Echinoidea from Jamaica. *Geological Magazine* **61**, 312-324.

HAWKINS, H.L. 1930. pp. 215-216. In Trechmann, C.T. The Manchioneal Beds of Jamaica. *Geological Magazine* **78**, 199-218.

MATLEY, C.A. 1929. The Basal Complex of Jamaica, with special reference to the Kingston district. With petrographical notes by Frank Higham, M.Sc., A.R.S.M., F.G.S. *Quarterly Journal of the Geological Society, London* **85**, 440-492.

MATLEY, C.A. 1946. *Outline of the Geology of the Kingston district of Jamaica*. Institute of Jamaica, Kingston, published by the Crown Agents of the Colonies, London, 4 pp.

MATLEY, C.A. (ED. RAW, F.). 1951. *Geology and Physiography of the Kingston District, Jamaica*. Institute of Jamaica, Kingston, published by the Crown Agents of the Colonies, London, 139 pp.

McLEAN, S. 2008. Obituary. Denys Barker Smith 1929-2007. *Proceedings of the Yorkshire Geological Society* **57**, 131-132.

MILLAR, R. 1972. *The Piltdown Men*. St. Martin's Press, New York, 264 pp.

PATTERSON, C. and FORTEY, R.A. 1999. Thomas

Stanley Westoll 3 July 1912-19 September 1995. *Biographical Memoirs of Fellows of the Royal Society, London* **45**, 531-546.

PETROSKI, H. 2014. In memory of the offprint. *American Scientist* **102**, 14-17.

RUSSELL, M. 2003. *Piltdown Man. The Secret Life of Charles Dawson & the World's greatest archaeological Hoax*. Tempus Publishing, Stroud, Gloucestershire, 288 pp.

SPATH, L.F. 1925. On Senonian ammonites from Jamaica. *Geological Magazine* **62**, 28-32.

STEARN, W.T. 1998. *The Natural History Museum at South Kensington*. Natural History Museum, London, xxiii+414 pp.

THOMAS, H.D. 1935. On some sponges and a coral of Upper Cretaceous age from Toco Bay, Trinidad. *Geological Magazine* **72**, 175-179.

TRECHMANN, C.T. 1922. The Cretaceous and Tertiary question in Jamaica. *Geological Magazine* **59**, 422-431.

TRECHMANN, C.T. 1923. The Yellow Limestone of Jamaica and its Mollusca. *Geological Magazine* **60**, 337-367.

TRECHMANN, C.T. 1925a. The Scotland Beds of Barbados. *Geological Magazine* **62**, 481-504.

TRECHMANN, C.T. 1925b. The Northern Range of Trinidad. *Geological Magazine* **62**, 544-551.

TRECHMANN, C.T. 1927. The Cretaceous shales of Jamaica. *Geological Magazine* **64**, 27-42, 49-65.

TRECHMANN, C.T. 1932. Notes on Brimstone Hill, St. Kitts. Petrology by T.S. Westoll. *Geological Magazine* **69**, 241-258.

TRECHMANN, C.T. 1933. The uplift of Barbados. *Geological Magazine* **70**, 19-47.

TRECHMANN, C.T. 1934. Tertiary and Quaternary beds of Tobago, West Indies. *Geological Magazine* **71**, 481-493.

TRECHMANN, C.T. 1936a. Mesolithic flints from the submerged forest at West Hartlepool. *Proceedings of the Prehistoric Society for 1936, Paper* No. **7**, 161-168.

TRECHMANN, C.T. 1936b. The Basal Complex question in Jamaica. *Geological Magazine* **73**, 251-267.

TRECHMANN, C.T. 1937. The base and top of the coral-rock in Barbados. *Geological Magazine* **74**, 337-359.

TRECHMANN, C.T. 1945. *The West Indies and the Mountain Uplift Problem*. Privately published, Castle Eden, Co. Durham, 25 pp.

TRECHMANN, C.T. 1948. *The West Indies and the mountain uplift problem. Part II. Additional observations*. Privately published, Castle Eden, Co. Durham, 31 pp.

TRECHMANN, C.T. 1955. *The British Association for the Suppression of Science or A New Explanation of Mountain Uplift, Based on Lunar Gravitation and Ocean Pressure*. Privately published, Castle Eden, Co. Durham, 64 pp.

TRECHMANN, C.T. AND WOOLACOTT, D. 1919. On the highest Coal-Measures or "Zone" of *Anthracomya phillipsi* in the Durham Coalfield. *Geological Magazine* **56**, 203-211.

TURNER, S. 1999. Westoll, Thomas Stanley. *In* Singer, R. (ed.), *Encyclopedia of Paleontology*, *Vol. 2, M-Z*. Fitzroy Dearborn Publishers, Chicago, 1338-1341.

WESTOLL, T.S. 1932. Description of rock specimens from Brimstone Hill and three other localities in St. Kitts, B.W.I. *Geological Magazine* **69**, 259-264.

WHITE, E.I. 1946. Sir Arthur Smith Woodward [obituary]. *Proceedings of the Geological Society* **101**, xliii-xlvi.

WITHERS, T.H. 1922. On a new brachyurous crustacean from the Upper Cretaceous of Jamaica. *Annals and Magazine of Natural History* (series 9) **10**, 534-541.

WITHERS, T.H. 1924a. Some Cretaceous and Tertiary decapod crustaceans from Jamaica, *Annals and Magazine of Natural History* (series 9) **13**, 81-93.

WITHERS, T.H. 1924b. Decapod crustaceans from the Oligocene of Anguilla. *Annals and Magazine of Natural History* (series 9) **14**, 225-233.

WITHERS, T.H. 1926a. Barnacles of the *Creusia-Pyrgoma* type from the Pleistocene of Barbados. *Annals and Magazine of Natural History* (series 9) **17**, 1-11.

WITHERS, T.H. 1926b. Decapod crustaceans (*Callianassa*) from the Scotland Beds of Barbados. *Geological Magazine* **63**, 104-108.

WITHERS, T.H. 1927. *Ranina trechmanni*, a new Cretaceous crab from Jamaica. *Geological Magazine* **64**, 176-180.

WOODWARD, B.B. 1926. Obituary. Richard Bullen Newton, I.S.O., F.G.S., etc. *Proceedings of the Malacological Society*, London **17**, 69-70.

WOODWARD, H.B. 1915. I.-Eminent living geologists. Arthur Smith Woodward, LL.D. (St. Andrews, Glasgow), F.R.S., F.L.S., F.G.S., F.Z.S., F.R.G.S., Keeper of the Department of Geology, British Museum (Natural History). *Geological Magazine* **52**, 1-5.

WRIGHT, C.W. 1958. Leonard Frank Spath. *Proceedings of the Geologists' Association* **69**, 70-71. [Obituary.]

WYSE JACKSON, P.N. 1999. Geological museums and their collections: rich sources for historians of geology. *Annals of Science* **56**, 417-431.

GEOLOGICAL CURATORS' GROUP SURVEY 2014: RESULTS AND A VISION FOR THE FUTURE

by C. Giles Miller[1], Tim Ewin[1], Hannah-Lee Chalk[2] , Kathryn Riddington[3], Helen Kerbey[4], Cindy Howells[4], John Nudds[5], Matthew Parkes[6], Jim Spencer[7], Tony Morgan[8], Mike Howe[9], Emma Bernard[1], Sarah King[10] and Isla Gladstone[11]

Miller, C.G. *et al*. 2014. Geological Curators' Group Survey 2014: results and a vision for the future. *The Geological Curator* 10 (2): 77-92.

In early 2014 the GCG carried out an on-line survey to investigate: the present status of geological curators, potential networking with other groups, support levels for electronic delivery of our journal and newsletter, subjects requested for future workshops/training events, the need for a database of natural history collections, how to deliver skills sharing networks and future GCG activities. It would appear that most geological collections are managed by curators with additional subject specialist areas of responsibility but there is a core of experienced geological curators in the UK with responsibilities for large collections. Direct e-mailing and our JISCmail list are the best method for communication within our group. The largest overlap in our membership is with NatSCA but members listed 45 other organisations with 91% of the total responses welcoming closer links with other natural science collection organisations. A list of subjects are presented here that can act as a basis for planning future programmes and skills sharing networks. There were many requests for low-level training as well as for advice on specimen conservation issues. 74% would consider receiving a pdf and not hard copy of *Geological Curator* but this was higher for *Coprolite* (88%). Only 64% said that they see GCG as the first port of a call to answer questions on the management and use of geological collections. 'A louder voice for advocating geological collections' was considered the most important future role for the GCG. Finally 12 major action points summarising our proposed direction over the next three years are presented.

1 Department of Earth Science, Natural History Museum, Cromwell Road, London SW7 5BD, UK
2 Manchester Museum, The University of Manchester, Oxford Road, Manchester, M13 9PL, UK
3 Lapworth Museum of Geology, University of Birmingham, Edgbaston, Birmingham B15 2TT, UK
4 Amgueddfa Cymru - National Museum Wales, Cathays Park, Cardiff CF10 3NP, Wales, UK
5 School of Earth, Atmospheric and Environmental Sciences, University of Manchester, Oxford Road, Manchester M13 9PL, UK
6 Natural History Division, National Museum of Ireland, Merrion Street, Dublin 2, Ireland
7 3 Merlyn Court, Austin Drive, Didsbury, Manchester M20 6EA, UK
8 Clore Natural History Centre, World Museum Liverpool, William Brown Street, Liverpool L3 8EN, UK
9 British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham NG12 5GG, UK
10 York Museums Trust, Yorkshire Museum, Museum Gardens, York YO1 7FR, UK
11 Bristol Museum & Art Gallery, Queens Rd, Bristol BS8 1RL, UK. *Received 27th November 2014. Accepted 1st December 2014*

Introduction

In February 2014 we circulated and solicited responses to a Google Docs survey aimed at investigating stakeholder requirements from the GCG. The survey was not aimed specifically at GCG membership, but those managing geological collections or with an interest in the management of geological collections. We circulated an invitation to fill out the survey on both the GCG and Natural Sciences Collections Association (NatSCA) JISCmail lists, on our Facebook and Twitter feeds as well as by e-mailing all members that we have on our

database. This was aimed mainly at a UK and European audience but there are some members and subscribers to these lists outside Europe, mainly from North America. The Google Docs survey link was shortened to http://bit.ly/O2Ooeg by registering it on-line with Bitly (https://bitly.com/). This allowed us to download on-line statistics about the timing of visits to the link, country of origin of replies and therefore evaluate the more successful methods for dissemination of information to our members. Adverts placed on JISCmail, Facebook and Twitter were deliberately separated by at least 5 days so that we could assess the effect of various methods for communication.

The intention of the survey was to ask questions on the following broad topics: background of respondents, networking with other groups, delivering information by our journal and newsletter, subjects requested for workshops/training events, databases of natural history collections, skills sharing networks, future GCG activities.

The results were analysed as two subsets, one for data relating only to GCG members and another for the whole dataset. The results of the survey are presented here, with the full details (minus personal details such as e-mail addresses) published online with Figshare at http://dx.doi.org/10.6084/m9.figshare.1251302. The results are discussed and a future strategy for the GCG presented.

The survey questions

Background:

Do you manage geological collections? Y/N

If yes, what size are your geological holdings?
<500
500-1,000
1,000-5,000
5,000-10,000
10,000-100,000
>100,000

Do you or anyone else on your staff have geological training or background? Y/N

If yes, what is your/their employment status?
-Full time
-Part time
-Mixture of full and part time staff
-Volunteer
-N/a
-Other (please state)

What is your current status?
-Geological Curator
-Natural Science Curator of a collection that includes Geological specimens
-Researcher with interest in Geological Collections
-Retired
-Other (please state)

How long have you been managing geological collections?
< 1year
1-5 years
5-10 years
10-20 years
>20 years
n/a

Meetings:

Do you attend GCG Meetings and events? Y/N

If yes, which of the following? (multivalued answers possible)
-AGM
-Workshops/training sessions
-Study visits

If not, please indicate why? (multivalued answers possible)
-Not relevant to my job
-Too expensive
-Lack of support from institution
-Other (please state)

What would encourage you to participate more often in GCG events? Free text

Are there any subjects that you would like to see us cover as part of our programme? Free text

Publications:

Do you read *Geological Curator*? Y/N

Do you read *Coprolite*? Y/N

Subscriptions may need to be raised, but a reduced rate would be offered for people who only receive pdfs of publications. Would you consider subscribing to electronic copies of *Coprolite*? Y/N

Subscriptions may need to be raised, but a reduced rate would be offered for people who only receive pdfs of publications. Would you consider subscribing to electronic copies of *Geological Curator*? Y/N

Would you like to comment on our suggestion to deliver our publications electronically? Free text

What topics would you like to see covered in GCG publications? Free text

Other organisations:

Are you a member of the following? (multiple options possible)
-GCG
-NatSCA
-SPNHC
-HOGG
-Russell Society
-Other (please specify)

Would you welcome a closer relationship between the GCG and these other natural science collections organisations? Y/N

How would you like to see these collaborations happen (meetings, joint projects etc)? Free text

Would a database of natural science collections, for example an updated FENSCORE, be useful for your work? Y/N

Comments: Free text

Advice:

Do you see GCG as the first port of a call to answer questions on the management and use of geological collections? Y/N

If no, where would you normally go? Free text field

Which of the following would you most likely seek advice for? (put the following in order of preference)
-Providing valuations for insurance purposes
-Conservation issues
-Expert identifications
-Storage solutions

Are there any other areas not included above? Free text

How would you like to access such advice? (multivalues possible)
-Professional working parties ("Geoblitzes") organised by the GCG
-On-line list of experts to contact with their expertise listed
-On-line site where requests can be logged and an administrator decides who to delegate questions to?
-On-line factsheets
-Workshops or training courses
-Other (please state in comments)

Comments. Free text.

Would you be prepared to join a list of members willing to offer expert advice? Y/N
If yes, please leave your e-mail address for us to contact you. If you wish the answers in this questionnaire to remain anonymous then you can volunteer for the skill sharing database by e-mailing geologicalcuratorsgroup@gmail.com.

What subjects/areas of museum work would you be prepared to offer advice on e.g. collections management, mineral identification, fossil identification, hazards, conservation, display, outreach, digitisation? Free text

Future GCG activities:

How do you see the role of the GCG in the future? Please place the following in order of preference:
Organising study trips
Organising training seminars
Publishing ideas and advice in *Geological Curator*
Keeping members informed of latest happenings in geological collections management
Monitoring and providing support for collections/staff at risk
A louder voice advocating geological collections

Is there anything that the GCG are not currently doing that you would like to see us supporting? Free text

Thank you for taking part in this anonymous survey we hope to publish the results shortly.

Communication

Results

There were a total of 113 replies to the survey, half of whom responded after the initial requests over the two JISCmail lists. Facebook and Twitter adverts produced a much lower hit rate to the survey as did an e-mail sent out to our whole membership. During the time that the survey was live there were 215 hits on the bitly link so just over half of the visits to the survey form resulted in data being sent to us (Figure 1).

Discussion

The main communication outcome from this survey is that e-mail distribution lists such as the JISCmail list or mass e-mailing of our membership are key methods for communication within our group of specialists. The data is slightly skewed because this was the first method for dissemination of details of the survey so subsequent adverts using other media (Facebook, Twitter) may not have appeared to have been so successful. However, several respondents replied that JISCmail would be their first port of call for requesting specialist information about geological curation. Another reason may be the fledgling nature of the Twitter and Facebook accounts and the relatively low number of followers at the time of the survey. The recent SPNHC/NatSCA/GCG meeting in Cardiff is a very good example of how these new forms of communication have served to enhance the profile of the GCG. Although these formats may not be

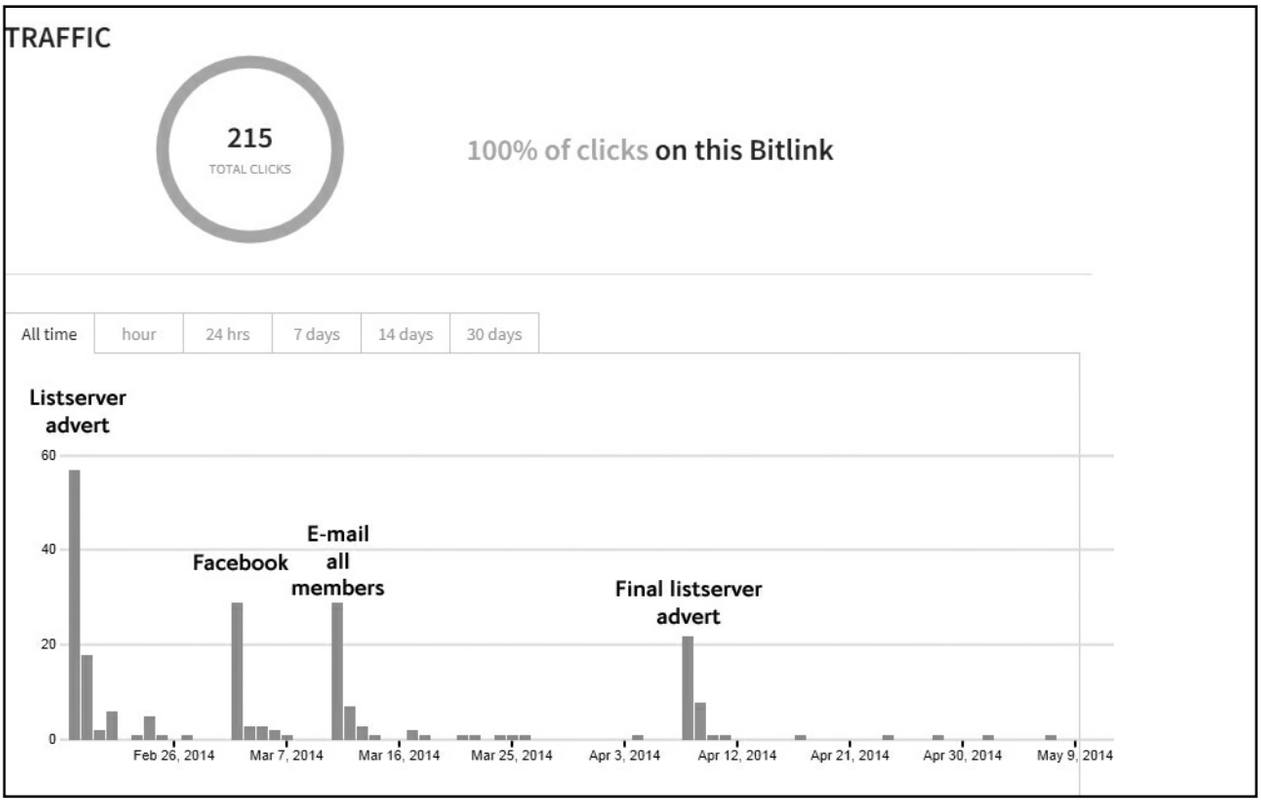


Figure 1. Traffic on the Bitly link used to disseminate the survey. The four main peaks relate to: initial listserver adverts (GCG and NatSCA), Facebook (6th March), e-mail to all members (11th March) and final reminder listserver advert (April 8th). Only 5 clicks came from two separate tweets.

reaching the majority of our membership, they are still a very effective method for wider communication of the activities of the GCG.

Future

- Maintain an up to date list of member e-mails for better communication with our membership.
- Encourage a wider engagement of our membership with the JISCmail list by analyzing who is currently subscribed and encouraging those not currently signed up to do so.
- Advertise the JISCmail list to those that are currently non-members.
- Encourage membership via the JISCmail to follow us on Twitter and Facebook.

Background of respondents

Results

74% of respondents replied that they manage geological collections with 33% Geological Curators, 16% Natural Science Curators of a collection that includes geological specimens, 8% Researchers with an interest in geological collections and 5% retired.

A total of 45 other job titles were given with the spread reflecting education, exhibition, conservation, preparation, museum directorial, visit management or technician roles.

88% of replies indicated that either the respondent or someone else on the staff has geological training or background.

88% of all respondents replied that their collections were over 10,000 specimens in size with 40% of the total saying that the number of specimens they managed exceeded 100,000.

56% replied that they had been managing geological collections for over 10 years with 33% of the total having managed geological collections for over 20 years. Only 13% had been managing geological collections for fewer than 5 years.

62% replied that their museums had full time Geological Curators and with 13% saying a mixture of full and part time, a total of 75% of museums had at least one full time geological curator. Part time accounted for only 6% but the number of respondents that mentioned volunteers was 11%. Other answers included retired (3%) and others (5% of total) replied that they were not employed as curators but gave advice, were honorary curators, museum trustees or freelance.

82% of respondents answered from the UK, but replies came from 15 different countries, mainly from Europe and North America (Figure 3).

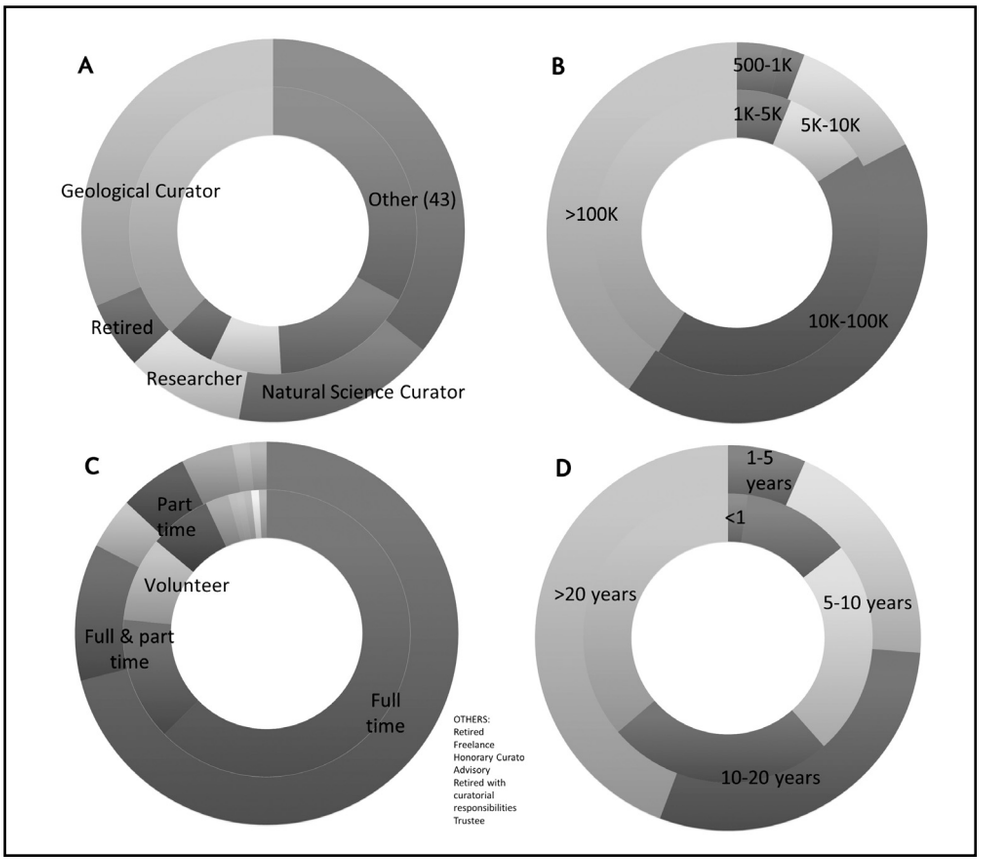


Figure 2. Job titles (A), collection sizes (B), employment status (C) and length of time managing collections (D) of respondents. The outer rings show GCG member data and the middle rings the dataset as a whole.

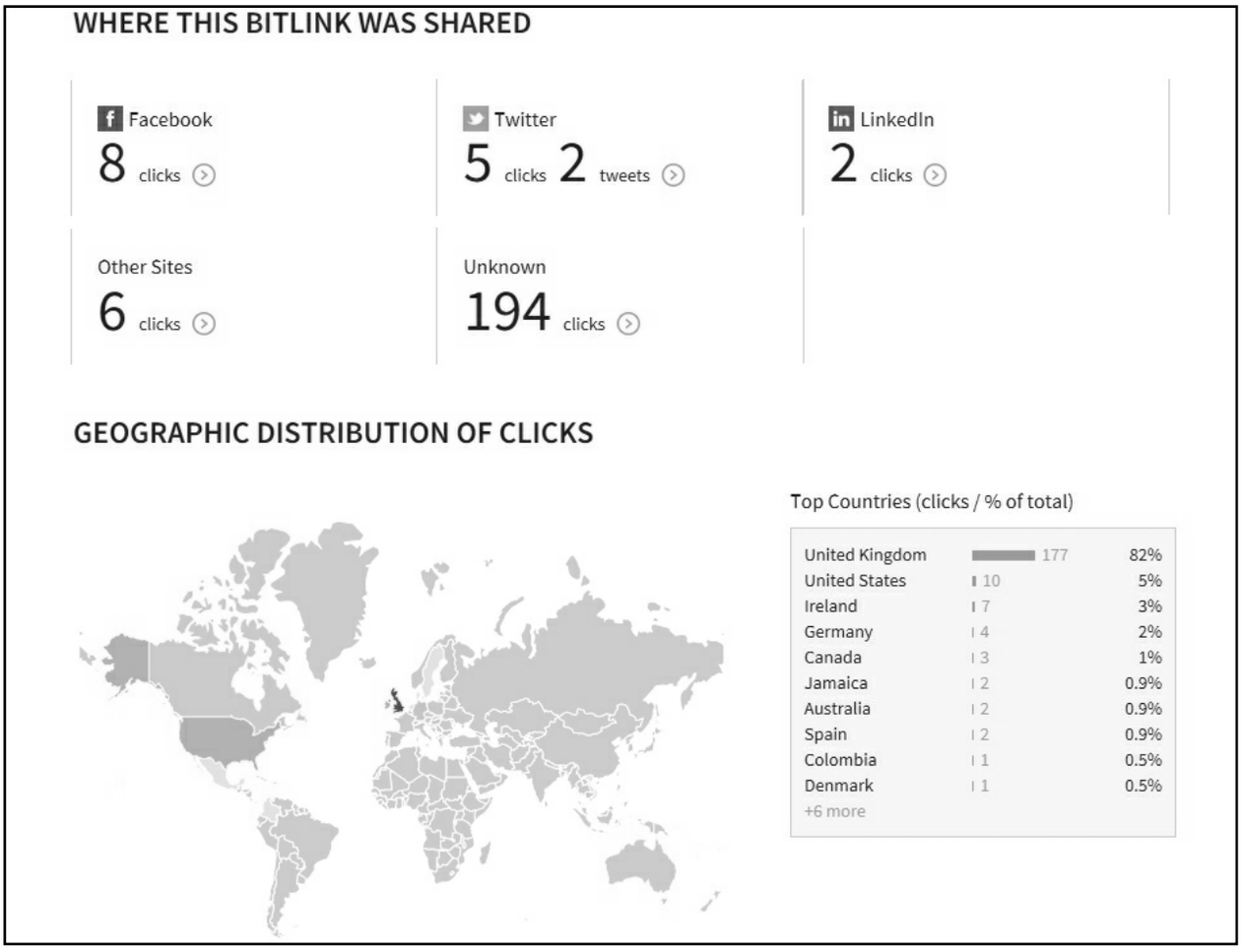


Figure 3. Distribution of hits on the Bitly link (http://bit.ly/O2Ooeg).

Discussion

The survey seems to have been filled in mainly by those who currently manage geological collections rather than those with an interest in managing geological collections and this probably reflects that the survey was sent directly to our membership. A total of 45 different job titles and a total percentage of 33% solely managing geological collections suggests unsurprisingly that most geological collections are managed by curators with additional subject specialist areas of responsibility. However, it was interesting to see that only 16% described themselves as natural science curators of a collection that includes geological specimens. Job titles are notoriously unstandardised for museum professionals with one person doing a similar role in another museum having a very different job title so this may not be significant. Alternatively it may just show that we failed to encourage this group of collections managers to respond. One trend that does come across clearly is that there is a core of experienced geological curators in the UK with responsibilities for large collections.

The request for status of staff included a multivalued option so not too much can be inferred from the data other than to say that 75% of museums had full time curatorial staff in charge of their geological collections. The numbers for volunteers (11%) were higher than for part time (6%).

Future

- Future surveys aimed at a non-specialist audience so that we can find out what they require from us.
- Make sure that the core of specialist geological curators are fully engaged with our activities so that they can pass on their knowledge and experience to future geological collections managers.
- Introduce Paypal to make it easier for new members to pay, particularly those from overseas. It will also make it easier for members to keep up to date with paying their subs.

Meetings

Results

Only 58% of GCG member respondents replied that they attend GCG meetings and events and the figure was only 42% when the whole dataset was considered. 47% have attended workshops/training sessions with AGM (33%) and study visits (20%) less well attended.
Multivalued answers available only to those who indicated that they do not attend GCG meetings showed that the main reason for non-attendance was travel distance (33% of all answers). Lack of support from institution (11%) and not relevant to job (10%) were next with 20% covering 17 different additional reasons. Interestingly, the most common additional reason outside of the tick boxes was that usually they would rely on colleagues to attend (5%). Lack of time and cost were both 8% with not receiving information on events only 5% of the total.

When free text answers were taken into account, the lack of time and money were much more to the fore particularly when all respondents were asked 'what would encourage them to participate more often in GCG events?' There were a range of answers given to the question 'Are there any subjects that you would like to see us cover as part of our programme?' and these have been incorporated into a set of subjects requested. These are reproduced in table 1.

Discussion

The total numbers of respondents who have attended a GCG event are disappointingly low, especially when the results included only GCG members. Only a third of respondents had been to a GCG AGM and as few as a fifth had been on a study visit. The free text descriptions perhaps give more details as to why this should be with the check box answers indicating that distance of travel is perhaps the overriding reason for non-attendance. Figure 4 gives details of the location of our UK membership and would indicate that a central location (Nottingham, Birmingham) is within easy reach of the majority of our membership. This does not take into account our overseas members so we should look into methods for engaging them with our meetings. It is interesting to see Integrated Digitized Biocollections (iDigBio) regularly holding web seminars so this may be an area to look into. It does not appear that the actual cost of the GCG meetings is putting people off, although the free text answers again would suggest that the total cost of travelling etc is a factor leading to lack of attendance. Lack of time available is also a key factor. Very few people cited lack of relevance of meetings as reasons for non-attendance, but there were a few answers that suggested that if we made our meetings more widely relevant then we might have greater attendances. It would have a knock-on effect with institutions more likely to support their staff to attend if meetings were more applicable and key skills directly transferrable to jobs. Requests for low-level training e.g. identifying minerals, managing geological collections, were conspicuous in their presence. However, the data is not quantitative so we should publish our list of possible subjects and see what the most popular events are before deciding on future strategies.

Figure 4. Dot map showing the location of our Members (6 Honorary and 190 Individual but excluding 97 Institutional).

Future

- We should aim to increase the percentage of members who attend our meetings. Some possible ways are listed here:
- Better advertising via JISC mail, *Coprolite*, GeolSoc newsletters, and other JISC mail (e.g. NatSCA, GEM, HOGG, etc.) with plenty of notice.
- Plan event programme over a year in advance, so that people can put dates in diaries.
- Have another survey to get some more quantitative data on what subjects people want covered based on the list given in Table 1.
- Choose subjects that are applicable to a wide audience.
- Send round the list of possible subjects to membership and other organisations who might participate in joint meetings. These might include HOGG, GEM, Geoconservation UK, University Museums Group and regional museum development groups as well as those that we currently engage with (NatSCA, SPNCH, SVPCA/SPPC, Royal Microscopical Society).
- Look into holding both specialist and non-specialist events.
- Hold most meetings in more central and accessible areas e.g. Birmingham, Nottingham.
- Re-run workshops so that more members have the opportunity to attend (ie we should schedule workshops for different dates for southern and northern members).
- Make a list of previous seminar and workshop titles so we can assess which were successful and re-run them.
- Record training and make the sessions available via the webpage, YouTube or do webinars so that members from further regions in the UK and abroad can participate.
- Post hand-outs from training onto our web page.
- Develop an online course (MOOC = Massive Open On-line Course).
- Look at the possibility of funded travel bursaries by applying for external funds.
- Make people attending meetings for the first time feel especially welcome so they encourage their colleagues to attend.
- Seek funds to support a travel bursary.

Publications

Results

The main questions asked related to whether we should deliver our publications electronically in future. When asked if respondents read *Geological Curator*, only 79% said yes although this was 97% when only GCG members were considered. The results were almost identical for the same questions about *Coprolite*. 71% of members (74% of whole dataset) answered that they would consider a reduced rate of subscription if a pdf and not hard copy of *Geological Curator* were sent to them. Answers on electronic publication were more conclusive when the same question was asked about *Coprolite* with 88% of members considering receiving a pdf and a reduced rate of membership. 12 members who answered no to *Geological Curator* going to pdf answered yes to *Coprolite* going electronic.

When comments in the free text field were taken into consideration, there would appear to be some members who wish to retain the option to receive hard copy of both *Coprolite* and *Geological Curator* with many comments very positive towards this potential move. Some questioned the long-term stability of keeping publications electronically and called for a more stable method for archiving.

Discussion

While it would seem that moving to providing pdf copies of *Coprolite* is inevitable, the message about our journal *Geological Curator* is not as conclusive and offering the chance to receive paper copies looks set to continue. Topics requested for inclusion in the journal include conservation related papers (see word

cloud Figure 5 below). Again these subjects have been added to the list of topics that could be offered as journal articles, workshop titles or future AGM topics (Table 1 - see page 90).

Future

- Electronic publishing of both *Coprolite* and *Geological Curator*.
- Members retain the option to receive paper copies of either.
- Make it clear where the money saved is being used so that value of membership is retained.
- Investigate methods for safe archival and delivery of electronic versions of both our newsletter and journal.

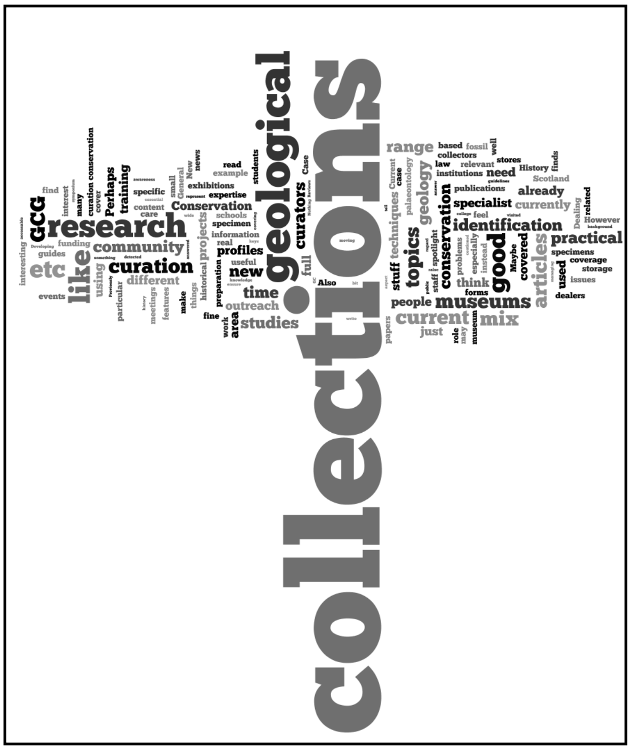


Figure 5. Word cloud taken from the free text request for information about subjects survey respondents would like to see covered in our journal.

- We have asked our membership so we should investigate how our 97 Institutional members might respond to a move to electronic publication.
- Re-establish an ICON rep on GCG committee so that we can strengthen our links with geological conservators.
- Encourage more participants in GCG meetings to submit journal and newsletter articles.

Networking with other groups

Results

The survey requested details of other groups to which members subscribe. These included, in order of most subscribed: GCG (72), NatSCA (45, of which 31 were both NatSCA and GCG members), no other groups (15), History of Geology Group (13), SPNHC (11), The Palaeontological Association (8), The MA (5), The Geological Society (4), The Geologists' Association (4) and the Society for Vertebrate Palaeontology (4) (Figure 6). 36 other groups were listed by survey participants but none of them more than once. Some interesting names occurred amongst these 36 including GEM (Geoscience for Environment Management) and SHARE.

When asked if those completing the survey would welcome a closer relationship between the GCG and these other Natural Science Collections organisations, 102 replied yes with only 10 saying no. This equates to a positive response from 91% of the total replies with this figure dropping slightly to 89% when only GCG members were considered. The most common method for delivering these links was by holding joint meetings. Engaging in collaborative projects was another suggestion that appeared on several occasions (Figure 7).

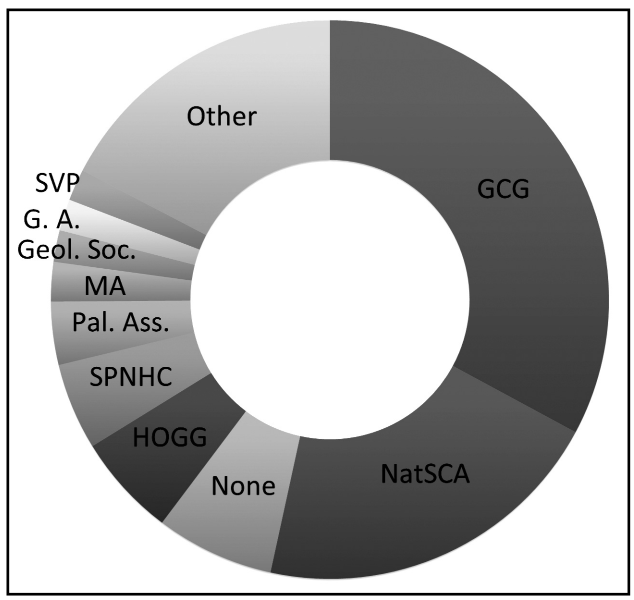


Figure 6. Pie chart showing the related groups that survey respondees are members of.

A question relating to a database of natural history collections was included here as it is a current project where NatSCA and GCG can collaborate. 86% said that such a database would be helpful for their work. The Word cloud included "Cleevely" and not so many chose to comment on FENSCORE.

Discussion

As suspected there is largest overlap in membership between GCG and NatSCA with 31 survey respondents reporting to be members of both.

Figure 7. Word cloud showing the free text field for the question 'How should we collaborate?'

Undoubtedly there are more than 31 members who subscribe to both organisations. The overlap between GCG and SPNHC is less well represented and this could be something that we could develop following the signing of the MoU between SPNHC, NatSCA and GCG at the 2014 SPNHC AGM in Cardiff. Other low numbers include The Geological Society and the Geologists' Association so we could try harder to forge links with these organisations. The Palaeontological Association, Society for Vertebrate Palaeontology and other fossil based organisations had a good representation and may indicate that our membership has more of a palaeontological than a mineralogical bias as strangely nobody admitted to being a member of the Russell Society. One possibility is that respondents felt that they had to limit their replies to the options given in the survey and did not mention other groups. However, there are certain trends that stand out relating GCG, NatSCA and HOGG and we should make make efforts to arrange joint meetings with these groups. We should also make efforts to forge links with SPNHC and the Geological Society despite the perceived lack of cross over between our membership.

A database of Natural History collections appears to be a popular move with survey respondents. Some suggested that we make use of Ron Cleevely's book in which he lists world Palaeontological Collections.

Future

- Set up a SPNHC, NatSCA, GCG working party following the signing of the MoU at the 2014 SPNHC meeting in Cardiff.
- Apply for grants to support networking.
- Forge stronger links with the Geological Society by participating in their activities such as "Earth Science Week".
- Contact all of the other groups mentioned with details of the GCG (what we can offer and how to join) and offer to make a link from our website.
- Make efforts to network with mineralogical groups.
- Work with NatSCA towards #naturedata project by supplying information about collectors and collections present in the Cleevely Book "World Palaeontological Collections".

Advice

Results

Amongst survey respondents, only 64% said that they see GCG as the first port of call to answer questions on the management and use of geological collections. Predictably the percentage amongst members was higher at 75%. A word cloud (Figure 8) for data relating to the question, 'where would you normally go for advice?' included 'NatSCA' and 'colleagues' as largest letters but quite a few people mentioned listservers under a number of different guises (JISCmail, GCG and NatSCA lists, listserver, e-mail list).

58% said they would consider becoming part of a skills sharing network and when only GCG members were considered, this figure was higher at 65%. 30 survey respondents left their e-mails so that they could be contacted at a later date to become part of a skills sharing network.

Four potential options were given for areas where advice may be requested. Most respondents said that providing valuations for insurance purposes was either unlikely or very unlikely to be requested. 'Conservation issues' and 'expert identification' were listed as either quite or very likely to be requested while 'advice on storage solutions' was mainly quite likely or unlikely to be requested (Figure 9). Details from the free text field asking for other subjects that could be included for advice have been synthesized into the list of topics (Table 1).

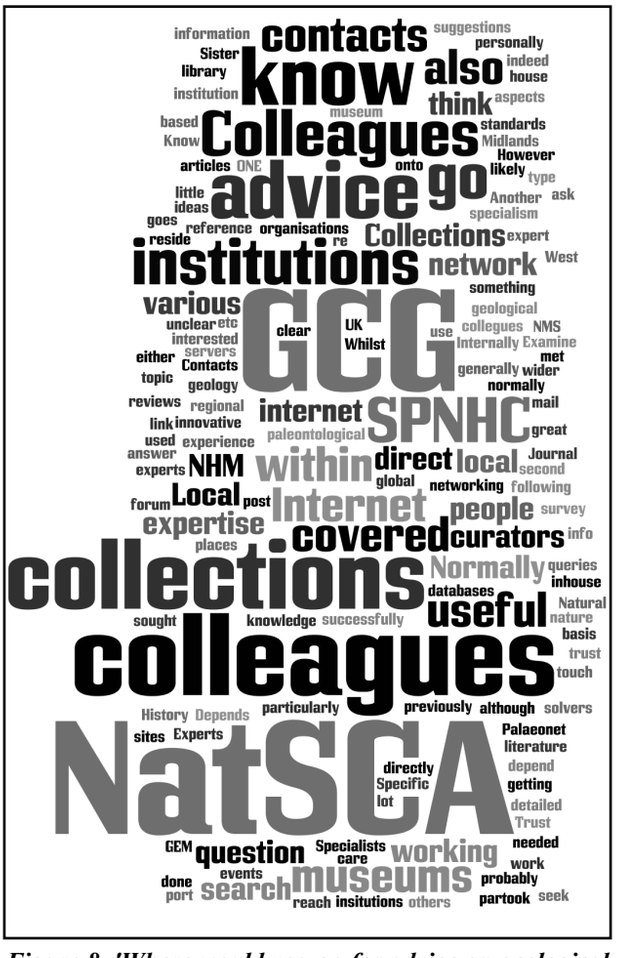


Figure 8. 'Where would you go for advice on geological collections management?' Word Cloud.

Three methods for delivering advice came out roughly equal with roughly half of the total respondents requesting 'on-line factsheets', 'workshops or training courses' or 'an on-line list of experts to contact with their expertise listed'. Other methods that scored less highly were 'Professional working parties ("Geoblitzes") organised by the GCG', an 'on-line site where requests can be logged and an administrator decides who to delegate questions to' and finally the 'I have no preference' category. Categories lists under 'other' included the JISCmail group, a forum monitored by GCG specialists, online instructional videos - e.g hosted by YouTube, our website or simply via a colleague who is a member.

Discussion

The percentage of people suggesting that the GCG would be their first port of call for answering questions relating to the management of geological collections is disappointingly low. We need to increase this percentage and creating a skill sharing network for advice on geological collections management would be the best way forward. The survey gives a clear steer that providing a list of members and their areas of expertise is the most popular way to provide this service, although it is clear that providing short and snappy advice leaflets would also be a good way of delivering advice quickly and easily. A number of other methods including providing instructional videos on YouTube have been suggested and these are clearly methods that museums are currently using to provide guidance or to advertise their projects or expertise.

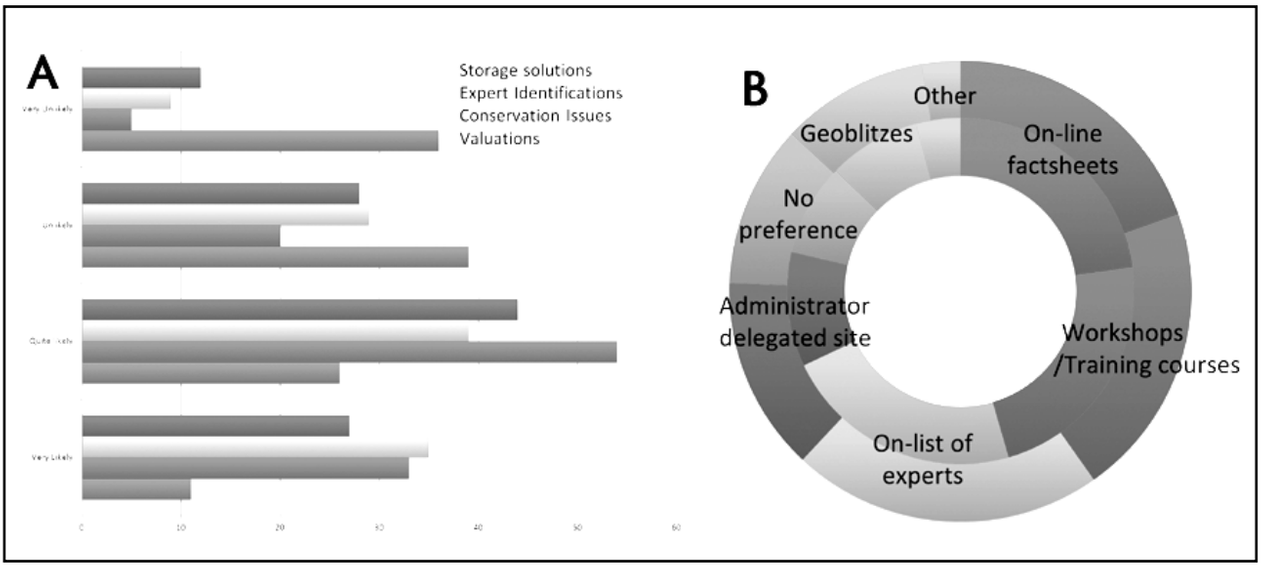


Figure 9. (A) Bar chart showing relative importance of advice subjects for the whole dataset. The details when GCG members were considered on their own was identical. (B) chart showing how respondees thought the advice should be delivered. The GCG members only data is in the middle ring and the data relating to the whole dataset on the outer ring.

It is interesting to see that providing valuations for insurance purposes scores so lowly on the scale of subjects for which advice is sought considering this was something suggested by the state and status report published in 2005 (Fothergill 2005). It raises an issue that this may still not have judged the exact requirements for our membership or those managing geological collections. The free text nature of this survey does not give very much quantitative information. Another survey using the list of skill and requirements identified by his survey might give more information about how many people want information about particular skills.

Future

- We need to increase the percentage of people who would come to us for advice on managing geological collections. Some suggestions to improve this would include:
- Set up a skills sharing network by circulating the list of topics (Table 1) and asking if people would provide support or need support under each of the categories?
- Develop our website so that there are clear pointers to how advice can be obtained (a new tab "Advice" has already been created).
- Host an on-line list of experts to contact with their expertise listed.
- Host on-line factsheets by publishing *Guidelines to Geological Curation* as bite sized pdfs on our website.
- Produce short YouTube videos on areas where most advice is needed.
- Continue to run relevant workshops or training courses.
- Run a mentoring scheme.
- Seek funds to support internships.
- Participate in initiatives that support short term exchanges or visits (e.g. UK Consortium of Natural History Museums).

Future direction

Results

Six different options were given for the question 'How do you see the role of the GCG in the future. Five of these rated 'important' or 'vital' for over 80% of respondents (Figure 10):
Organising training seminars
Publishing ideas and advice in *Geological Curator*
Keeping members informed of latest happenings in Geological Collections Management
Monitoring and providing support for collections/staff at risk
A louder voice advocating geological collections

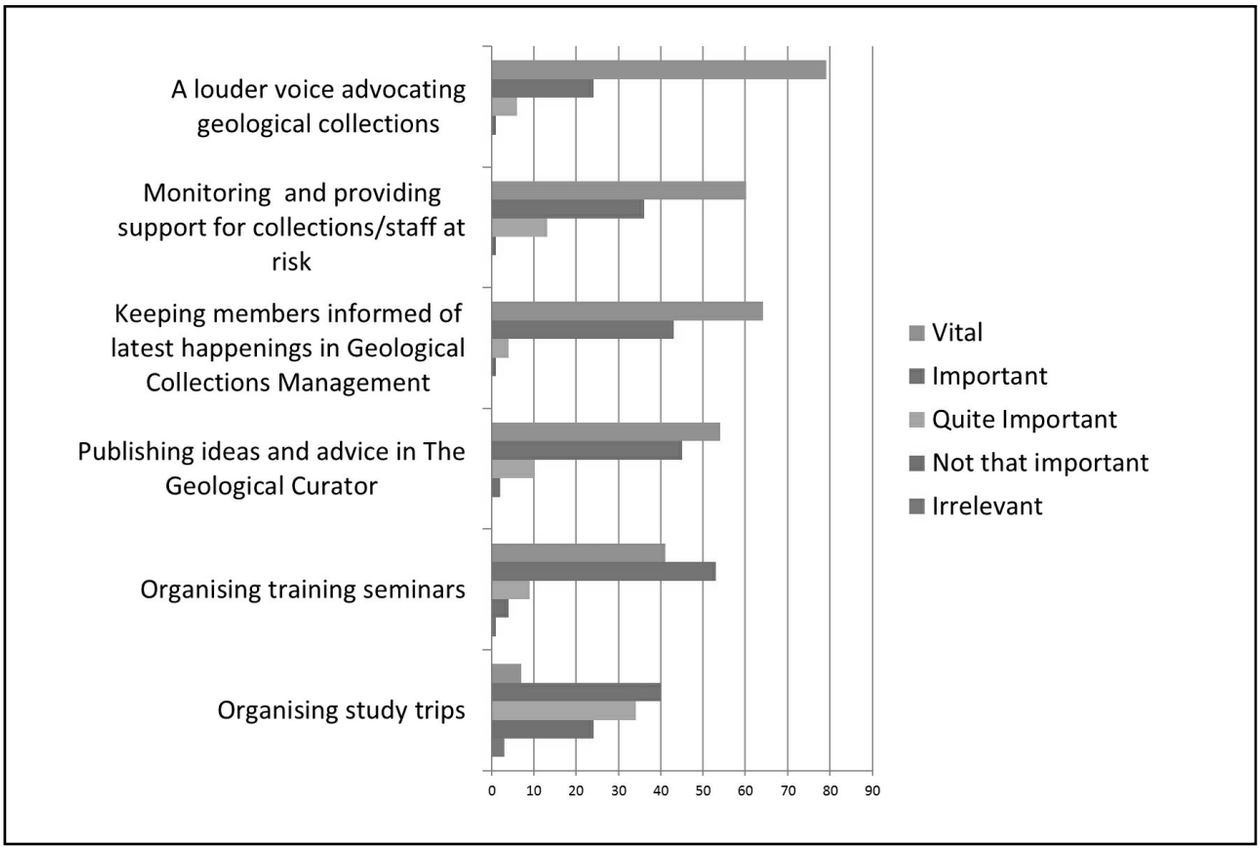


Figure 10. How respondees see the future role of the GCG. (Whole dataset)

The most obvious signal was that organising study trips was not considered vital whereas 'a louder voice for advocating geological collections' was considered the most important future role for the GCG. Those responding to the organising study trips question rated this function with a fairly even spread between not that important, quite important and important.

The free text data relating to other areas that the GCG should aim to be a positive voice advocating geological collections and being proactive at a higher level, lobbying ACE, MPs and local government. Many responses were positive about how the GCG are currently operating.

Discussion

The previous sections have covered many of the ways in which the GCG have been operating and will be operating in the future. It may be because these areas were covered in previous sections that comments were limited here. Many comments were positive, i.e. more of the same. However, the overriding subject for future activities relates to being an advocate for geological collections and for operating at a higher level where our voice can be heard more clearly by those making higher decisions about future funding. One area not picked up on by the survey that we consider to be important is encouraging outreach. Events such as Lyme Regis Fossil Festival, Scarborough Fossil Festival and GA Festival of Geology are important venues for engaging with younger geological collectors and the curators of the future.

Future

- Ensure that the any 'louder voice' is a positive one!
- Advocate geological collections by taking an active role in national initiatives advocating Natural History Collections (e.g. UK Consortium of Natural History Museums).
- Develop links with MPs by inviting them to Parliamentary Science Group meetings or launches such as for the Geodiversity Charter for England.
- Conduct a combined approach to lobbying (with NatSCA and SPNHC?) so that a cohesive message is sent about the value of collections and the need to get them used and funded.
- Lobby major bodies such as Arts Council, and the MA and seek funds from bodies HLF or ACE to support GCG activities.
- Encourage museums to host collections tours to open up behind the scenes collections.
- Set up a prize for young geological curators to encourage good standards of collections management.
- Facilitate dialogue between museums and professional fossil collectors.
- More blogs advocating the use of geological collections.

Conclusions

The previous sections have provided many suggestions for future direction and activity of the GCG based on the response from our 2014 survey. Here are 12 major action points that summarise our proposed direction over the next three years:

1. Encourage members to communicate with us via our JISCmail list and to follow us on Twitter and Facebook.
2. Use the table of potential topics presented here (Table 1) as a basis for another survey to gather quantitative data on meeting subjects and as basis for a skills sharing network.
3. Build on the signing of the Memorandum of Understanding (MoU) with SPNHC and NatSCA by collaborating and providing a combined and unified approach to tackling many of the activities mentioned in this report.
4. Investigate building better links with other closely related societies, particularly The Geological Society and HOGG.
5. Plan our meetings programme for at least a year in advance and encourage attendance by:
- Choosing subjects applicable to a wide audience
- Choosing easily accessible venues
- Developing a targeted advertising campaign
- Collaborating with other organisations to choose relevant subjects (initially SPNHC, NatSCA)
- Holding both specialist and non-specialist events
- Re-running successful events in different parts of the country
- Applying for money so we can award travel bursaries
6. Record training and make the sessions available via the webpage, YouTube or webinars so that members from further regions in the UK and abroad can participate.
7. Develop an on-line course (MOOC).
8. Publish both *Coprolite* and *Geological Curator* electronically as pdfs with paper copies still available on request.
9. Re-establish an ICON rep on GCG committee so that we can strengthen our links with geological conservators.
10. Increase the percentage of people who would come to us for advice on managing geological collections by:

- Hosting advice documents (training hand-outs, Guidelines for Geological Curation) on our website
- Setting up a skills sharing network based the list of topics presented here (Table 1)
- Run a mentoring scheme
- Seek funds to support internships

11. Become a louder voice advocating geological collections by employing a combined approach to lobbying (MA, Parliament, Arts Council).
12. Seek funds from bodies such as ACE to support GCG activities including outreach and skills sharing.

Acknowledgements

Justine Aw (NatSCA) is thanked for help in producing Figure 4.

References

Fothergill, H. 2005. 'The state and status of geological collections in United Kingdom museums: 2001' *The Geological Curator* **8**(3), 53-136.

TABLE 1

Skills Request no.	Skill requested title
1	**Early Career training/ Non-geological specialist resources**
1.01	· I have just been made responsible for a geology collection; I know very little about geology. What do I do?
1.02	· Geological curator intern program
1.03	· Mentors for early career palaeontologists/geologists interested in curation
1.04	· How to run a curatorial traineeship in geology
1.05	· Introduction into curating geological collections,
1.06	· How to become more involved in collections,
1.07	· How to become a geological curator
1.08	· Latin for non-classically trained Natural Scientists
1.09	· Crash course on mineral identification for non-mineralogists
1.1	· How to catalogue geology collections properly.
1.11	· Basic curation (especially for curators without a geology background).
1.12	· Information on how to answer enquiries with little knowledge.
1.13	· Internships, helping early stage curators with training/mentorship, collections tours
2	**Mid-Career/ Advanced Geological curation training**
2.01	· Managing volunteers in geology
2.02	· Managing geological collections for Natural Sciences curators.
2.03	· Moving geology stores.
2.04	· Case studies from museums with geology collections that are involved in a store move project
2.05	· Dealing with big and heavy objects
2.06	· Dealing with thin sections/caring for thin section collections
2.07	· Mineralogy and Igneous Petrology collections management
2.08	· Insurance valuation of geological specimens
2.09	· Social history for geology curators – HOGG?
2.1	· Training in devising storage systems, particularly for rock collections.
2.11	· Fieldwork training and active field collecting programs - curators may have little idea of how to log sections
2.12	· Geological site excavation
2.13	· Transport/couriering collections
2.14	· Collections tours program
2.15	· Keeping members informed of developments in museums beyond the area of collections management
2.16	· "how to" on geological specimen labelling
2.17	· Case studies from museums with geology collections that are involved in documenting undocumented collections projects.
2.18	· Doing geological collections reviews
3	**Legal and Ethical**
3.01	· Legal ownership of fossils found on private land or Crown Property
3.02	· Legality of geological specimens collected abroad
3.03	· The law as regards to institutions acquiring and/or paying for fossils especially with regard to the due diligence required to establishing true ownership.
3.04	· Ethics and the law as it applies to geological collections
3.05	· Fossil collecting and the law in Scotland
3.06	· Dealing with current problems with disposal for financial reasons

4	**General Collections issues**	
4.01	·	Collection Management issues
4.02	·	Centralised database for collections and collector profiles
4.03	·	Standard info page of where to find information on jobs - regularly updated online.
5	**Museum partnerships**	
5.01	·	How to get better use of collections by taxonomists, biographers, historians
5.02	·	Engaging with academia using geological collections for research, traditional and new areas
5.03	·	Links with research establishments and schools
5.04	·	Working with local geology/natural history groups
5.05	·	RIGS sites Conservation Research (collections and related museum research) Geoarchaeology
5.06	·	How to link up with RIGS groups.
5.07	·	Applying for grants to support networking.
5.08	·	Supporting amateur and professional individuals who care for their own private collections.
5.09	·	Creating dialogue between museums and professional/amateur fossil collectors who currently possess fossils wanted by museums.
5.1	·	Setting up regional links
5.11	·	"How to engage with" and information related to other small scale community organisations with collections
5.12	·	Engaging with Natural England (and other organisations), National Trust, English Heritage (and other organisations) the Geological Society of London/GA
6	**Conservation/preparation/sourcing of curatorial supplies**	
6.01	·	Palaeontological preparation
6.02	·	Packaging of objects
6.03	·	Recommendations for suppliers of geological curatorial supplies
6.04	·	Standard info page of where to find information on care of collections - regularly updated
6.05	·	long term environmental control
6.06	·	"how to" on collections storage
6.07	·	Conservation techniques
6.08	·	Curatorial Products
6.09	·	Care of particular collections or on particular subjects
6.1	·	Dealing with emergency situations with geological collections
7	**Digital collections creation/use/best practice**	
7.01	·	Cataloguing and relational databases
7.02	·	Connecting specimens and publications
7.03	·	Online databases
7.04	·	Database Development
7.05	·	Crowd sourcing for Geological Collections projects,
7.06	·	mass digitisation.
7.07	·	Microfossils Social Media Archives
7.08	·	Photography of fossils for digitised media
7.09	·	Digitisation of collections
7.10	·	Social media/online access: new ways of interpretation and learning - informal/formal
7.11	·	Digital media funding
7.12	·	Standardisation of collections databases and dictionaries
7.13	·	Web access to collections/Collections on -line
7.14	·	Blogs/twitter

8	Advocacy
8.01	· 'How to' improve advocacy for natural science collections and curatorial posts.
8.02	· How to raise awareness and use of geological collections within regional museums.
8.03	· Show the relevance of collections, not just about science but their relevance to the general community and its relevance to social history
8.04	· Training for senior museum managers to understand why NS collections are important and need to be looked after.
8.05	· Geological collections in peril - highlighting institutions to raise awareness what we are losing in terms of expertise and collections in different regions.
8.06	· New finds and rediscovered collections.
8.07	· Positive stories about how geological collections are being used.
8.08	· Operating a "higher levels" collections advocacy campaign
8.09	· contacting MPs/MEPS direct/lobbying
8.1	· Lobbying ACE, DCMS, etc.

9	Outreach/exhibition/community engagement
9.01	· geology and the new school curriculum
9.02	· "How to" on geological exhibitions
9.03	· Exhibition Planning
9.04	· Developing new displays with geology collections
9.05	· Case studies from museums with geology collections that are involved in re-display projects
9.06	· How to do geological educational programmes
9.07	· Making links with schools, colleges and other community groups.
9.08	· Engaging young people with geology.
9.09	· Exhibition design
9.1	· Engaging with scientific debate, e.g. climate change
9.11	· Social media online access new ways of interpretation learning - informal/formal
9.12	· Museum events (planning of and delivery),
9.13	· Geological outreach in the community.
9.14	· How to do a 'show and tell'.

10	Fund raising
10.01	· Sourcing funds.
10.02	· Applying for grants to support networking.
10.03	· Securing external funding
10.04	· Standard info page of where to find information on grants - regularly updated online
10.05	· Digital media funding
10.06	· Winning grants by crowdsourcing

A WORKFLOW FOR DIGITAL PHOTOGRAPHY OF FOSSIL SPECIMENS

by Paul A. Selden

Selden, P. A. 2014. A workflow for digital photography of fossil specimens. The Geological Curator 10 (2): 93-97.

A workflow for digital photography of fossil specimens is presented, in the hope that it will provide helpful for those wishing to set up a facility or enhance their existing setup for illustrations of geological specimens.

Paul A. Selden, Department of Geology, University of Kansas, Lawrence, Kansas 66045, USA, and The Natural History Museum, Cromwell Road, London SW7 5BD, UK. *Received 20th October 2014. Accepted 9th December 2014.*

Introduction

Since the resolution of digital photography has increased over the years, a gradual change has been made from traditional, film photography to digital. Now that full-frame (35 mm) sensors with 24 megapixels and more have become both widely available and at reasonable cost, I have developed a workflow for getting the finest resolution out of fossil specimens, which now surpasses that obtainable by film photography. An additional impetus for this change has been the difficulty or inability to borrow specimens from some museums (e.g. in China), so that having a high-quality representation of the specimen in digital form is almost as good as having the specimen under the microscope, and frequently more convenient.

The protocol described here was presented at an iDigBio workshop in Michigan in 2013 (https://www.idigbio.org/wiki/index.php/Fluid_Preserved_Invertebrate_Imaging), and has been requested by numerous people. Here, I describe the workflow in the hope that some readers might find it useful. Of course, everybody has their own needs, budgets, and existing facilities, but it is hoped that there will be some useful ideas here. The protocol has served very well with the study of fossil arthropods of various kinds and preservational types. Moreover, one photograph produced using this workflow was honoured as one (out of 14) of Nature's Images of the Year 2010 (Van Noorden 2010).

Setup

There are two setups: the microscope (Figure 1) and a macrophotography setup on a copy stand. The protocol for the microscope is given here, together with notes on the macro setup and workflow, as appropriate.

In Figure 1, the labels refer to the items below:

A. Eyepiece cover; remember this to keep light from entering through the eyepiece.

B. Canon EOS 5D MkIII. This is a full-frame sensor DSLR. The MkII is also fine, as is any similar DSLR, but make sure that the camera allows for LiveView (the mirror flips up so that the image can be seen on the computer screen).

C. M42 screw adapter. Use the correct mounting adapter to enable fitting your camera body (in this case Canon) to the M42 screw thread on the phototube. Adapters are cheap from any photographic store.

D. Phototube. The Leica uses a series of tubes and includes a 10× eyepiece. The whole assembly fits onto a trinocular head. This assembly will also mount on a lateral photo tube.

E. I use Leica stereoscopes. Any microcope will do: when travelling, I carry the camera and phototube assembly (A-D), which will mount on any of the Leica M and DM series microscopes. The one shown is an M16; we also have M205C and DM2500M microscopes in the laboratory; the photo assembly can be transferred between them all. Make sure the iris diaphragm is wide open, any drawing

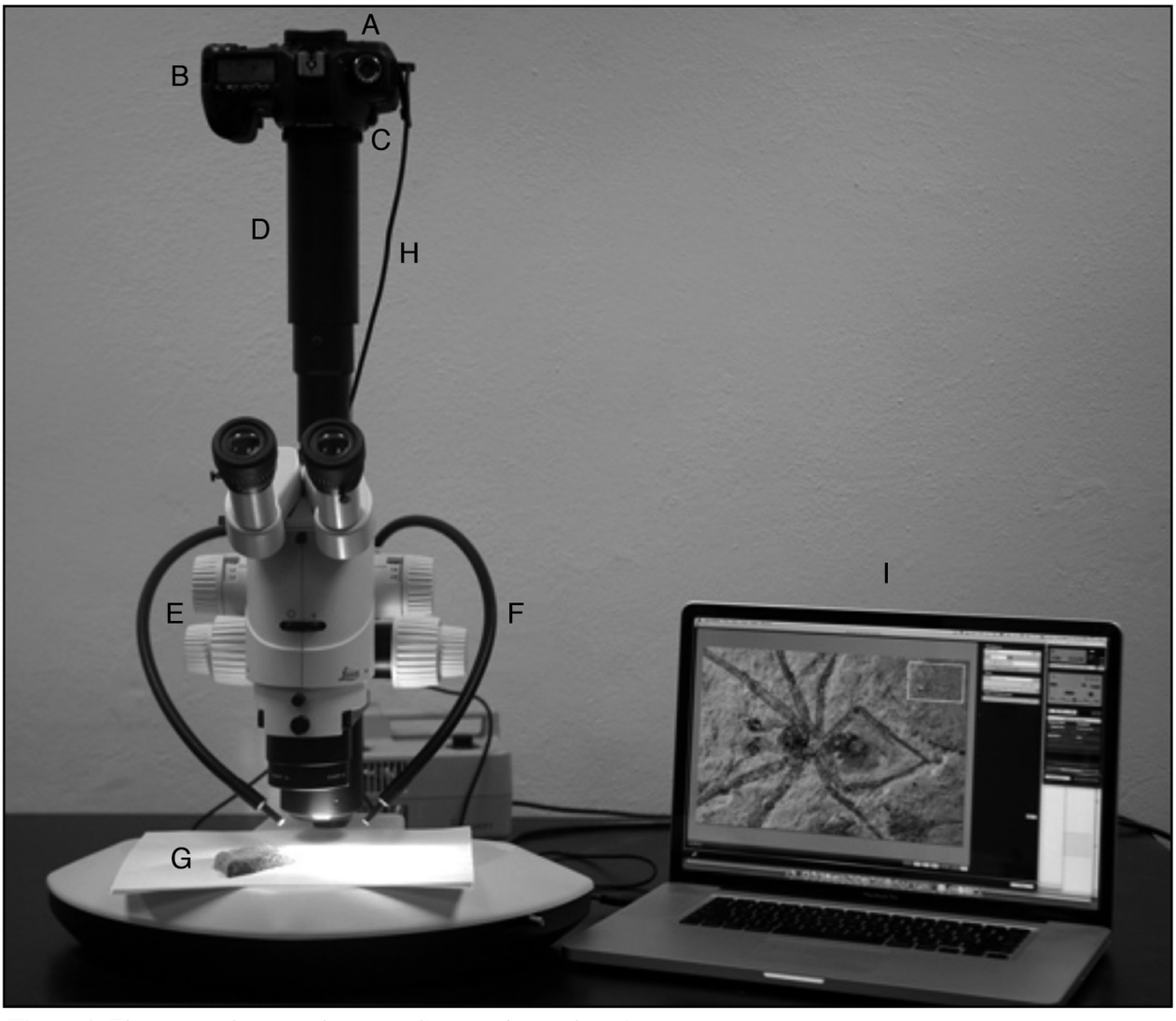


Figure 1. The macrophotography setup. See text for explanation.

tube is turned off, and (IMPORTANT) also cover the eyepieces and/or turn off the room lighting, otherwise you will get an image of any ceiling lighting superimposed on the photo. It took me years to discover this problem! Also, if using polarization, you do not want stray, non-polarized light entering the system.

F. Lighting: I use a variety of lighting setups: twin swan-neck (shown), and ring-illumination most commonly. For polarization on the stereoscope, I have a circular band of polarizing filter (cut by hand from a sheet) taped over the ringlight, and a photographic circular polarizing filter fits neatly between the ringlight and the objective lens. Rotating the polarizing filter to extinction provides higher definition and also cuts out any glare if immersion the specimen in alcohol. Both filters are available from photographic stores.

G. The specimen shown here is dry but, normally, immersion in alcohol increases the definition of the fossil from the rock. Sometimes, both alcohol immersion and polarization gives the best results. For a quick snap, it is possible to just squirt ethanol over the specimen, but for longer sessions, and to reduce glare from things breaking the surface, full immersion is better.

H. USB cable from camera to computer.

I. I use an Apple MacBook Pro laptop for capture and processing (more on that later). This machine has the maximum amount of RAM (16GB) and SSD drives, to manage large files in Photoshop.

J. Software: any image capture software will do for capture, including that supplied by Canon (shown in the picture). However, I prefer DSLR Assistant, which is dedicated Canon-Mac capture software. It is simple to use and does a few neat things. For example, if using it on a macrophotography setup, a stack of images can be taken automatically as the software will drive the macro lens remotely. It cannot, of course, do this on the microscope.

Workflow

1. Turn on the lighting, connect the cable from the camera to the laptop, and turn on the camera. This usually starts up the software automatically; if not, open the application and choose LiveView: a picture of what you have under the microscope will appear on the screen.

2. Camera is set to P; use a low ASA (100) for lowest noise (less of a problem these days), and the software works out the exposure. However, if there is any vibration, use higher ASA (400, perhaps). Photos are taken in Camera Raw. This allows for archiving at the best quality and widest color gamut. Occasionally, I do need to go back to these raw files.

3. Name your files and folders! Choose any system you want; I use the date and specimen number (also part or counterpart, if relevant).

4. Zoom in or out for the crop you want and focus the microscope. I normally take a preliminary shot of the whole specimen together with a mm scale alongside, for future reference (see later).

5. For most fossil spiders, I take a large mosaic of high-magnification shots which are then stitched together. So, starting at one corner (e.g. top left), take a shot. NOTE: you will need some shots of bare rock, e.g. between outstretched appendages and around the edges, in order to end up with a nice, rectangular final picture for publication.

6. For each shot, if not all is in focus, take several shots of the same area at different focus planes. Focus manually on the microscope or, if using a macro lens, this can be achieved automatically with the software. Later, these can be stacked.

7. Move the specimen gently to the next shot area, remembering that about a 40% overlap is necessary for stitching successfully. If necessary, take a stack again.

8. After all shots are taken, turn off LiveView, turn off the camera, and close the software.

9. Find your folder, in which will be all the shots taken. I now convert these from RAW to TIF. Photoshop can do this, but I use Capture One Pro, which is reckoned to be the best. It is a professional photography suite, similar to Aperture or Lightroom, written for the Phase One medium format digital cameras, but also available for Canon and Nikon DSLR. It is expensive, but if your educational institution has a contract with a software supplier, you can get it more cheaply. I batch convert all to 8-bit RGB TIF files (with this setup, they are each about 60MB in size). Store the RAW files somewhere safe!

10. Now begins the process of stitching everything together in Photoshop. First, find the stacks. Photoshop has a number of ways to stack and merge. Under File > Automate, you will find Photomerge. This only works for a few files, e.g. a short panorama, or 5 or 6 well-overlapped pictures of a specimen that would not fit under the microscope completely.

11. For stacking, it is usually safe to use File > Scripts > Load Files into Stack… Use the option Add Open Files to load your stack (if more files open, you can remove the unwanted ones), or else browse for the files you need. Make sure you click on the Attempt to Automatically Align Source Images option; this will align the images ready for merging. If this works (check the thumbnails), go to 13.

12. The fully manual method of stacking is to copy and paste all of the images you want to stack into one file (each one on its own layer). If one layer is a Background, it must be converted to a numbered layer by double-clicking on it in the Layers palette and renaming it (e.g. Layer 0). Then, select all layers in the Layers palette, and choose Edit > Auto-Align Layers… there are various options here; I just leave it at Auto and do not check the other boxes. This command will attempt to align the layers, just as in the automated method in 11.

13. Once the layers are aligned, they can be merged. Again, all layers you want to merge must be selected in the Layers palette (they will be already after the last step). Choose Edit > Auto-Blend Layers… The options here are: Panorama or Stack Images (choose stack for this step) and make sure you check Seamless Tones and Colors.

14. The result will be a series of layers in the Layers palette showing which parts of each layer have been used or deleted. It is worth looking through these to identify if any images are redundant. If all looks OK (the main window shows the result), then choose Layers > Merge Layers to merge them. You will probably see that the edges are a bit blurry; IMPORTANT: crop the image to exclude these artefacts.

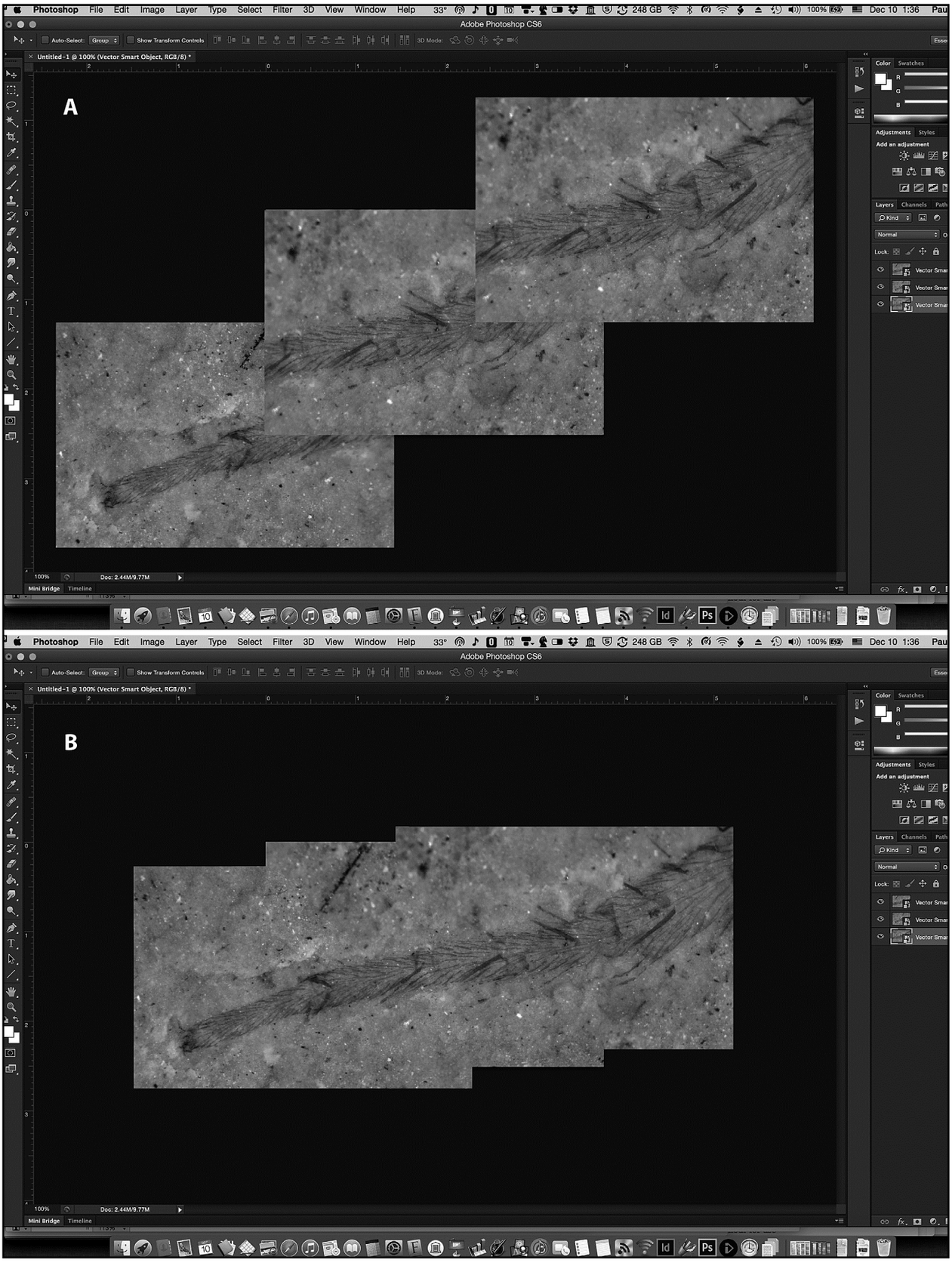


Figure 2. Photoshop screen shots showing the result of merging three shots of a specimen into a panorama. A before merge; B after merge.

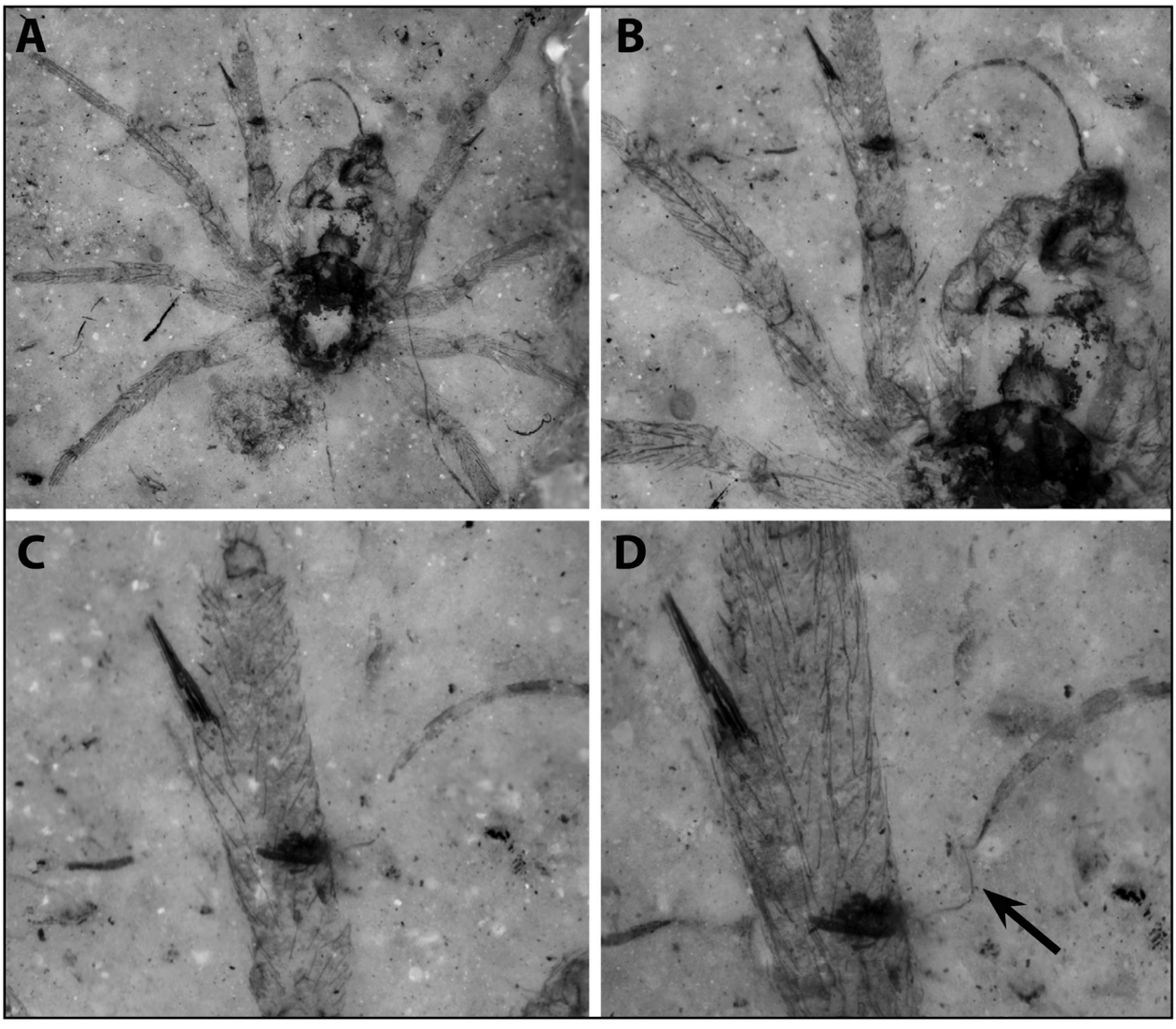


Figure 3. Photograph of a fossil plectreurid spider from the Jurassic of China, showing how the final composite picture with high resolution can be zoomed in to examine details. A whole specimen; B zooming in to the top left, showing male palp embolus and clasper on leg I; C zooming again, showing tip of embolus (right) and clasper on leg I (left); D composite picture merging part and counterpart indicates that clasper is composite of fused macrosetae (left) and tip of embolus (right, arrowed) is revealed to have a fine, helical flagellum (from Selden & Huang 2010).

15. Having done all the z-stacks in this way (NOTE: this can also be done in Helicon Focus or other stacking software), we now need to stitch the images together into a mosaic. File > Automate > Photomerge is unlikely to work on more than a few images (see above), in which case, do it manually. Copy and paste the first image onto the second and auto-align (see 12, above). Then select all layers (remember: none can be a Background) and choose Edit > Auto-Blend Layers… as in 13. This time, select Panorama, and make sure you check Seamless Tones and Colors. The result will be a small panorama of the two images.

16. Continue to add each image to the new panorama, merging, and saving after each step. See Figure 2.

17. Gradually, the whole specimen can be assembled into one large mosaic. Each image starts at about 60MB, so the final image can reach 1 or 2GB in size. You will need plenty of RAM and scratch disk space to manipulate this file.

18. The final image may show distortion around the edges. To remove this, I drop in the picture I took of the whole specimen with the scale ruler. Make this layer half-transparent (Opacity 50% on the Layers palette), so both layers can be seen. Resize and rotate the new layer with the whole specimen until it is at the size of the underlying panorama. If any distortion needs correcting, the panorama layer can be distorted back to its correct proportions by selecting the layer (Select All) and then carefully using Edit > Transform > Warp to get it into shape. In practice, I

find that there is really little or no distortion and this step is unnecessary, but it is worth checking.

19. Before removing the additional layer, create a new layer and draw a black line along 1mm (or whatever) of the ruler to provide a scale for the main panorama. Now, the imported layer can be deleted, and what remains is a panorama with a scale on a separate layer.

20. Now, the image can be cropped to remove the ragged edges. If there are still some patches without an image (e.g. at the edge where some background is missing), then use of the Clone Stamp, Spot Healing Brushes, etc. can be used to fill in. Adjustments to colour, tone, contrast, saturation, etc. can now be applied; also some sharpening if necessary.

21. A final result is shown in Figure 3.

Conclusion

The final, large file can be reduced in size to produce a whole-specimen illustration (Figure 3A), or zoomed in to reveal the finest detail, nearly as good as having the original specimen under the microscope. Crops can then be used as illustrations of details (Figure 3B,C). Moreover, part and counterpart can be superimposed (with one reversed) and aligned to provide a view of the complete specimen. In the example given here, this allowed the discovery of a fine, helical tip to the male spider's palpal embolus (Figure 3D).

Acknowledgements

I thank Gil Nelson (Florida State University) for encouragement.

References

VAN NOORDEN, R. (ed.). 2010. Images of the year. *Nature* **468**, 1018-1023.

SELDEN, P. A. & HUANG, D-Y. 2010. The oldest haplogyne spider (Araneae: Plectreuridae), from the Middle Jurassic of China. *Naturwissenschaften* **97**, 449-459.

ROCKBAND - USING PARTNERSHIP WORKING TO PROVIDE ACCESS TO GEOLOGY COLLECTIONS

by Christine Taylor

Taylor, C. 2014. Rockband - Using partnership working to provide access to geology collections. The Geological Curator 10 (2): 99-102.

Many museums have geology collections which lie unused through lack of specialist staff and expertise. A partnership of five museums in south east England was formed to try and address this problem by commissioning a suite of geological activities that could be delivered by staff and volunteers with little geological knowledge. This local initiative was very successful, with targets for improved access to local geology collections being exceeded by over five times in the first year. The project model is one which could be applied more widely.

Christine Taylor, Keeper of Natural Sciences. Hampshire Cultural Trust, Chilcomb House, Chilcomb Lane, Winchester, Hampshire, SO23 8RD UK. *Received 6th November 2014. Accepted 10th December 2014.*

Introduction

Geology can be a challenging subject to interpret without specialist staff. Museum staff can inherit good quality displays, but delivering geology sessions based on the subject can be daunting. To try and address this problem a partnership was formed with the aims of pooling ideas and expertise to create a suite of geological based activities that could be delivered by non specialists.

The partnership, known as Rockband, has its origins in SLIME (Science Links in Museum Education), a network of museums in the south east region. Although a number of museums were initially interested in the project, several dropped out, through other commitments, before the preliminary bid stage, leaving Hampshire County Council Arts and Museums Service (now called Hampshire Cultural Trust), English Heritage Education Centre, Dover (specifically providing for the Osborne House site on the Isle of Wight); Canterbury City Museums and Galleries Service, Kent; Painshill Park, Surrey; Vale and Downland Museum, Oxfordshire as the five partners. In retrospect the smaller partnership made the project much more manageable and ensured that the resulting suite of activities was of very high quality.

Four of the five partners have geology collections, two with substantial collections. The diverse backgrounds of the individual members helped form the basis of the HLF bid and ensured that overall aims of the project had an even balance of geological / curatorial / educational requirements.

Aims of the Project

- To produce a series of mobile learning kits exploring the geological heritage of the south east region. These to include story telling resources/props, focussing on stories, poems, songs and folklore aimed at younger children, to provide a fun introduction to geology.
- To recruit and train 10 volunteers (2 per partner) in how to deliver relevant educational sessions using the new materials.
- To engage 450 participants through the education sessions, including primary school groups, adults, blind and partially sighted people.

The Rockband Kit

After identifying a wish-list of resources and outcomes, the partners successfully secured a grant of £47,250 from the Heritage Lottery Fund (Your Heritage Programme). The funding was used to commission a team of freelance consultants to help interpret the geology collections within the partnership in innovative and exciting ways.

The resulting kit comprised the following:

- A bespoke 'collector's box' of geological curiosities. These can be uses in facilitated sessions with schools as well as self led family and group activities (Figure 1).
- A Geology/Chemistry Kit with resources and a session plan relating to building materials.
- A series of cards entitled 'Think you've found a Fossil?' These illustrate some of the most commonly found fossil invertebrates in South East England, along with fascinating facts about them.

▪ A bespoke textile geological mat, one for each partner. Each mat, produced by textile artist Jenny Langley, contains pockets for fossils, flaps to explore, geological features and a story, with props, relating to the local area of each partner (Figures 2-5)

Figure 1. Children's Festival activity using a bespoke 'collector's box'.

Figure 2. Adult group working with a bespoke textile geological mat.

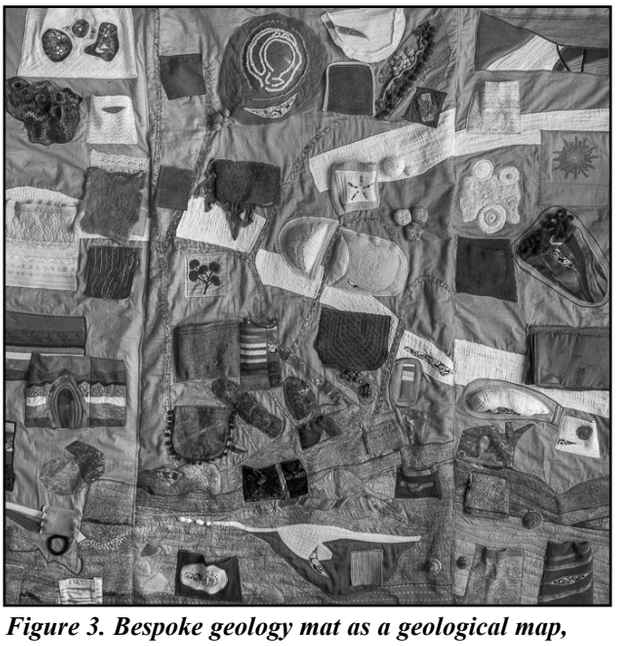


Figure 3. Bespoke geology mat as a geological map, with the Isle of Wight in bottom centre of view and Danebury Iron Age Hillfort top middle.

Figure 4. An outdoor session with a children's group and a large textile mat.

Figure 5. Bespoke textile mat of Vale and Downland geology.

Benefits from working in a partnership

1. Value for Money

The partnership made this an extremely cost effective project. The different backgrounds of the individuals on the team enabled the partnership to tap into geological, art based, story telling and educational expertise. It also enabled the exchange of non data material between the partners especially where gaps in the collections were identified. Although the collectors' boxes, story telling props and interactive mats were bespoke to each partner there were elements that were generic, such as the bases and some of contents of the collectors' boxes. The 'Think you've found a Fossil Card' and geo / chemical kits were generic as they used examples of fossils and rocks common to all partners.

2. Network of expertise

Working with partners provided a ready made network of expertise and experience which has been sustained long after the completion of the project. Each partner was able to contribute different skills and provide advice, enabling a collective and individual growing in confidence.

3. Improved access to geology collections

The initial target of 450 participants to be engaged through education sessions, including primary school groups up to adults, blind and partially sighted people was exceeded by over five times (2632) within the first year. Of these 96 were partially sighted, many of whom had never held a fossil before.

The Rockband Kits fit in perfectly with recent changes in the National Curriculum - Rocks (Year 3), All living things (Year 4), Evolution and Inheritance (Year 4) and has providing 'off the peg' geology sessions for schools.

In order to meet the demands of the brief partners had to seek out local geological expertise, which in itself has opened out new opportunities to work with local universities, geological societies and other geological initiatives. The project also provided staff with research time to get to know their collections.

One of the targets of the project was to engage 10 volunteers. By March 2014, 34 people had volunteered and been trained in the delivery of geological sessions. Twelve of these were new volunteers, many with a geological or science background.

Volunteers continue to be recruited, not just to deliver Rockband sessions, but to work on the geology collections. Making initial contact with other institutions and talking to geologists led to offers of volunteer work and student based projects.

Lessons learned from working in a partnership

A partnership can only work effectively when each partner pulls their own weight! Although frustrating when potential partners did not respond to requests for basic information, the initial planning stages identified potential issues and ensured that partners were fully signed up to the project. Even when a key member of staff at a partner museum left just before the delivery of Rockband activities, the remaining members were able to exceed the targets set out in the HLF bid.

Don't under estimate the amount of training required. The bespoke nature of some of the activities (mat and the collector's box) and the diverse backgrounds of the partners meant that the one training day wasn't enough time to become fully engaged with the product. Further training at partner sites was required to deliver the sessions confidently.

The geographical distance between the partners meant that meeting up on a regular basis became costly in both time and money. Communicating by email, telephone and setting up a closed group on Facebook proved to be effective methods of resolving this issue.

Factoring in enough time for consultants is critical, especially if commissioning bespoke products. If partners are in close proximity a visit to two partners in a day is realistic. In this instance only one site could be visited in a day.

Conclusion

Partnership working is an extremely effective method of working, especially in an area where more expertise or research into a subject area is required. The success of a good partnership relies on the members working closely with each other as a team. Costs can be kept down, especially where there is a generic aspect to the project and resources can be shared or duplicated. Finally, share the success of the partnership - this one has gained impetus since its completion and ensured that the geology collections are firmly embedded in the activity planning process.

References

Taylor, C. 2013. Rockband links fossils, fabrics and folklore. *Earth Heritage* **40**, 24-25.

Acknowledgements

The Heritage Lottery Fund (Your Heritage Program) for providing the funding. I would also like to thank the following for making the partnership work: Phil Hadland, Fran Lashmar, Sabrina Coxon, Dorothy Burrows and Ruth Howard. Special thanks to the consultancy team: Annette Shelford, Naomi Chapman, Marion Leeper and Jenny Langley.

GENERAL MEMORANDUM OF UNDERSTANDING

BETWEEN

THE NATURAL SCIENCES COLLECTIONS ASSOCIATION,

THE GEOLOGICAL CURATORS' GROUP

AND

THE SOCIETY FOR THE PRESERVATION OF NATURAL HISTORY COLLECTIONS

The Natural Science Collections Association (hereafter referred to as NatSCA), The Geological Curators' Group (hereafter referred to as GCG) and the Society for the Preservation of Natural History Collections (hereafter referred to as SPNHC) have reached an agreement on the following points in order to increase and improve collaboration in areas of common interest.

WHEREAS

- The aims and missions of NatSCA, GCG and of SPNHC (hereafter referred to as The Parties) are both complementary and overlapping.
- The Parties wish to recognize and benefit from the professional contribution made to their shared goals by the members and representatives of each Party.

NOW IT IS HEREBY AGREED THAT THE PARTIES SHALL

1. Establish on their respective Committees (NatSCA and GCG) and Council (SPNHC) an ex-officio member position for the President (or appointed representative) of the other Party.
This non-voting member will make all reasonable efforts to attend meetings and conference calls as would any voting member of the Board or Council, receive correspondence and serve as liaison between their organization and the other Parties.

2. Collaborate to establish a separate Memorandum of Understanding (MoU) to provide guidance and directions for productive collaborative/joint NatSCA-GCG-SPNHC Conferences.

3. Actively seek opportunities to cooperate and, when considered appropriate by all Parties, initiate and implement joint action, including- but not limited to- issuing joint statements regarding issues of concern in areas of common interest and value.

4. Draw on mutual synergies and complementarities, through the exchange of information and the implementation of strategies, projects and activities jointly elaborated and undertaken pursuant to this MoU, with progress being reviewed through regular contacts between the Presidents (or appointed representatives) of the Parties.

Limitations

The Parties will seek the approval of their respective governing bodies, as appropriate and as mandated by their respective Bylaws, in implementing the cooperation foreseen under the present MoU.

Fulfillment of the Parties' obligations under the present MoU shall at all times be subject to the terms of their respective Bylaws and the extent of the financial resources available to each Party.

Collaborative projects arising from the current MoU will be governed by separate detailed agreements between the Pat1ies. Such agreements will include - but will not be limited to- financial arrangements associated with the collaborative projects.

Nothing in this agreement shall be construed as creating an exclusive relationship between the Parties. Each Party shall be free to enter into other agreements with other organizations.

Each Party's obligations under the present MoU shall be subject to: a) the application of its respective rules and policies and b) the availability of the appropriate financial resources.

Neither party shall use the name and /or logo of the other Party without prior written permission.

Under no circumstances should any Party use the name and/or logo of any other Party in a way that implies that they are part of the other Party or under its patronage or affiliation.

The present MoU may be amended, at any time, upon formal written request by one Party and written agreement of the other Parties.

Duration and Termination

The present MoU shall take effect upon its signature by the Parties and shall extend through alternating representatives. It can be extended or amended.

Any Party may terminate the present MoU by giving 60 days written notice to the other Parties or by mutual consent of all Parties.

Any dispute arising out of the interpretation or implementation of the MoU will be settled through discussion between the Parties.

This Memorandum of Understanding signifies a statement of intent to collaborate, but it is not a legally binding document.

IN WITNESS THEREOF, the duly authorized representatives of the Parties affix their signatures below on the two original copies in English.

Signed on the 26th of June 2014
Clare Brown
Chair of NatSCA

Chris Norris
President of SPNHC

Dr C. Giles Miller
Chairman of GCG

THE GEOLOGICAL CURATOR

Publication scheme
Two issues of The Geological Curator are published for each year (usually in the Spring and the Autumn); a complete volume consists of ten issues (covering five years) and an index.

Notes to authors
Articles should be submitted as hard copy in the journal style, on good quality paper (A4 size) double spaced, with wide margins, and on disk (although e-mail submissions are also accepted). Three copies should be sent to the Editor, Matthew A. Parkes, Natural History Museum, Merrion St., Dublin 2, Ireland (tel 353-87-122-1967; e-mail: mparkes@museum.ie). Line drawings should be prepared in black ink at the desired publication size. Photographs for halftone reproduction should be printed on glossy paper. Both drawings and photographs should be proportioned to utilise either the full width of one column (85mm) or two (175mm). References in the text follow the Harvard system, i.e. name and date '(Jones 1980)' or 'Jones (1980)'. All references are listed alphabetically at the end of the article and journal titles should be cited in full. Authors will normally receive proofs of text for correction. Major articles are refereed. Copyright is retained by authors.
If submitting articles electronically please note the following:

1. Do not 'upper case' headings. Keep all headings in upper and lower case.
2. Use italics rather than underline for latin names and expressions, journal names and book titles. Use bold for volume numbers in references.
3. Line spacing. Your hard copy should be double spaced. If possible, single space your copy on disk. Use a single (hard) carriage return at the end of each paragraph.
4. Single space-bar between words, double space-bar between sentences.
5. Do not attempt to format your article into columns. Use a minimum of tabs and indents.

Regular features
LOST AND FOUND enables requests for information concerning collections and collectors to reach a wide audience. It also contains any responses to such requests from the readership, and thereby provides an invaluable medium for information exchanges. All items relating to this column should be sent to the Editor (address above).
FACT FILE contains basic information for the use of curators. All items relating to this column should be sent to the Editor (address above)
NOTES comprising short pieces of less than two pages are particularly welcome. Please send contributions to the Editor (address above).
GALLERY REVIEW comprising short pieces on new museums or exhibitions.
CONSERVATION FORUM helps keep you up to date with developments in specimen conservation. Information on techniques, publications, courses, conferences etc. to Dr Caroline Buttler, National Museums and Galleries of Wales, Cathays Park, Cardiff CF10 3NP, Wales, UK.
BOOK REVIEWS contains informed opinion about recently published books of particular relevance to geology in museums. The Editor welcomes suggestions of suitable titles for review, and unsolicited reviews (of 500 words maximum) can be accepted at his discretion. Publishers should submit books for review to David Craven (see inside front cover for address).
INFORMATION SERIES ON GEOLOGICAL COLLECTION LABELS consists of loose A4 size sheets, issued irregularly, which carry reproductions of specimen labels usually written by a collector of historic importance. The aim of the series is to aid recognition of specimens originating from historically important collections. Contact the Editor.

Advertisement charges

Full A4 page	£80 per issue
Half A4 page	£60 per issue
Quarter A4 page	£40 per issue

25% discount for space bought in three or more issues. Further details from the Editor.
Inserts such as publishers' 'flyers' can be mailed with issues of The Geological Curator for a fee of £80 per issue. 350 copies of any insert should be sent to the Editor.

Subscription charges 2014

UK Personal Membership	£15 per year
Overseas Personal Membership	£18/ US$32/ EURO 25 per year
UK Institutional Membership	£20 per year
Overseas Institutional Membership	£22/ US$40/ EURO 32 per year

All enquiries to the Treasurer, John Nudds, Department of Earth Sciences, University of Manchester, Oxford Road, Manchester M13 9PL, U.K. (tel: +44 161 275 7861; e-mail: john.nudds@manchester.ac.uk).

Backnumbers
Backnumbers of The Geological Curator (and its predecessor, the Newsletter of the Geological Curators' Group) are available - please enquire with your requirements. All issues are available for download from www.geocurator.org.

THE GEOLOGICAL CURATOR

VOLUME 10, NO. 2

CONTENTS