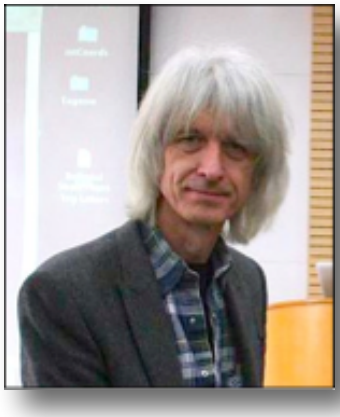
CURRICULUM VITAE[1]

Prof. Norman MacLeod, BSc, MSc, PhD, FGS, FLS



PERSONAL INFORMATION

Address

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163 Xianlin Avenue
Jiansu, Nanjing, China 210023

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NMacLeod@nju.edu.cn (China)
http://paleonet.org/MacLeod/MacLeodCV.pdf (UK Web Page)
https://macleod01.online/ (CN Web Page)

EDUCATION

PhD Paleontology, University of Texas, Dallas, 1981-1986. Thesis: Systematic, Phylogenetic, and Morphometric Analyses of the Jurassic Radiolarian Genus *Perispyridium* Dumitrica, 466 p., 42 figures, 26 tables, 5 appendices; Supervisor: Prof. E. A. Pessagno Jr.

MSc Paleontology, Southern Methodist University, 1978–1980. Thesis: The Paleoecology of the Wolf Mountain Shale (North Central Texas): Community Structure and Trophic Analysis, 202 p., 24 figures, 2 tables, 4 appendices; Supervisor: Prof. A Lee McAlester

BSc Geology, University of Missouri, 1971–1975

CURRENT POSITIONS

- Distinguished Professor, School of Earth Science & Engineering, Nanjing University, Nanjing, China (2019 – Present)
- Creator/Manager of *PaleoNet* (1996 – Present)

CAREER PROGRESS

2019 – Present Nanjing University, Nanjing, China
1993 – 2019 The Natural History Museum, London (NHM), UK

- Scientific Officer (1993–1994)
- Senior Scientific Officer (1994–1996)
- Stratigraphy & Correlation Programme Leader (1995–2001)
- Researcher (1996–Present)

[1] Electronic version available at http://paleonet.org/MacLeod/MacLeodCV.pdf.

- Petroleum Consultancy Sector Leader (1997–2001)
- Associate Keeper of Palaeontology (2000–2001)
- Acting Keeper of Palaeontology (11 Aug. 2000–1 Oct. 2001)
- Keeper of Palaeontology (2001–2012)
- Dean, Post-Graduate Education & Training (2012- 2016)

1989 – 1993 Princeton University, Princeton, New Jersey
- Researcher, Dept. of Geological and Geophysical Sciences (1989–1992)
- Senior Researcher (Tenured), Dept. of Geological and Geophysical Sciences (1993)

1989 Consultant - AMOCO Production Company (Tulsa Research Center) on the topics of morphometric methods of biostratigraphic data acquisition/analysis and the numerical modelling of microfossil morphology and morphologic variation.

1986 – 1989 University of Michigan, Ann Arbor, Michigan
- Fellow, Michigan Society of Fellows (1986–1989)
- Visiting Assistant Professor, Department of Geological Sciences (1986–1989)

1984 – 1986 Consultant - Atlantic Richfield (ARCO) Oil and Gas. Responsibilities included development and implementation of an interactive base-map generating computer program for use by the Central North Atlantic Project, development and implementation of a computer based shape analysis system for use in micropaleontological and biostratigraphic research, and development and implementation of a computer based shape analysis system for use in sedimentary petrographic and basin analysis research.

1982 – 1986 Owner - *Boreas* Technical Photographers, Dallas, Texas.

1981 – 1982 Scientific Programmer - Teledyne Geotech, 3401 Shiloh Rd., Garland, Texas, supervisor: Jannet Hennard.

1976 – 1978 Secondary School Science Teacher (Physics, Geology, Astronomy, Ecology), H. Grady Spruce High School, Segoville, Texas.

SOCIETY MEMBERSHIPS

- **Current Memberships**
  - *The Society of Systematic Biologists* (since 1981)
  - *Centre for Evolution and Ecology* (since 1998)
  - *Systematics Association* (since 2001)
  - *Geological Society of London* (Fellow since 2002)
  - *Linnean Society* (Fellow since 2003)

- **Former Memberships**
  - *Palaeontological Association* (2003-2009)
  - *Willi Hennig Society* (1985-2005)
  - *Paleontological Society* (1978-1993)
  - *Society for Sedimentary Geology* (1989-1993)
  - *Society of Vertebrate Paleontology* (1978-1978)
  - *The Micropalaeontological Society* (1994-2006)

MANAGEMENT TRAINING

- **NHM**
  - Induction Course (1994)
  - Management Development Programme (1997-1998)
    - Foundation Module
    - People Management
    - Managing Meetings
    - Employment Law
    - Managing Change

        - Equal Opportunities
        - Evaluation Workshop
        - Financial Management
    - EU Grants Workshop (2000)
    - Special Programme in Management of Creative People (2002)
    - Leadership Development Programme (2003-2004)

- **Civil Service College**
    - Effective Manager (2000)

- **Roffey Park College**
    - Interpersonal Relations in Organizations (2002)

- **Advanced Management Coaching**
    - w/ Prof. Jacquie Drake, Director Praxis Centre, Cranfield University School of Management & Senior Lecturer (Organisational Behaviour)
        - 2001-2002
        - 2007-2008

MANAGEMENT EXPERIENCE

From 1997-1998 I line-managed two Palaeontology Department post-doctoral scientists, both of whom were funded by NERC grants to myself. I continued to line manage one of these for an additional year after switching him to one of my commercially funded projects. From 1998 I served as advisor to a PhD student (Russell Seymour, Univ. of Surrey) who completed his degree course successfully in 2001. In 2004 I accepted a second PhD student (William Parr, UCL) who completed her degree course in 2004. Subsequent to this I have served as advisor to two additional PhD students, Eugenie Barrow (Oxford, vertebrate palaeontology), and Kalina Davies (QMW, Zoology). From 1998 to present I have served as advisor or co-advisor for a total of 40 MSc and MRes students and 5 PhD students.

I was appointed NHM Associate Keeper of the NHM Palaeontology Department in 2000 with direct line management responsibility for four division heads, as well as the Dept. Administrator, Business Manager, and Enquiries Officer and countersigning responsibility for six others in various positions throughout the Department and have primary responsibility for all Department research and external income-generation activities.

As NHM Keeper of Palaeontology I had direct line-management responsibility for all Palaeontology Department Individual Merit Promotion (IMP) staff, for the Associate Keeper, Head of Collections, for the administrative office staff, and for my personal research assistant. I also held countersigning responsibility for all other researchers and all collections managers. The NHM Keeper of Palaeontology bore ultimate responsibility for all decisions made throughout the NHM Palaeontology Department.

As NHM Dean of Post-Graduate Education and Training I have operations-level responsibility for all advanced academic and commercial training across The Natural History Museum's Science Group as well as corporate responsibility for establishing education and training policy, negotiating education and training contracts with universities and commercial organizations worldwide, maintaining the quality and scope of The Natural History Museum's education & training offer, managing the NHM PhD studentships, managing the museum's participation in various Doctoral training Partnerships with UK universities, and developing new strategic initiatives in these areas (*e.g.,* a diverse online education offer). In addition to these duties I serve as senior advisor to various NHM strategic initiatives and, as the UK Human Tissue Authority Designated Individual for the NHM, retain responsibility for aspects of human remains repatriation policy and operations.

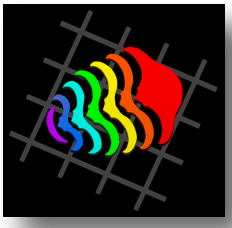
- **Service on Natural History Museum Committees**

  - NHM Centre for Arts & Humanities (CAHR) Board (2011 - present)
  - NHM Intellectual Property Rights (Committee Member, 2007-present)
  - NHM Representative to Consortium of European Taxonomic Facilities (CETAF) (2010 - present)
  - UK Human Tissue Authority Designated Individual for The Natural History Museum (2006-present)
  - NHM Senior Management Team (Member, 2010 - present)
  - NHM Science Strategy Group (Member, 2012 - present)
  - NHM Post-Graduate Education & Training Advisory Group (Chairperson, 2012–present)
  - Corporate Services Executive (2010 - 2012)
  - NHM Security Board (2010 - 2012)
  - Library Users Group (Member, 2010 - 2012)
  - Science Group Education & Training Programme (Programme Leader, 2010 - 2012)
    - Science Group Post-graduate Education Committee (Chairperson, 2010 - 2012)
    - Science Group Continuing Education & Training Committee (Chairperson, 2010 - 2012)
  - Ancient DNA Sampling Laboratory Project Board (Senior Reporting Officer, 2010 - 2012)
  - Science Executive Committee (2001-2012)
  - Palaeo. Dept. Executive Committee (Chairperson, 2001–2012)
  - Palaeo. Department Health and Safety Committee (Chairperson, 2000–2012)
  - Science Group Collections Committee (Chairperson, 2006-2010)
  - Science Group Research Committee (Chairperson, 2004-2006)
  - NHM Security Committee (Steering Group Chairperson, 2003–2010)
  - NHM Leadership Development Programme Steering Committee (2003-2004)
  - Science Group Education Committee (2002–2004)
  - Research and Consulting Group (1999-2001)
  - Web Editorial Board (WEB) (1996-2000)
  - Global Change and the Biosphere Planning Committee (Chairperson, 1996)

- ***PaleoBase* Database Series (General Editor)**

PaleoBase (http://www.paleobase.com) is the result of a joint publishing venture between the Palaeontology Dept., the NHM Publishing Dept., Blackwell Science Publishers, and Compustrat Database Products. PaleoBase databases provide a comprehensive taxonomic, biostratigraphical, and paleoenvironmental reference for all major invertebrate fossil groups. The *PaleoBase* project is unprecedented in its scope, level of detail, and commitment to the provision of the illustrations necessary for effective standardization of taxonomic concepts. I am the founder and Executive Editor of the *PaleoBase* series.

- ***Palaeontologia Electronica* and *Coquina Press***



Palaeontologia Electronica (http://palaeo-electronica.org) is the world's first internationally sponsored, peer-reviewed paleontological journal. Manuscripts from all branches of paleontology and related biological or palaeontologically-related disciplines have been published in its virtual pages. *Palaeontologia Electronica* meets the provisions of Article 8.6 of the International Commission of Zoological Nomenclature, and was the first to publish ICZN-approved taxonomy in a completely electronic format. All technical papers are peer-reviewed by professional palaeontologists and biologists (using advice from an international panel of associate editors) and published as html and pdf documents, accessible to all with Internet connections via the World Wide Web (WWW). The journal is also available on CD-ROM at nine archival libraries, through its sponsoring

societies (http://palaeo-electronica.org/sponsor.htm), and directly from Coquina Press. I am *Palaeontologia Electronica's* founder and was its first Executive Editor (1998-2002). I retain an active involvement with the journal in an 'emeritus' editorial capacity.

- ***PaleoNet***

PaleoNet is a system of listservers, WWW pages, and ftp sites designed to enhance electronic communication among palaeontologists. The listserver has the largest user subscription of any paleontological listserver and is considered the 'list of record' for the professional paleontological community as a whole. I am the founder and technical manager of the PaleoNet electronic communications system (1996–present

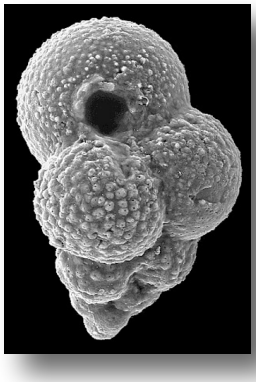
NOTABLE ACHIEVEMENTS (NOT OTHERWISE LISTED)

- Honorary Professor, Department of Earth Sciences, *University College, London, UK* (2010–2019)
- Honorary Professor, *Nanjing Institute of Geology & Palaeontology, Nanjing, China* (2014)
- Honorary Professor, *Faculty of Life Sciences, The University of Manchester* (2011–2013)
- Co-Chief Editor, *Palaeoworld* (2014–2019)
- Associate Editor (Morphology), *Systematic Biology* (2013–2019)
- Editorial Board Member, *Proceedings B (Biological Sciences), Royal Society* (2013–2019)
- Editor (Emeritus), *Palaeontologia Electronica*
- Invited Delegate, UK /China Scoping Workshop: *Developing Collaborations in the Natural and Social Sciences in the Areas of Geohazards, Palaeontology and Geofluids (Volatiles)*, Chengdu, China (2014)
- Publications Committee Member, *Geological Society of London, London, UK* (2005–2013)
- Trustee, *Scarborough Museums Trust, Scarborough, UK* (2003–2013)
- Co-Host, *International Palaeontological Congress*, Imperial College and The Natural History Museum, London, (2010)
- Member, *Scientific Committee on Oceanic Research (SCOR) Working Group 130* (Automatic Visual Plankton Recognition, (2007 - 2010)
- Organizer, *New Approaches To and Uses For Morphological Imagining/Scanning in a Collections Context*, Annual Meeting of the Society for the Preservation of Natural History Collections (SPNHC), National Museum of Natural History (*Naturalis*) and the Leiden University Medical Center, Leiden, (2009)
- Co-Organizer, *e-Biosphere 09 Conference and Workshop*, London (2009)
- Vice-President, Palaeontological Association (2008-2010)
- NSF Paleontology and Stratigraphy Review Panel (2005)
- Section Editor (Earth History), *Encyclopaedia of Geology* (2001–2003)
- NSF Site Visit Panel Member to the CHRONOS Project, University of Iowa, Ames, Iowa (2004)
- Associate Editor *Geodiversitas* (2002–2006)
- Associate Editor, *Marine Micropaleontology* (1995–2003)
- Creator/Executive Editor of *Set in Stone* (NHM Palaeontology Dept. Newsletter, 2003-2012) [see http://www.nhm.ac.uk/palaeontology]
- Geological Contributions Advisor, *Microsoft Encarta Encyclopaedia*, (1998-2003)
- Co-founder, *London Applied Shape Analysis Forum*, (1995)
- Co-leader, NHM field trip to Belize, (1995)
- Created cover illustration for Jan. 1994 Geoscientist, (1994)
- Excavated Late Cretaceous dinosaur footprints for Shuler Museum of Paleontology, (1982)

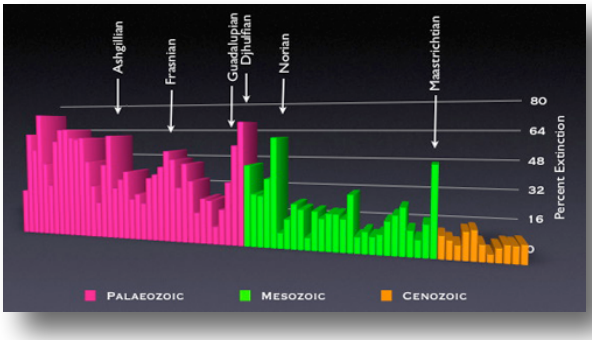
RESEARCH INTERESTS

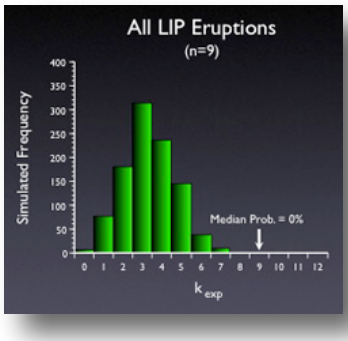
My primary research interests lie in the causes of Phanerozoic extinctions, the evolution of form, biostratigraphy-paleoceanography, and the use of numerical data-analysis methods in natural history.

- **Phanerozoic Extinctions**



Since 1988 I have conducted research on a variety of extinction-related topics, including the Eocene-Oligocene marine extinction event, the Cretaceous-Tertiary marine extinction event, the Paleocene-Eocene benthic foraminiferal extinction event, and, most recently, the Phanerozoic record of marine invertebrate extinctions. This work has resulted in numerous research publications and conference abstracts, several grants, one edited book, one single authored book and a two-volume encyclopedia. Systematic results have focused on the documentation of planktonic foraminiferal extinctions (including the patterning of planktonic foraminiferal extinctions in time and space), as well as the historical ecology and developmental correlates of planktonic foraminiferal survivorship across major extinction horizons. More recent work in this area has focused on the role of terrestrial plants and phytoplankton in controlling the broad patterns of the Phanerozoic extinction record via testing various causal mechanism time series' that have been proposed to account for local peaks in Mesozoic and Cenozoic extinction intensity and conducting the first detailed, quantitative analyses of the background extinction gradient. In this area, I am known as one of the foremost critics of the Alvarez *et al.* (1980) impact-extinction scenario which, despite its support in much of the popular media and general scientific community, has failed to achieve a consensus among paleontological professionals.

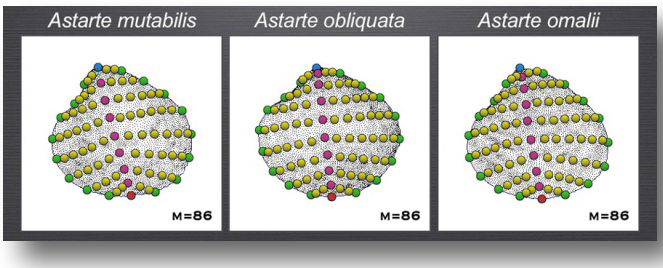


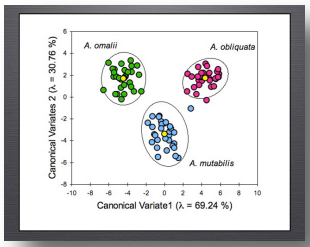


- **The Evolution of Form**

Since 1982 I have conducted research on a variety of topics relating to patterns of phenotypic evolution. This work began with an interest in examining patterns of punctuated evolution and 'punctuated anagenesis' (both of which require the quantitative summarization of morphological variation), but quickly progressed to the development of improved techniques for generalized morphometric analysis, reformulation of the classical comparative method along morphometric lines, use of morphometric methods to better constrain phylogenetic hypotheses, and, most recently, application of unsupervised neural nets to the species-identification problem. Links exist between this research program and all of the others (e.g., morphometrics methods are used to assess patterns of developmental timing in K-T planktonic foraminiferal survivor species), but these are facultative, not obligatory. This research program has led to numerous research publications and conference abstracts, been an important component of several grants, and served as the subject

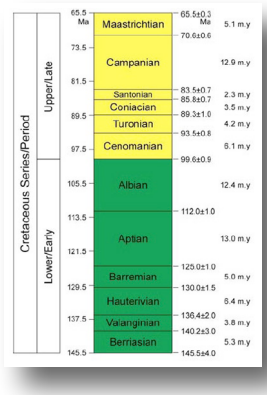
of two edited books as well as a single-authored book on morphometrics and quantitative data-analysis methods in natural history (in progress). In addition, I am also known throughout the morphometrics community as a principle supplier of software for undertaking morphometric analyses.

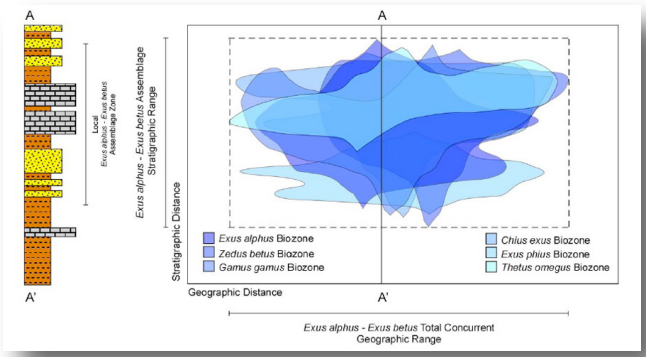


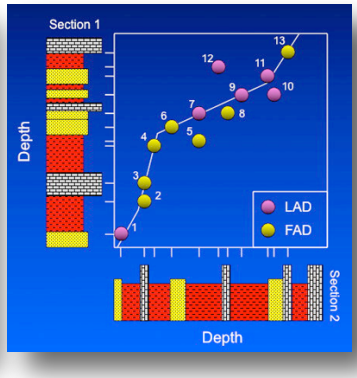


Biostratigraphy-Paleoceanography

Much of my formal post-graduate training was in the areas of biostratigraphy and paleoceanography. I have been publishing technical and methodological papers in this area since 1988. In addition, I have used my expertise in this area as the basis of a number of consulting contracts with various petroleum exploration and resource development companies. In this area I am best known for my work on the theory and application graphic correlation methods the latter of which I have applied to the analysis of evolutionary rate and rate changes in the fossil record as well as in the chronostratigraphical analysis of major extinction intervals. In addition, I am known throughout the graphic correlation community as a supplier of software for undertaking computer-aided stratigraphic analyses.

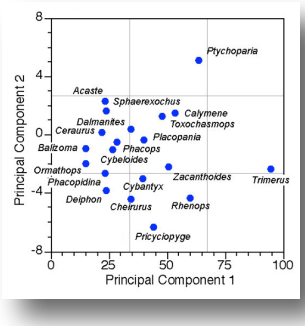


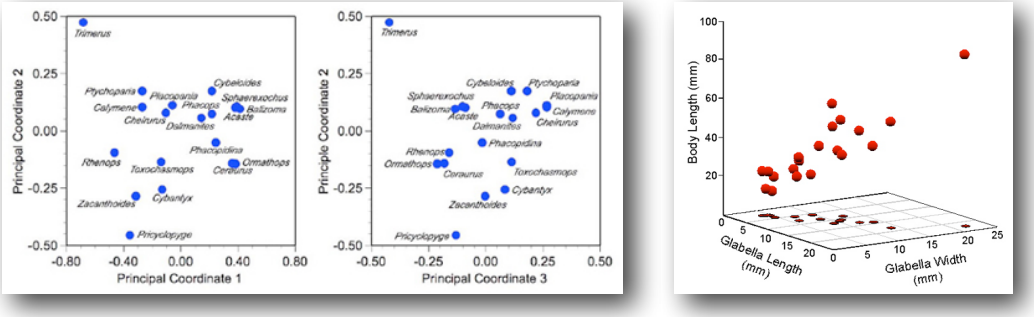




- **Quantitative Data Analysis**

I have published on the use of quantitative data analysis methods in the geological an biological sciences since 1987 and invariably employ state-of-the-art numerical summarization and statistical hypothesis-testing procedures in virtually all of my publications. In this area I'm best known for my work on the development and application of Monte-Carlo simulation and bootstrapping methods to natural history problems. In addition, I am also known throughout the paleontological community as a principal supplier of software for undertaking statistical, Monte-Carlo, and bootstrap analyses.

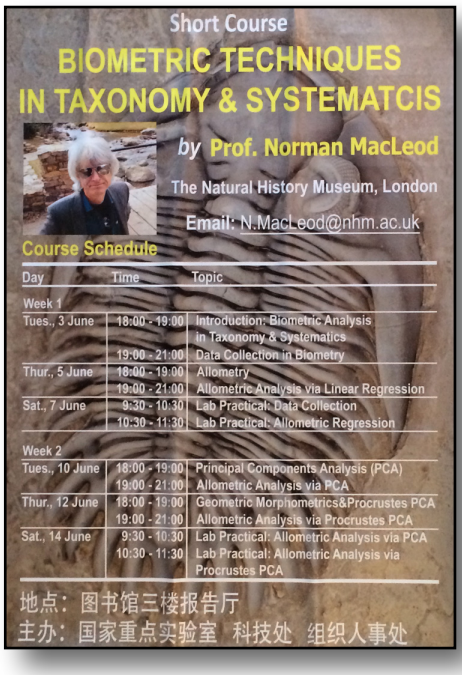




MEETINGS, SYMPOSIA COURSES AND FIELD TRIPS ORGANIZED

1. Organizer/Lecturer: *The Quantitative Analysis of Morphological Data*, Paleobiology and GBDB Short Course (ISQSP 2015), 3-6 September 2015, Beijing, China.

2. Co-Organizer (w/ Graham Shields, Ying Shields Shilds-Zhou, Qun Yang and Maoyan Zhu), *Biosphere Evolution & Resilience: A China-UK Scoping Workshop*, Nanjing, China, 3-9 May 2015, sponsored by Natural Environment Research Council (UK) and National Natural Science Foundation of China.



3. Organizer, *Biometric Techniques in Taxonomy & Systematics Short Course*, Nanjing Institute of Palaeontology & Stratigraphy, Nanjing, China, 2014

4. Co-Organizer, *Rethinking Repatriation: Moving Beyond Conflict*, American Association for the Advancement of Science Symposium, AAAS Annual Convention, Chicago 2014

5. Co-Organizer, *Mass Extinctions: Causes and Effects*, The Natural History Museum, London 2013

6. Co-Organizer, *Royal Entomological Society Electronic Computing and Technology Special Interest Group Meeting*, The Natural History Museum, London, 2013

7. Co-Organizer: Special Topic Symposium - *Application of Biometry, Computer Vision and Machine Learning to Classification Problems in Paleontology*, Annual Meeting of the Geological Society of America, Charlotte, North Carolina, 2012

8. Organizing Committee Member, *Global Biodiversity Information Conference*, University of Copenhagen, Copenhagen, 2012

9. Co-Organizer, *Palaeopathology in Egypt and Nubia: A Century in Review*, The Natural History Museum, London 2012

10. *International Palaeontological Convention* (Executive Committee Member), Imperial College & The Natural History Museum, London, UK 2010

11. Organizer, *New Approaches To and Uses For Morphological Imagining/Scanning in a Collections Context Workshop*, Annual Meeting of the Society for the Preservation of Natural History Collections (SPNHC), Leiden, 2009

12. Co-Organizer, *e-Biosphere 09 Conference*, Queen Elizabeth II Conference Centre, London, 2009

13. *Co-organizer, Evolution and Palaeontology Symposium*, International Zoological Congress, Paris, 2008

14. Organizer, *Evolutionary Morphometrics Symposium and Workshop*, Forams 2006 Conference, Natal, Brazil, 2006

15. Organizing Committee Member, *Forams 2006 Conference*, Natal, Brazil, 2006

16. Organizer, *Theory and Applications for Quantitative Models of Fossil Form Symposium*, North American Paleontological Convention Dalhousie University, Halifax, Canada, 2005

17. Organizer, *Algorithmic Approaches to the Identification Problem in Systematics*, co-sponsored by the Systematics Association and the Natural History Museum, London, 2005

18. Organizer, *Storage and Retrieval of Morphological Data for Phylogenetic Analysis Symposium*, Sixth International Congress of Systematics and Evolutionary Biology, Patras, Greece, 2002

19. Organizing Committee Member, *Forams 2002 Conference*, Perth, Australia, 2002

20. Organizer, *Controls on Phanerozoic Diversifications and Extinctions: Long-term Interactions Between the Physical and Biotic Realms*, Earth Systems Processes Conference, Edinburgh, Scotland, 2001

21. Organizer, *British Micropalaeontological Society Foram. Group Spring Meeting*, The Natural History Museum, London, 2000

22. Organizing Committee, Programme Committee Chairperson, *Nature's Treasure-houses? Conference*, The Natural History Museum, London, 2000

23. Co-Organizer, *Morphometrics, Shape and Phylogeny Symposium*, Biennial Meeting of the Systematics Association, Glasgow, Scotland, 1999

24. Organizer, *British Micropalaeontological Society Foram. Group Spring Meeting*, The Natural History Museum, London, 1999

25. Organizer, *British Micropalaeontological Society Foram. Group Spring Meeting*, The Natural History Museum, London, 1998

26. Organizing Committee Member, *Workshop on Paleontology in the 21st Century*, Senckenberg Museum, Frankfurt, Germany, 1997

27. Organizer, *British Micropalaeontological Society Foram. Group Spring Meeting*, The Natural History Museum, London, 1997

28. Theme Session, Co-organizer, *Paleontological Databases: Techniques and Applications Symposium*, North American Paleontological Convention '96, Field Museum of Natural History, Chicago, 1996

29. Organizer, *K-T & Paleocene Research Symposium*, University College, London, 1995

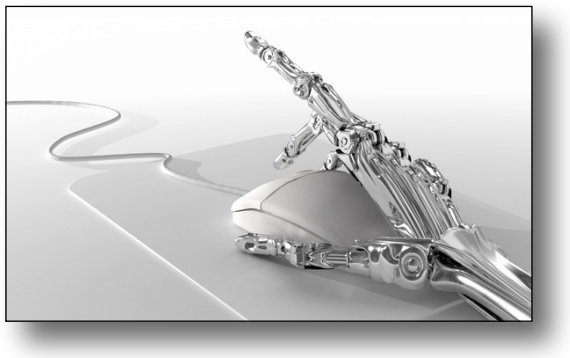
30. Co-Organizer, *Field trip to K-T boundary and the mid-Cretaceous sections of Central Texas, Graphic Correlation & the Composite Standard*, SEPM Research Conference, Houston, TX, 1994

31. Organizing Committee Member, *Graphic Correlation & the Composite Standard, SEPM Research Conference*, Houston, TX, 1994

32. Co-organizer, *The Cretaceous-Tertiary Boundary Event: Biotic and Environmental Changes Theme Session*, Annual Meeting of the Geological Society of America, Boston, 1993

33. Technical Committee Member, *National Science Foundation Morphometrics Workshop*, Museums of Paleontology and Zoology, University of Michigan, 1988

INVITED LECTURES



1. Machine Learning & Artificial Intelligence in the Earth Sciences: Methods, Applications, Prospects, Deep-Time Digital Earth Summer Course, Nanjing University, Nanjing, China, 2020.
2. *Mass Extinctions*, Sinergia Virtual PaleoC4 Workshop, University of Zürich, Zürich, Switzerland, 2020.
3. *Morphometrics and Machine Learning, Systematics & Taxonomy (with Examples from Palaeontology, Biology and Archaeology)*, Research Seminar, Department of Earth Sciences, University of Nanjing, Nanjing, China, 2018.
4. *Morphometrics: Origins, Data, Approaches & Prospects*, Keynote Presentation, Morphometrics & Quantitative Data Analysis Sympodium, Chinese Palaeontological Congress, Zangzhou, China, 2018.
5. *Machine Learning & Artificial Intelligence in the Earth Sciences: Methods, Applications and Prospects*, Keynote Presentation, Geobiodiversity Database Workshop, Nanjing, 2018.
6. *Morphometrics Workshop: Origins, Data, Approaches & Experience*, Short Course, Geobiodiversity Database Workshop, Nanjing, 2018.
7. *Morphometrics, Machine Learning & Artificial Intelligence in Systematics & Taxonomy*, Institute of Zoology, Chinese Academy of Science, Beijing, China, 2018.
8. *Identifying Sexual Dimorphism in Northern Israeli Gray Wolf (Canis lupus) Crania via Geometric Analysis & Deep Learning*, Hebrew University of Jerusalem, Jerusalem, Israel, 2018.
9. *Morphometrics: Development, Methods and Prospects (What is it? Where did it come from? What can it do for me?)*, Hebrew University of Jerusalem, Jerusalem, Israel, 2018.
10. *The Quantitative Assessment of Archaeological Artifact Groups: Beyond Geometric Morphometrics*, Hebrew University of Jerusalem, Jerusalem, Israel, 2018.
11. *The Automated Assessment and Identification of Organisms from Morphological Data*, Research Seminar, Max Plank Institute (Plant Breeding), Köln, Germany, 2017.
12. Morphometric Approaches to the Delineation & Analysis of Taxonomic and Phylogenetic Characters, Invited Lecture, Role of Morphology Symposium, BioSystEU Conference, Gothenberg, Sweden, 2017.
13. *The Automated Assessment and Identification of Organisms from Morphological Data*, Keynote Presentation, Automated Identification Symposium, BioSystEU Conference, Gothenberg, Sweden, 2017.
14. *Geometric Morphometrics for Samples with Few or No Landmarks*, University of the Ryukus, Nishihara, Okinawa, Japan, 2017.
15. *Geometric Ecomorphology: Shape Analysis, Taxonomy, Ecology and the Modelling of Morphological Adaptation*, Okinawa Institute of Science & Technology, Okinawa, Japan, 2017.
16. *Morphometrics Workshop: Origins, Data, Approaches & Experience* (full-day short course), Morph16 Conference, The Natural History Museum, 2016.

17. *Biopower, Biopolitics and Biology: A Biologist's Encounter with Contemporary Cultural Criticism*, Atheist Humanist Secular Society, University of Exeter, Exeter, 2016.

18. *Setting the Modern Biodiversity Crisis in Context*, Invited Speaker, Nigel J. Seeley Memorial Lecture, University College London Institute for Sustainable Heritage (in association with the Centre for Doctoral Training in Science and Engineering in Arts Heritage and Archaeology), University College London, 2016.

19. *Automated Assessment and Identification of Vertebrate Morphology From Images and 3D Models: Making the Jump From Geometric Morphometrics to Computer Vision, Artificial Intelligence & Deep Learning*: Invited Speaker, The Shape Of Things To Come: Geometric Morphometrics In Vertebrate Paleontology Symposium, Annual Meeting of the Society of Vertebrate Paleontology, Dallas, Texas, 2015.

20. *Making the Jump From Geometric Morphometrics to Computer Vision, Artificial Intelligence & Deep Learning:* Invited Speaker, 4th International Symposium on Biological Shape Analysis, University of California, Los Angeles, Los Angeles, California, 2015.

21. *The Morphometric Assessment of Archaeological Objects: Principles, Practices and Prospectus:* Keynote Speaker, MORPH 2015: A Conference on the Archaeological Applications of Morphometrics, Department of Archaeology, University of Southhampton, 2015.

22. *Comparison of Morphometric and Machine-Learning Approaches to Automated Species Identification (With Examples From the Planktonic Foraminifera)*: Invited Lecturer, Department of Earth Sciences, Chinese Geological University, Wuhan, China, 2015.

23. *Morphometric Approaches to Improving the Accuracy and Consistency of Taxonomic Identifications in Palaeobotanical Climate-Change Studies*: Invited Lecturer, Department of Earth Sciences, Peking University, Beijing, China, 2015.

24. *'Mass Extinctions' in the Geological Record: Causes and Consequences*: Invited Lecturer, Department of Earth Sciences, Peking University, Beijing, China, 2015.

25. *Comparison of Morphometric and Machine-Learning Approaches to Automated Taxon Identification (With Examples From the Vertebrates)*: Invited Lecturer, Institute of Vertebrate Paleontology and Paleoanthropology, Beijing, China, 2015.

26. *Databases & Paleobiology (Quantitative Stratigraphy, Morphometrics, Automated ID, Phylogenetics, Modelling):* Invited Lecturer, Thematic Lectures, Nanjing Institute of Geology, Palaeontology and Stratigraphy, Chinese Academy of Science, Nanjing, China, 2015.

27. T*he Causes of Extinction: Setting the Modern Biodiversity Crisis in Context:* Invited Lecturer, University Lecture, Ohio State University, Columbus, Ohio, 2013.

28. *Climate Change and the Eternal Questions of History:* Invited Lecturer, History Department Research Seminar, Ohio State University, Columbus, Ohio, 2013.

29. *Cretaceous-Paleogene Planktonic Foraminiferal Stratigraphy, Extinction, and Survivorship (Revisited):* Invited Speaker, Volcanism, Impacts and Mass Extinctions: Causes and Effects Meeting, The Natural History Museum, London, 2013.

30. *Setting Digitization Priorities for Natural History Museum Collections in an Uncertain World:* Invited Speaker, Democratizing Science: Virtualization and Global Natural History Repositories Symposium: Invited Lecturer, American Association for the Advancement of Science Annual Meeting, Boston, 2013.

31. *Geometry-Based Insect Wing Morphological Analysis as a Tool for Achieving Robust, Accurate, and Automated Species Identifications:* Invited Speaker, Electronic Computing and Technology Special Interest Group Meeting, Royal Entomological Society, The Natural History Museum, London, 2013.

32. *Improving the Accuracy and Consistency of Taxonomic Identifications in Climate Change Studies:* Invited Lecturer, The Southern Ocean Symposium, Seventh Southern Connection Congress, University of Otago, New Zealand, 2013.

33. *The Promise, and the Challenge, of Automated Species Identification:* Invited Lecturer, Geosciences Department, University of Washington, Seattle, Washington, 2012.

34. *Is the Consistency of Expert-Level Taxonomic Identifications a Significant Source of Error in Biodiversity and Ecological Investigations?: An Empirical Assessment:* Keynote Lecture, Application of Biometry, Computer Vision and Machine Learning to Classification Problems in Paleontology Theme Session, GSA Annual Meeting, Charlotte, North Carolina, 2012.

35. *Images, Totems, Types and Memes: Perspectives on Images & Science*: Invited Lecturer, School of Arts and Humanities Seminar, University of Notre Dame, South Bend, Indiana, 2012.

36. *Geometric Ecomorphology: Shape Analysis, Taxonomy, Ecology, and the Modelling of Morphological Adaptation:* Invited Lecturer, Biology, Dept., University of Notre Dame, South Bend, Indiana, 2012.

37. *Causes and Consequences of "Mass Extinctions" in the Geological Record*: Invited Lecturer, History of Science Seminar, University of Notre Dame, South Bend, Indiana, 2012.

38. *3D Scanning and Analysis of Skeletal Pathologies: Tools and Techniques:* Invited Lecturer, Palaeopathology in Egypt and Nubia: A Century in Review, The Natural History Museum, London, 2012.

39. *New Mathematical Tools (with Applications) That Improve the Consistency, Speed, and Objectivity of Taxonomy & Systematics:* Invited Lecturer, New Mathematical Approaches to Morphological Analysis, Identification, Taxonomy and Phylogenetics in the NHM, The Natural History Museum, London, 2012.

40. *Images, Totems, Types and Memes: Perspectives on an Iconological Mimetics:* Invited Lecturer, Science Discussion Group, St. Anne's College, University of Oxford, Oxford, 2012.

41. *The Promise, and the Challenge, of Automated Species Identification:* Invited Lecturer, Computations in Science Seminar, Physics Department, University of Chicago, Chicago, Illinois, 2011.

42. *"Mass Extinctions" in the Geological Record: Causes and Consequences:* Invited Lecturer, Plenary Address, Swiss Geosciences Conference, University of Zürich & Eidgenössische Technische Hochschule, Zürich, Switzerland, 2011.

43. *Comparison of Morphometric and Machine Learning Approaches to Automated Species Identification (with examples from the Planktonic Foraminifera):* Invited Lecturer, Wilbert Lecture, Louisiana State University, Baton Rouge, Louisiana, 2011.

44. *Geometric Ecomorphology: Shape Analysis, Taxonomy, Ecology, and the Modelling of Morphological Adaptation:* Invited Lecturer, Geology Department Research Seminar, Louisiana State University, Baton Rouge, Louisiana, 2011.

45. *d'Arcy Thompson: The Aesthetics, and the Utility, of Geometric Analysis in Biology:* Invited Lecturer, Nicholson Centre for British Studies Seminar, University of Chicago, Chicago, Illinois, 2011.

46. *Images & Science:* Invited Lecturer, Design & Technology Group Meeting, The Franke Institute for the Humanities, University of Chicago, Chicago, Illinois, 2011.

47. *Images, Totems, Types and Memes:* Invited Lecturer, The Franke Institute for the Humanities Seminar, University of Chicago, Chicago, Illinois, 2011.

48. *Mass Extinctions in the Geological Record:* Invited Lecturer, Geosciences Department, The University of Nanjing, Nanjing, China, 2011.

49. *Quantitative Analyses in Biostratigraphy:* Invited Lecturer, Nanjing Institute of Geology & Palaeontology, Chinese Academy of Sciences Seminar, Nanjing, China, 2011.

50. *Morphometrics: Principles and Applications:* Invited Lecturer, Nanjing Institute of Geology & Palaeontology, Chinese Academy of Sciences Seminar, Nanjing, China, 2011.

51. *The Natural History Museum:* Invited Lecturer, Nanjing Institute of Geology & Palaeontology, Chinese Academy of Sciences Seminar, Nanjing, China, 2011.

52. *The Challenge, and the Promise, of Automated Species Identification:* Invited Lecturer, International Institute for Species Exploration, Arizona State University, Tempe, Arizona, 2010.

53. *Digitization Strategies, Collections-use Surveys, and iDaisy: new e-Collections-based Initiatives at the Natural History Museum:* Invited Lecturer, Geological and Paleobiological Collections: Best Practices for Preservation, Access, and Use in a Changing World Workshop; Molineux, A., White, T., Holl, C. M., organizers, Geological Society of America Annual Convention, Denver, Colorado, 2010.

54. *The Challenge, and the Promise, of Automated Species Identification:* Invited Lecturer, Functional Phylogenies Workshop; Aston, J, Buck, D, Jones, N. Macaulay, V., and Moriarty, J., organizers; Physics Department, University of Oxford, Oxford, 2010.

55. *Alternative 2D and 3D Form Characterization Approaches to the Automated Identification of Biological Species:* Invited Lecturer, Bioidentify Conference; Nimis, P. L. and Lebbe, R. V., Organizers; Muséum national d'Histoire naturelle, Paris, France, 2010.

56. *The Sixth Extinction in Perspective: What Dinosaurs Can Tell Us About the Modern Biodiversity Crisis:* Invited Lecturer, Scarborough Fossil Festival; William Watts, organizer; Scarborough, Yorkshire, 2010.

57. *Non-linear Morphology-Based Discrimination of Taxonomic Groups With and Without Landmarks:* Invited Lecturer, Second UK One-Day Meeting on Morphometrics and Statistical Shape Analysis; von Cramon-Taubadel, N. and Kume, A., organizers; Kent Business School, University of Kent, Canterbury, 2010.

58. *Algorithmic Approaches to the Class-Recognition Problem in Systematics:* Invited Lecturer, TOTAL Petroleum Research Seminar, TOTAL Research Facility, Pau, France, 2008.

59. *Morphometric Data Analysis: Principles, Approaches and Prospects:* Invited Lecturer, Palaeontological Data Analysis Workshop, International Geological Congress Workshop WSS-13, Oyvind Hammer and Mikael Fortelius organizers; Olso, Norway, 2008.

60. *Non-linear Discrimination and Classification:* Invited Lecturer, SCOR Working Group 130 Meeting, J. Benfield and P. Culverhouse, organizers; Ubatuba, Brazil, 2008.

61. *Methods in Taxonomy, Ordination and Classification: Invited Lecturer,* SCOR Working Group 130 Meeting, J. Benfield and P. Culverhouse, organizers; Ubatuba, Brazil, 2008.

62. *Eigensurface Analysis: A New Method for Modelling and Analyzing 3D Morphological Data:* Invited Lecturer, Computer-aided Visualisation in Palaeontology Symposium; I. Rahman and M. Sutton, organizers; Imperial College, London, 2007.

63. *The Sixth Extinction? What Dinosaurs Can Tell Us About the Modern Biodiversity Crisis:* Annual Lecture, Leicester Literary & Philosophical Society, Leicester, 2007.

64. *Mass Extinctions: Victims, Survivors, and Causes,* Farhham Maltings Lecture, Farnham, Surrey, 2007.

65. *Size, Extinction, Survivorship, and Phylogeny in Foraminifera:* Keynote lecture, Lilliput Effect Symposium (B. Wade & R. Twichett organizers), Geological Society of America Annual Meeting, Seattle, Washington, 2006.

66. *Automated Taxon Discrimination: A Synthesis Between Morphometrics and Artificial Intelligence:* Keynote lecture, MorphoFest, Vienna, Austria, 2006.

67. *Applied Morphometrics: Points, Outlines and Surfaces:* Invited Lecturer, Palaeontologisches Institut und Museum, Universität Zürich, Zürich, Switzerland, 2006.

68. *Timely Fossils: The Past, Present and Future Roles of Biostratigraphy in Constructing Time Scales:* Keynote Speaker, EARTHTIME: Calibrating Earth's History via Astronomic, Magneto-Biostratigraphic and Geochronologic Timescales, European Geosciences Union, Vienna, Austria, 2006.

69. *The Provision of Quantitative Tools for Analyzing and Identifying Taxa from Morphological Data over Distributed Networks:* Invited Lecturer, New Systematics Symposium, Systematics Association Biennial Meeting, Cardiff, Wales, 2005.

70. *Algorithmic Approaches to the Species Identification Problem:* Invited Lecturer, Southern Methodist University, Dallas, Texas, 2004.

71. *Use of Morphometric Methods in Systematic Applications:* Invited Lecturer, Southern Methodist University, Dallas, Texas, 2004.

72. *Extinctions I Have Known:* Invited Lecturer, Southern Methodist University, Dallas, Texas, 2004.

73. *Morphometric Analysis as a Strategy for Finding and Defining Character States: Thinking the Unthinkable:* Invited Lecturer, Evening Lecture Series, London Evolutionary Research Network, Imperial College, London, 2003.

74. *Morphometric Perspectives on the MorphoBank Project:* Keynote Lecture: Storage and Retrieval of Morphological Data for Phylogenetic Analysis' Symposium, Sixth International Congress of Systematics and Evolutionary Biology, Patras, Greece, 2002.

75. *Explaining Extinctions: Evidence for Long-Term Eco-Macroevolutionary Coupling Between the Biodiversification of Marine Plankton and Phanerozoic Extinction-Rate Controls:* Keynote Lecture, Evolution of the Pelagic Realm Through Time Symposium, First International Paleontological Congress, Macquarie University, Sydney, Australia, 2002.

76. *Sources of—and Solutions to—Error in High-Resolution Quantitative Biostratigraphical Analyses:* Keynote Lecture, High-Resolution Biostratigraphy Symposium, First International Paleontological Congress, Macquarie University, Sydney, Australia, 2002.

77. *PaleoBase: Images, Databases, Collection Catalogues, and Commercialism in the Emerging Virtual Museum:* Invited Lecturer, Dept. of Geosciences, Macquarie University, Sydney, Australia, 2002.

78. *Composite Digital Images:* Invited Lecturer, Dept. of Geosciences, Macquarie University, Sydney, Australia, 2002.

79. *Systematic Implications of a Synthesis Between Theoretical Morphology and Geometric Morphometrics:* Invited Lecturer, Computations in Science, Department of Physics, University of Chicago, 2002.

80. *PaleoBase: Images, Databases, Collection Catalogues, and Commercialism in the Emerging Virtual Museum:* Invited Lecturer, *Images and Ideas: Exhibiting Science in Museums Workshop*; Prof. Leo Kandoff (organizer), University of Chicago and Museum of Science and Industry, Chicago, Illinois, 2002.

81. *Identifying Long-Term Controls on Phanerozoic Extinction and Diversification Patterns:* Keynote Lecture, The Palynology and Micropalaeontology of Boundaries Sym-

posium, Geological Association of Canada – Mineralogical Association of Canada Joint Annual Meeting 2002, Saskatoon, Saskatchewan, 2002.

82. *The Use of Monte-Carlo Simulations to Test Causal Hypotheses with Paleoceanographical Data:* Keynote Lecture, Forams 2002 Conference, Perth Australia, 2002.

83. *The Importance of Stratigraphy to the K-T Extinction Debate: New Solutions to an Old Problem:* Invited Lecturer, Open University Geological Society, Milton Keynes, 2001.

84. *The Importance of Stratigraphy to the K-T Extinction Debate: New Solutions to an Old Problem:* Invited Lecturer, Evening Seminar, Hertfordshire Geological Society, St. Albans, 2000.

85. *The Electronic Publication of Systematic Information: Images, Databases, & Journals:* Invited Lecturer, UK Museum Computer Group Meeting, The Natural History Museum, London, 1999.

86. *Sex, The Royal Family, and K-T Extinctions: Invited Lecturer,* University of Greenwich, 1999.

87. *Mass Extinctions:* Invited Lecturer, University of the Third Age, London, 1999.

88. *Identifying Instances of Past Environmental Change and Their Causal Mechanisms:* Keynote Speaker, Geological Society of London Symposium: Defining the Effect of Sub-Critical Impacts, Geological Society of London, London, 1998.

89. *Explaining Mass Extinctions: An Evaluation of Mechanisms:* Invited Lecturer, Dept. of Geology, The University of Wales, Cardiff, 1998.

90. *The Renaissance of Graphic Correlation:* Keynote Lecture, British Micropalaeontological Society Annual General Meeting, The Natural History Museum, London, 1998.

91. T*he Renaissance of Graphic Correlation:* Invited Lecturer, Geoscience 98—Stratigraphic Timescales and Correlations: New Directions, Keele University, 1998.

92. *Sex, The Royal Family, and K-T Extinctions: Invited Lecturer,* Leicester University, 1997.

93. *Extinctions at the K-T Boundary:* Keynote Lecture, UK ODP Science Forum, London, 1997.

94. *Earth Impacts - Their Effects on Life on Earth:* Invited Lecturer, The Maxwell Society Cumberland Lodge Meeting “Life in the Universe”, London, 1997.

95. *Timing and Causes of Invertebrate Extinctions at the Cretaceous-Tertiary (K-T) Boundary:* Invited Lecturer, Meteorites: Flux with Time and Impact Effects, The Geological Society, London, 1997.

96. *The Stratigraphy of the Cretaceous-Tertiary (K-T) Boundary: Implications for Extinction Models:* Research Colloquia Speaker, School of Oceanography, Southampton University, Southampton, 1997.

97. *The Stratigraphy of the Cretaceous-Tertiary (K-T) Boundary: Implications for Extinction Models:* Research Colloquia Speaker, Postgraduate Research Institute for Sedimentology, Reading University, Reading, 1996.

98. *Quantitative Strategies for Determining the Reliability of Biostratigraphic Data:* Invited Speaker, Symposium on Quantitative Stratigraphic Paleontology, North American Paleontological Convention, Field Museum of Natural History, Chicago, 1996.

99. Empirical Shape Space Representations and Shape Modelling of Fossils from *Landmark-Registered 2D Outlines, 3D Outlines, and 3D Surfaces, With a Comment on the Indeterminacy of Empirical “Mono-Morphospace” Analysis:* Invited Speaker, Morphospace Concepts in Paleontology, North American Paleontological Convention, Field Museum of Natural History, Chicago 1996.

100. *Computers and Paleontology:* Keynote Lecture, Palaeontological Association Symposium: Computers and Palaeontology, London, 1996.

101. *Mass Extinctions Across the Cretaceous-Tertiary Boundary:* Guest Lecture, Southampton Geological Society, Southampton, 1995.

102. *Morphometric Methods II: Eigenshape, Extended Eigenshape, and Landmark-Based Techniques:* Invited Lecturer, London Applied Shape Analysis Forum, London, 1995.

103. *Overview of Morphometrics:* Invited Lecturer, London Applied Shape Analysis Forum, London, 1995.

104. *Mass Extinctions Across the Cretaceous-Tertiary Boundary:* Invited Lecturer, Department of Geology, Cardiff University, Wales, 1995.

105. *Mass Extinctions Across the Cretaceous-Tertiary Boundary:* Invited Lecturer, Department of Geology, Imperial College, London, 1994.

106. *Data Types, Assumptions, and Applications for Graphic Correlation:* Keynote Lecture, Graphic Correlation and the Composite Standard, SEPM Research Conference; H. R. Lane, G. Blakke, and N. MacLeod (Organizers), Houston, Texas, 1994.

107. *2D & 3D Eigenshape Analysis for Macintosh Computers:* Invited Lecturer, Workshop on Three-Dimensional Morphometrics, Joan T. Richtsmeier (Organizer), Fourth International Congress of Vertebrate Morphology, 1994.

108. *Morphometric Characterization and Analysis When There Are No Landmarks: 3D Outlines and Outline Segments: Invited Lecturer,* Workshop on Three-Dimensional Morphometrics, Joan T. Richtsmeier (Organizer), Fourth International Congress of Vertebrate Morphology, 1994.

109. *Blind Tests and Survivorship of Planktic Foraminifera Across the Cretaceous-Tertiary (K/T) Boundary:* Science Officer Lecture, The Natural History Museum, London, [formerly the British (Natural History) Museum] 1994.

110. *An Evaluation of Criteria That May be Used to Identify Species Surviving a Mass Extinction:* Invited Lecturer, New Developments Regarding the K/T Event and Other Catastrophes in Earth History, Lunar and Planetary Institute, Houston, Texas, 1994.

111. *Planktic Foraminiferal Biostratigraphy, Biogeography, and Paleoecology Across the Cretaceous -Tertiary (K/T) Boundary: Implications for Event Scenarios:* Invited Lecturer, University of Delaware, 1993.

112. *Planktic Foraminiferal Response to Environmental Change Across the Cretaceous-Tertiary (K/T) Boundary:* Invited Lecturer, Symposium: Biological Response to Past Global Change, organized by Donald Prothero, Annual Meeting of the Society of Economic Paleontologists and Mineralogists, Pennsylvania State University, 1993.

113. *Oceanography and Paleobiology of the K/T Transition: Relationships Between Hiatus Distributions, Extinctions, and Survivorship:* Invited Lecturer, Harvard University, 1991.

114. *Eigenshape Analysis of Anatomical Outlines as a Tool for Interpreting Locomotor Behavior in Fossil Mammals:* Invited Lecturer, Johns Hopkins University School of Medicine, 1992.

115. *Biogeography of the Cretaceous/Tertiary Planktic Foraminiferal Faunal Transition:* Invited Speaker, Symposium on Paleobiogeography, R. Crick, A. Raymond, and C. Scotese (Organizers), Fifth North American Paleontological Convention, Field Museum of Natural History, Chicago, 1992.

116. *Functional Comparisons Among Modern and Paleogene Mammals Based on Quantitative Analyses of Skeletal Element Outlines:* Invited Speaker: Morphometrics Symposium; B. Huber and D. Erwin (Organizers), Fifth North American Paleontological Convention, Field Museum of Natural History, Chicago, 1992.

117. *Biogeography of the K/T Planktic Foraminiferal Faunal Transition:* Invited Lecturer, Amoco Paleontology Seminar, Amoco, Tulsa, Oklahoma, 1992.

118. *Biologs: A Paleontologic Approach to Sequence Analysis and Environmental Interpretation: Invited Lecturer,* Amoco Paleontology Seminar, Amoco, Tulsa, Oklahoma, 1992.

119. *Planktic Foraminiferal Systematics, Biostratigraphy, Biogeography, and Paleoecology Across the Cretaceous-Tertiary (K/T) Boundary: Implications for Event Scenarios:* Invited Lecturer, American Museum of Natural History, 1993.

120. *Planktic Foraminiferal Biostratigraphy, Biogeography, and Paleoecology Across the Cretaceous-Tertiary (K/T) Boundary: Implications for Event Scenarios:* Invited Speaker, Symposium: Mesozoic Mass Extinctions, Dale Russell and Alan Hildebrand (Organizers), Joint Annual Meeting of the Geological Association of Canada and the Mineralogical Association of Canada, 1993.

121. *Planktic Foraminiferal Biostratigraphy, Biogeography, and Paleoecology Across the Cretaceous-Tertiary (K/T) Boundary: Implications for Event Scenarios:* Invited Speaker, The Natural History Museum, London, 1993.

122. *Size, Shape and Development in Planktic Foraminifera:* Invited Lecturer, S. S. Wilks Workshop on Climate Models and Shape Theory; Colin Goodall (Organizer), Princeton University, 1990.

123. *The Origin of Hantkenina, a Cladistic Test of Alternative Hypotheses:* Invited Speaker, Meeting of the Paleogene Planktic Foraminiferal Working Group; W. A. Berggren and C. Hemleben (Organizers), University of Tübingen, Tübingen, Germany, 1988.

124. *Quantitative Analysis of Morphologic Variation in Middle-Late Eocene Subbotina linaperta (Finlay) from DSDP Sits 612, 94 and 363:* Invited Lecturer, Louisiana State University, 1988.

125. *Systematic, Phylogenetic and Morphometric Analysis of the Bizarre Jurassic Radiolarian Genus* Perispyridium: Invited Lecturer, Louisiana State University, 1988.

126. *Digital Image Analysis Systems: What They Are and What They Do:* Invited Lecturer, Science Foundation - University of Michigan Workshop: Morphometrics and Systematics; Jennifer Kitchell and William Fink (Organizers), Museum of Paleontology & Museum of Zoology, University of Michigan, 1988.

127. *Morphometric and Phylogenetic Analysis: A New Approach to Systematics:* Invited Lecturer, Princeton University, 1987.

128. *Morphometric and Phylogenetic Analysis: A New Approach to Radiolarian Systematics:* Invited Lecturer, University of Michigan, 1986.

FINANCIAL SUPPORT

- **GRANTS**[2]

Leverhulme *Reconciling Ichthyology and Palaeontology with Exceptionally Preserved Fossils* (RPG-2012-658, £171,602 w/ M. Friedman - University of Oxford, Z. Johanson - NHM, and P. Wainwright - University California, Davis, 2012-2015)

[2] Acronyms: NSF - National Science Foundation (US), NERC - Natural Environment Research Council (UK), NHM - The Natural History Museum (internal fund; UK), ACS - American Chemical Society, AHRC - Arts & Humanities Research Council (UK), CEE - Centre for Ecology and Evolution, TOTAL, French National Petroleum Exploration & Production Company.

Wellcome *Sir Grafton Elliot Smith and the Archaeological Survey of Nubia: their significance to the palaeopathological tradition* (£416,526.00 w/ Prof. R. David, University of Manchester, 2010-2013)

AHRC *Coded Chimera: Exploring Relationships Between Sculptural Form Making and Biological Morphogenesis Through Computer Modelling* (£ 27,487.20, with Bruce Gernand, University of the Arts, London and Prof. Alan Blackwell, Cambridge University, 2010-2011)

TOTAL *Deep Water Arenaceous Foraminifera: Relationships with Environments and Sedimentary Geometries in Deep Turbiditic Basins* (£101,230.00, 2008-2011)

TOTAL *The Automated Identification of Planktonic Foraminifera: A Feasibility Test* (£ 9,600, 2008-2009)

CEE *The Evolution of Bat Echolocation* (£3,750, with Prof. S. Rossiter, Queen Mary & Westfield University, 2008-2009)

AHRC *PrediCtoR: A Predictive Tool for Managing Destructive Sampling of Materials for Ancient DNA Analysis* (£47,520, with M. Collins, University of York, 2008-2011)

ACS *Testing the Effect of Taxonomic Bias on Estimating Pliocene – Recent Sea-Surface Temperatures Using Planktonic Foraminifera* ($40,000, 2006-2007)

NHM *Automated Recognition of Fossil and Recent Taxa Using Particle-Analysis, Geometrical-Morphometric, and Pattern-Recognition Methods* (£4,000, 2003-2004)

NERC *Taxonomic Revision and Illustrated Relational Database for Deep-Sea Benthic Foraminifera* (£130,261, 1997-2001)

NERC *Mesoscale Response to Rapid Environmental Change in Kimmeridgian Benthic Foraminifera (Meiofauna)* (£ 32,481.00, w/ Dr. S. Culver, NHM, 1997 - 2000)

NSF *Anatomy and Adaptations of Early Eocene Mammals from Wyoming* ($190,000, with Prof. K. Rose, Johns Hopkins University, 1995 - 1998)

NHM *Field Investigation of the Cretaceous/Tertiary (K/T) Boundary in Belize* (£8,000 with Dr. R. Hutchinson, NHM, 1995)

NSF *Biotic and Abiotic Constraints on Phenotypic Evolution During the Recovery of Planktic Foraminiferal Diversity After the K/T Boundary Event* ($63,221.00, w/ Prof. G. Keller, Princeton University, 1990-1991)

NSF *Phenotypic Evolution in Lineages of Eocene and Miocene Foraminifera* ($84,666, w/ Prof. J. A. Kitchell, University of Michigan, 1988-1990)

NSF *Macroevolutionary Studies of the Mesozoic Radiolarian Families Hagiastridae (Subfamily Higumastrinae), Patulibracchidae, Pantanellidae and Parvicingulidae* ($99,606, with E. A. Pessagno Jr., University of Texas, Dallas, 1984-1986)

- **COMMERCIAL PROJECTS**

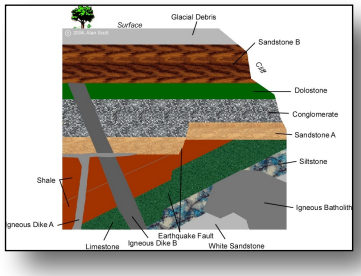
TOTAL *Deep Water Arenaceous Foraminifera: Relationships with Environments and Sedimentary Geometries in Deep Turbiditic Basins* (£ 101,230, 2008-2011)

TOTAL *The Automated Identification of Planktonic Foraminifera: A Feasibility Test* (£ 9,600, 2008-2009)

Blackwell	*Deep-Sea Benthic Foraminifera CD-ROM* (£ 3,500, 2001-2003)
Shell U.K.	*Graphic Correlation of Three North Sea Wells* (£ 4,100, 1998)
Blackwell	*Macrofossils CD-ROM* (£ 45,500, 1998-2001)
Blackwell	*Microfossils CD-ROM* (£12,500, 1998-1999)
Mobil	*Consulting Contract* ($4,000, 1984)
ARCO	*Consulting Contract* ($15,000, 1985-1986)
ARCO	*Consulting Contract* ($15,000, 1984-1985)
ARCO	*Consulting Contract* ($12,000, 1983-1984)
ARCO	*Consulting Contract* ($12,000, 1982-1983)
ARCO	*Consulting Contract* ($12,000, 1981-1982)
ARCO	*Consulting Contract* ($10,000, 1980-1981)

FIELD WORK

1998	Belize (Paleontological/Stratigraphical Survey)
1996	Belize (Cretaceous-Tertiary Boundary
1994	Northern Mexico (Cretaceous-Tertiary Boundary)
1992	Central Texas (Cretaceous-Tertiary Boundary)
1990	Central Texas (Cretaceous-Tertiary Boundary)
1988	Spain, Israel (Cretaceous-Tertiary Boundary)
1984	North Central Mexico (Pleistocene Terrace Deposits)
1981-1983	John Day Inlier (Jurassic Section)
1979	North Central Texas (Wolf Mountain Shale)



REFEREEING

- **Major Academic Journals**

- Acta Biotheoretica
- Applications in Plant Sciences
- Archaeometry
- Biological Theory
- Biology Letters
- Biological Journal of the Linnean Society
- BioMed Central Research Notes
- Bulletin of Entomological Research
- Bulletin of Marine Science
- Bulletin of the Geological Society of America
- Cladistics
- Computers & Geosciences
- Cushman Journal of Foraminiferal Research
- Earth-Science Reviews
- Earth and Planetary Science Letters
- Evolution
- Evolution and Development
- Frontiers
- Frontiers in Zoology
- Functional Ecology
- Geobiology
- GEOBIOS
- Geology
- Geosciences
- Geoscientist
- Global and Planetary Change
- Historical Biology
- Humanities and Social Sciences Communications
- Insect Conservation and Diversity
- International Journal of Legal Medicine
- Journal of Archaeologcal Science
- Journal of Biogeography
- Journal of Paleontology
- Journal of the Geological Society of London
- Journal of Human Evolution
- Journal of Morphology
- Journal of Sedimentary Petrology
- Journal of Systematic Palaeontology
- Journal of Zoology
- Journal of Systematic Palaeontology
- Journal of Zoology, Systematics, and Evolutionary Research
- JOVE Journal
- Marine Micropaleontology
- Micropalaeontology
- Micropaleontology Press

- Nature
- Nature Human Bahavior
- Nature Technology
- Palaeogeography, Palaeoclimatology, Palaeoecology
- Paläontologische Zeitschrift
- Paleontologia Electronica
- Palaios
- Paleobiology
- Palaeontology
- PeerJ
- PLOS One
- Proceedings of the Royal Society, Series B (Biological Sciences)
- Quarterly Review of Biology
- Revista Española Micopalaeontologíe
- Royal Society Open Science
- Science
- Signal Image and Video Processing
- Systematics and Biodiversity
- Systematic Biology
- Technology in Society
- Zoological Journal of the Linnean Society
- Zoolgica Scripta
- Zootaxa
- Zootaxa Review

- **Grant-Awarding Bodies**

- American Chemical Society (Petroleum Research Fund)
- Deutsche Forschngsgemeinschaft (DRF)
- Keck Foundation
- Leverhulme Foundation
- Marsden Fund
- The National Geographic Society
- National Environmental Resources Council (NERC)
- National Science Foundation (NSF)
- Reinforcing Women in Research (REWIRE) Fellowship Programme, University of Vienna

- **Publishers**

- Academic Press
- Blackwell Science
- Cambridge University Press
- Geological Society of America
- Heinneman Library
- John Wiley
- Wiley-Blackwell

- **Institutions**

- Smithsonian Institution (National Museum of Natural History)
- University College London
- American Museum of Natural History

TEACHING

- H. Grady Spruce High School, Dallas, Texas
- Southern Methodist University, Dallas, Texas
- The University of Chicago, Chicago, Illinois
- The University of Texas, Dallas, Texas
- The University of Michigan, Ann Arbor, Michigan
- Princeton University, Princeton, New Jersey
- University College London, UK
- Imperial College, London, UK
- Nanjing University, China

STUDENT THESES AND DISSERTATIONS

- Masters (Science, MSc)

1. Sheila Funnell, *A Morphometric Study of Skull Variation in a Horned Carboniferous Amphibian*, Imperial College, 2013, co-supervised with Angela Milner
2. Jack Oyston, *The Diversification of Crocodylus: A Morphometric Approach to Assessing the Correlation Between Skull Morphology and Ecology*, Imperial College, 2013
3. Robert Treasure, *Examining the Gondwanan origin of Passerine birds using morphological data*, Imperial College, 2012, co-supervised with Jo Cooper
4. Lucille Pearce, *The Inference of Function from Form: A Morphometric Analysis of Penguin (Sphenisciformes), Loon (Gaviidae), and Auk (Alcidae) Locomotor Adaptations*, Imperial College, 2012, co-supervised with Jo Cooper
5. Lucinda Kirkpartick, Geometric morphometric techniques applied to the assessment of phylogenetic contraint in echolocation calls in Chiroptera, 2012, co-supervised with Kate Jones
6. Christopher Hunt, *Automated Identification of Culicidae*, Imperial College, 2012
7. Karen Banton, *Growth, sexual dimorphism and left-right asymmetry in canon bones and mandibles of Red Deer (Cervus elaphus) and Fallow Deer (Dama dama) populations*, Imperial College, 2012
8. Gail Austen-Price, *A Geometric Morphometric Approach to Detecting Ecomorphological Patterns in Extant Bears (Carnivora: Ursidae) on the Basis of Skull Shape*, Imperial College, 2011, co-supervised with Roberto Portella Miguez
9. Jonathan Tennant, *A Geometric Morphometric Analysis of Ruminant (Ungulata: Artiodactyla) and Ornithopod (Dinosauria: Ornithischia) Snouts: Comparative and Functional Ecomorphology*, Imperial College, 2011, co-supervised with Roberto Portella Miguez
10. Zoë Hughes, *Are Three Dimensions Better Than Two? A Geometric Morphometric Study using Open Curve Eigenshape Analysis to Determine How Increased Dimensionality Affects the Classification of Ammonoids*, Imperial College, 2011
11. Leila D'Sousa, *Potential Applications of Geometric Morphometric Techniques to Aid Resolution of Panthera (Carnivora: Felidae) Phylogenetic Inconsistencies*, Imperial College, 2011
12. James Rainford, *An Evolutionary Analysis of Disparity with respect to Shape and Form in the Planktonic Foraminifera*, Imperial College, 2009
13. Ben Sobkowiack, Species delimitation within the taxonomically unclear *Pitar* (Calpitaria) *sulcatarius* species group (Bivalvia: Vereridae: Pitarinae) using 3D eigensurface analysis, 2009, co-supervised with Jon Todd

14. Katherine Yexley, *Perspectives of geometric pattern and macroevolutionary processes involved in ammonoid suture evolution*, Imperial College, 2008, co-supervised with Hugh Owens

15. Laura McFarlane, *Geometric morphometric analysis of the humerus as a predictor of environmental preferences in the Strigiformes*, Imperial College, 2008, co-supervised with Jo Cooper

16. Jessica Dean, *Adaptation modification of the human skeleton through habitual activity: a morphometric analysis of the upper limb in Spitalfields weavers*, Imperial College, 2008, co-supervised with Louise Humphrey

17. Alex Papadopulos, *The evolution of dung beetle assemblages: the effects of inter-specific competition on morphology and niche partitioning*, Imperial College, 2007, With Alfried Vogler

18. Timothy Astrop, T*he Family Mecochiridae (Crustacea: Decapoda: a contemporary phylogenetic and morphometric analysis*, Imperial College, 2007

19. Louis Hadjioannou, *Inferring locomotory adaptations based on morphological differences of the astragulus of deer (Cervidae, Artiodactyla) using 3D imagery*, Imperial College, 2007, co-supervised with Andy Currant

20. Holly Sievwright, *The ecomorphology of the avian humerus: using morphometric techniques to predict habitat preferences in the Falconiformes*, Imperial College, 2007

21. Laura Green, *The relationship between humerus shape and wing shape in birds*, Imperial College, 2007, co-supervised with Jo Cooper

22. Mark Young, *Taxonomic re-assessment of the marine crocodile Metriorhynchus (Crocodyliformes: Thalattosuchia) from the Callovian (Middle Jurassic) of England*, Imperial College, 2006

23. Elizabeth Pickering, *Testing species limits using morphometric and molecular data in a morphologically variable Solanum (Solanaceae) species*, Imperial College, 2006

24. Andya Primanda, *Worker mandible shape and feeding groups in termites*, Imperial College, 2006

25. Kalina Davis, *Morphological evolution of Pleistocene bears in response to climatic variations*, Imperial College, 2006, co-supervised with Adrian Lister

26. Timothy Galton, *Taxonomic implications of relative growth and sexual dimorphism in Lystrosaurus (Therapsida, Dicynodontia) from South Africa*, Imperial College, 2006

27. Johanna Babcock, *Taxonomic status of Cave Bears*, Imperial College, 2006 (co-supervised with Andy Currant)

28. Johanna Barbrook, *Comparison of Ursus deningeri and Ursus arctos teeth using geometric morphometrics*, Imperial College, 2006, co-supervised with Andy Currant

29. Natalie Dale-Skey Papilloud, *Sexual shape dimorphism in Araneomorphae: a comparative study*, Imperial College, 2006, co-supervised with Tim Barraclough

30. Olivia Scholtz, *Termite soldier defence strategies: a reassessment of Prestwich's classification using extended eigenshape analyses of head morphology*, Imperial College, 2005

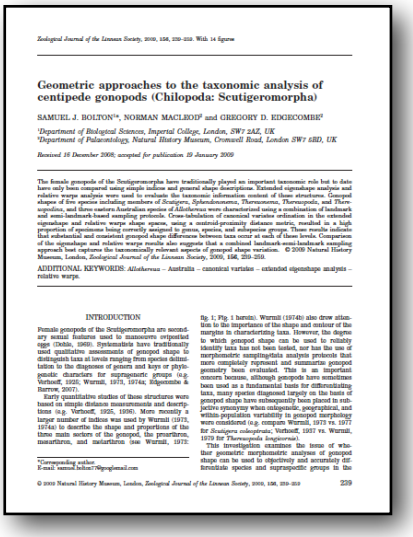
31. Francois Gould, *Distribution of shape variation in the teeth of the European Cave Bear Ursus splaeus Rosenmüller analyzed using three-dimensional*

eigenshape and computer image analysis, Imperial College, 2005, co-supervised with Andy Currant

32. Ursula Smith, *Objective identification of mollusc species using geometric morphometrics*, Imperial College, 2005, co-supervised with Jon Todd
33. Eugenie Barrow, *Morphometric analysis of mole dentaries (Talpidae, Mammalia)*, Imperial College, 2005, co-supervised with Marcelo Sánchez Vilagras
34. Roger Benson, *Morphometric and unsupervised neural net analyses of basal tetrapod dermal sculpture*, Imperial College, 2005
35. Stephen M. Roberts, *A study of cephalopod beak morphology to examine any potential as a phylogenetic tool and improving its usefulness in specimen identification*, Imperial College, 2004
36. Graham Slater, *Geographic variation and subspecific taxonomy in the African leopard Panthera pardus spp*. Imperial College, 2004
37. Katherine M. McDonald, *Investigation into morphometric variation in a collection of laboratory mouse lines, phenotypically selected for large and small size over 60 generations: estimation of allometric scaling exponents for femoral bones and eigenshape analysis of mandible*, Imperial College, 2004
38. Francisca Sandra Kern, *A comparison of how four systematic methods determine hybrid parentage using British Sorbus apomictis as a model organism*, Imperial College, 2001, co-supervised with Chris Humphries
39. Claire Wilsher, *Ecomorphology and evolution of South African dung beetles (Scarabaeinae)*, Imperial College, 2000, co-supervised with Alfried Vogler
40. Russell Seymour, *The subspecies in taxonomy and conservation: patterns of subspecific designations and assessment of methods for determining subspecies*, Imperial College, 1997

- Masters (Research, MRes)

1. Rungtip Wonglersak, *Comparative Analysis of Morphological in Psyllid Wings and Genetic Variation Along a Trans-European Transect*, University College London, 2016
2. James Koh, Assessing the utility of psyllid wing variation for geographic and taxonomic identification, University College London, 2015
3. Laura Upton, *Applying novel digital visualization tools and traditional morphometrics to the ecomorphological analysis of a British dragonfly*, University College London, 2015
4. Andrew Knapp, *A Geometric Analysis of the Functional Morphology of Bird Talons*, Imperial College, 2013



Zoological Journal of the Linnean Society, 2010, 158, 229–253. With 14 figures

Geometric approaches to the taxonomic analysis of centipede gonopods (Chilopoda: Scutigeromorpha)

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The female gonopods of the Scutigeromorpha have traditionally played an important taxonomic role but to date have only been compared using simple indices and general shape descriptions. Extended eigenshape analysis and relative warps analysis were used to evaluate the taxonomic information content of these structures. Gonopod shapes of five species including members of *Scutigera*, *Sphendononema*, *Thereuonema*, *Thereuopoda*, and *Thereuopoditea*, and three eastern Australian species of *Allothereua* were characterized using a combination of landmark and semi-landmark-based sampling protocols. Cross-tabulation of canonical variates ordination in the extended eigenshape and relative warps shape spaces, using a centroid-proximity distance metric, resulted in a high proportion of specimens being correctly assigned to genus, species, and subspecies groups. These results indicate that substantial and consistent gonopod shape differences between taxa occur at each of these levels. Comparison of the eigenshape and relative warps results also suggests that a combined landmark-semi-landmark sampling approach best captures the taxonomically relevant aspects of gonopod shape variation. © 2009 Natural History Museum, London, *Zoological Journal of the Linnean Society*, 2010, 158, 229–253.

ADDITIONAL KEYWORDS: *Allothereua* – Australia – canonical variates – extended eigenshape analysis – relative warps.

INTRODUCTION

Female gonopods of the Scutigeromorpha are secondary sexual features used to manoeuvre cryptobiid eggs (Dobbs, 1960). Systematists have traditionally used qualitative assessments of gonopod shape to distinguish taxa at levels ranging from species delimitation to the diagnoses of genera and keys or phylogenetic characters for supraspecific groups (e.g. Verhoeff, 1928; Wurmli, 1975, 1974a; Edgecombe & Barrow, 2007).

Early quantitative studies of these structures were based on simple distance measurements and descriptions (e.g. Verhoeff, 1925, 1936). More recently a larger number of indices was used by Wurmli (1973, 1974a) to describe the shape and proportions of the three main sectors of the gonopod, the presternum, mesosternum, and metasternum (see Wurmli, 1973: fig. 1; Fig. 1 herein). Wurmli (1974b) also drew attention to the importance of the shape and contour of the margins in characterizing taxa. However, the degree to which gonopod shape can be used to reliably identify taxa has not been tested, nor has the use of morphometric sampling/data analysis protocols that more completely represent and summarize gonopod geometry been evaluated. This is an important concern because, although gonopods have sometimes been used as a fundamental basis for differentiating taxa, many species diagnosed largely on the basis of gonopod shape have subsequently been placed in subjective synonymy when ontogenetic, geographical, and within-population variability in gonopod morphology were considered (e.g. compare Wurmli, 1973 vs. 1977 for *Scutigera coleoptrata*; Verhoeff, 1937 vs. Wurmli, 1979 for *Thereuopoda longicornis*).

This investigation examines the issue of whether geometric morphometric analyses of gonopod shape can be used to objectively and accurately differentiate species and supraspecific groups in the

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5. Emma Johnson, *Sex Determination Using Human Skull Shape*, Imperial College, 2013, co-supervised with Margaret Clegg
6. Rachel Kemp, *Form and texture analysis of butterfly wings*, Imperial College, 2012, co-supervised with Alfried Vogler

7. Emily Saunders, *Adaptive radiation of Paracanthopterygii and Acanthopterygii (Teleostei; Acanthomorpha)*, Imperial College, 2012, co-supervised with Matt Friedman and Zerina Johanson

8. Luke Siberry, Convergence between eutheria and metatheria. How ecological homoplasy is linked to morphological homoplasy, Imperial College, 2011, co-supervised with Andy Current

9. Meillissa Marr, *A geometric morphometric analysis of the lower mandible and cranium in Sciurus vulgaris and its application in sub-species taxonomy*, Imperial College, 2011

10. Beatriz Lopez Gutierrez, *Geometric Morphometric Analysis of the Forcipular Coxosternite of Scutigeromorpha (Chilopoda)*, Imperial College, 2011, co-supervised with Greg Edgecombe

11. Ben Sobkowiak, *Three-dimensional morphometric delimitation of a taxonomically unclear group of bivalve molluscs in the Genus Pitar*, Imperial College, 2010

12. Alex Lee, Functional morphology of the mammalian elbow joint: using a 3D eigensurface approach to infer locomotor behaviour in Palaeogene Mammals, 2010, co-supervised with Andy Currant

13. Michelle Scott, *Centipede mandible morphometrics*, Imperial College, 2009

14. Sam Bolton, *Geometric morphometrics of the gonopods of scutigeromorph centipedes (Chilopoda), with a model-based approach to canonical variates analysis*, Imperial College, 2008

15. Laura Wilson, *Morphometric criteria for sexing juvenile human skeletons: the ilium*, Imperial College, 2007, co-supervised with Louse Humphrey

16. Julia Heathcoat, *Morphometric investigation of iguanodont teeth*, Imperial College, 2004

- Doctorate (PhD)

1. Kristian Moffat, *Automated Species Identification*, Department of Mathematics, Imperial College, 2014

2. Melissa Marr, *Faunal Response to Abrupt Climate Change: The History of the British Fauna From the Late Glacial to the Early Holocene*, Royal Holloway University of London, 2013-present

3. Kalina Davies, *The evolution of bat echolocation*, Queen Mary & Westfield University, 2011-2014

4. Eugenie Barrow, *Systematics and Functional Morphology of Fossil and Extant Hyracoidea (Mammalia)*, Oxford University, 2011-2014

5. Joanne Powell, *Uncertainty Evaluation of Amino Acid Racemization - Towards a new Chronology*,York University 2011-2014

6. Will Parr, *Morphometric investigations of the primate foot joint*, University College London, 2008-2012

7. Russell Seymour, *Patterns of subspecies diversity in the Giraffe, Giraffa camelopardis (Linneaus 1758): comparison of systematic methods and their implications for conservation policy*, University of Kent, 2003-2007

8. Maureen A. O'Leary, *New Data from the Integument and Osteoderms for Amniote Phylogeny*, Johns Hopkins University, 1996-2000

- Post-Doctorate

1. Yukun Shi (2014-2015): http://www.researchgate.net/profile/Yukun_Shi
2. David Steart (2012 - 2014, 2015): https://au.linkedin.com/pub/david-steart/24/a8b/3a7
3. Jon Kreiger (2008 - 2011): http://www.kew.org/science-conservation/research-data/science-directory/people/krieger-jonathan
4. Stig Walsh (2004 - 2007): http://www.nms.ac.uk/about-us/collections-departments/natural-sciences/palaeobiology/dr-stig-walsh/
5. Ann Holbourn (1998-2000): http://www.ifg.uni-kiel.de/461.html
6. Andy Henderson (1997 - 2000)
7. Simon Revets (1998-1999)

MEDIA WORK

- 60 Minutes (Australian TV, Australia)
- BBC World Service Radio (UK)
- Channel 4 Evening News (ITV TV, UK)
- Drive Time (BBC Radio 3, UK)
- Equinox Documentaries (ITV TV, UK)
- Horizon (BBC TV, UK)
- Morning News (BBC TV)
- National Public Radio (US)
- Nature Podcast (Online Media, UK)
- PM (BBC Radio 4, UK)
- Today Programme (BBC Radio 4, UK)
- University Challenge (ITV TV, UK)
- University Challenge (ITV TV, UK)
- The Guardian (Newspaper, UK)
- The Times (Newspaper, UK)
- The Telegraph (Newspaper, UK)

PUBLICATIONS (SUMMARY)

Category	Count
Peer-Reviewed Technical Articles	152
In Press Technical Articles	8
Non-Peer-Reviewed Technical Articles	46
Technical Reports	7
Books, Field Guides & Databases	12
Published Reviews	35
Meeting-Conference-Symposium Abstracts	168
In Press Abstracts	-
Popular Works	33
Total	461

PUBLICATIONS (LISTING)

- **Peer-Reviewed Technical Articles**

1. Archibald, J. D., and MacLeod, N., 2007, Dinosaurs, extinction theories for, *in* Levin, S. A., ed., Encyclopedia of Biodiversity: Amsterdam, Elsevier, p. 1–9.
2. Archibald, J. D., and MacLeod, N., 2013, End-Cretaceous extinction, *in* MacLeod, N., Archibald, J. D., and Levin, P., eds., Grzimek's Animal Life Encyclopedia: Extinctions, Volume 1: Farmington Hills, Michigan, Gale-Cengage, p. 497–512.
3. Archibald, J. D., et al., 2010, Cretaceous Extinctions: Multiple Causes: Science, v. 238, p. 973.
4. Aston, J. D., et al., 2012, Phylogenetic inference for function-valued traits: speech sound evolution: Trends in Ecology and Evolution, v. 27, no. 3, p. 160–166.
5. Barrow, E., and MacLeod, N., 2008, Shape variation in the mole dentary (Talpidae: Mammalia): Zoological Journal of the Linnean Society, v. 153, p. 187–211.
6. Beeson, D., Gartner, S., Keller, G., MacLeod, N., Medus, J., Rocchia, R. and Robin, E., 1994, The K/T Boundary along the Brazos River, Falls County, Texas: Multidisciplinary stratigraphy and depositional environment, New Developments Regarding the K/T Event and Other Catastrophes in Earth History: Houston, Texas, Lunar and Planetary Institute, p. 9–10.
7. Bolton, S., MacLeod, N., and Edgecombe, G. D., 2009, Geometric approaches to the taxonomic analysis of centipede gonopods (Chilopoda: Scutigeromorpha): Zoological Journal of the Linnean Society, v. 156, p. 239–259.
8. Cockitt, J., et al., 2012, Capturing a century of study: the search for the human remains from the first Archaeological Survey of Nubia (1907-1911): Antiquity, v. 86, no. 332, p. 1–3

9. Cockitt, J., MacLeod, N., and David, R., 2018, All that remains? A virtual collection for the Archaeological Survey of Nubia, in Honegger, M. ed., Nubian archaeology in the 21st centruy: Proceedings of the 13th International Conference for Nubian Studies, Neuchâtel, 1-6, September 2014, Leuven, Switzerland, Peeters, p. 835–841.

10. Culverhouse, P. F., et al., 2013, An empirical assessment of the consistency of taxonomic identifications: Marine Biology Research, v. 10, no. 1, p. 73-84

11. Fan, Junxuan-X., Shen, S.-Z., Erwin, Douglas H., Sadler, Peter M., MacLeod, Norman, Cheng, Q.-M., Hou, X.-D., Yang, J., Wang, X.-D., Wang, Y., Zhang, H., Chen, X., Li, G.-X., Zhang, Y.-C., Shi, Y.-K., Yuan, D.-X., Chen, Q., Zhang, L.-N., Li, C., Zhao, Y.-Y., 2020, A high-resolution summary of Cambrian to early Triassic marine invertebrate biodiversity: Science, v. 367, doi:10.1126/science.aax4953.

12. Danellian, T., and MacLeod, N., 2019, Morphometric analysis of two Eocene radiolarian species of the Podocyrtis (Lampterium) lineage: Paleontological Research, v. 23, p. 314–330, doi:10.2517/2019PR007.

13. Figueirido, B., Figueirido, B., Macleod, N., Krieger, J., De Renzi, M., Pérez-Claros, J. A., and Palmqvist, P., 2011, Constraint and adaptation in the evolution of carnivoran skull shape: Paleobiology, v. 37, no. 3, p. 490–518.

14. Forey, P. L., López-Arbarello, A., and MacLeod, N., 2011, A new species of *Lepidotes* (Actinopterygii: semiontiformes) from the Cenomanian (Upper Cretaceous) of Morocco: Palaeontologia Electronica, v. 14, no. 1, p. 1–12.

15. García-Rodriguez, F. J., de la Cruz Aguero, J., Pérez-Enriquez, R., and MacLeod, N., 2004, Morphometric analysis of population differentiation and sexual dimorphism in the blue spiny lobster *Panulirus inflatus* (Bouvier 1895) from NW Mexico, in Elewa, A. M. T., ed., Morphometrics: Applications in Biology and Paleontology: London, Springer, p. 29–44.

16. Hall, M. J., MacLeod, N., and Wardhana, A. H., 2014, Use of wing morphometrics to identify populations of the Old World screwworm fly, *Chrysomya bezziana* (Diptera: Calliphoridae): a preliminary study of the utility of museum specimens: Acta Tropica, v. 138 Suppl, p. 49–55.

17. Hudson, J. D. and MacLeod, N., 1998, Discussion on the Cretaceous–Tertiary biotic transition: Journal of the Geological Society, v. 155, p. 413–419.

18. Huber, B. T., Liu, C., Olsson, R. K., Berggren, W. A., Keller, G., and MacLeod, N., 1994, MicroForum: Comment and response on "The Cretaceous-Tertiary transition in the Antarctic Ocean and its global implications", by G. Keller: Marine Micropaleontology, v. 24, no. 1994, p. 91–118.

19. Keller, G., Armstrong, H., Courtillot, V., Harper, D., Joachimski, M., Kerr, A., MacLeod, N., Napier, W., Palfy, J., and Wignall, P. 2012, Volcanism, impacts and mass extinctions (long version): Geoscientist, v. 22, no. 10.

20. Keller, G., Armstrong, H., Courtillot, V., Harper, D., Joachimski, M., Kerr, A., MacLeod, N., Napier, W., Palfy, J., and Wignall, P. 2012, Volcanism, impacts and mass extinctions (short, print version): Geoscientist, v. 22, no. 10, p. 10-15.

21. Keller, G., Li, L. and MacLeod, N., 1994, The K/T boundary stratotype section at El Kef Tunisia: How catastrophic was the mass extinction, New Developments Regarding the K/T Event and Other Catastrophes in Earth History: Houston, Texas, Lunar and Planetary Institute, p. 59–60.

22. Keller, G., Li, L. and MacLeod, N., 1995, The Cretaceous/Tertiary boundary stratotype section at El Kef, Tunisia: How Catastrophic was the mass extinc-

tion?: Palaeogeography, Palaeoclimatology, Palaeoecology, v. 119, p. 255–273.

23. Keller, N. and MacLeod, N., 1992, Faunal turnover and depth stratification: their relationship to climate and productivity events in the Eocene to Miocene pelagic realm, in Ishizaki, K., and Saito, T., eds., Centenary of Japanese Micropaleontology: Contributed Papers in Honor of Professor Yokichi Takayanagi: Tokyo, Terra Scientific Publishing Company, p. 1–14.

24. Keller, G., and MacLeod, N., 1993, Carbon isotopic evidence for biomass burning at the K-T boundary: Comment and Reply (Comment): Geology, v. 21, p. 1149-1150.

25. Keller, G. and MacLeod, N., 1995, The Cretaceous-Tertiary boundary transition in the Antarctic Ocean: Reply: Marine Micropaleontology, v. 24, p. 101–118.

26. Keller, G., MacLeod, N. and Barerra, E., 1992, Eocene-Oligocene faunal turnover in planktic foraminifera and Antarctic glaciation, in Prothero, D., and Berggren, W. A., eds., Eocene-Oligocene Climatic and Biotic Evolution: Princeton, Princeton University Press, p. 218–244.

27. Keller, G., MacLeod, N., Ivany, L. and Salawitch, R., 1993, Carbon isotopic evidence for biomass burning at the K-T boundary: Comment and Reply: Geology, v. 21, p. 1149–1151.

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38. MacLeod, N., 1982, The first North American occurrence of the Late Cretaceous elasmobranch *Ptychodus rugosus* Dixon with comments on the functional morphology of the dentition and dermal denticles: Journal of Paleontology, v. 56, p. 403–409.

39. MacLeod, N., 1982, Upper Pennsylvanian peri-tidal benthic marine communities from the Wolf Mountain Shale (Canyon Group) north-central Texas, in Cromwell, D., ed., Middle and Upper Pennsylvanian System of North-Central and West Texas: Symposium and Field Conference Guidebook: Midland, Texas, Society of Economic Paleontologists and Mineralogists, p. 167–178.

40. MacLeod, N., 1988, Lower and Middle Jurassic *Perispyridium* (Radiolaria) from the Snowshoe Formation, east-central Oregon: Micropaleontology, v. 34, p. 289–315.

41. MacLeod, N., 1990, Digital images and automated image analysis systems, in Rohlf, F. J., and Bookstein, F. L., eds., Proceedings of the Michigan Morphometrics Workshop: Ann Arbor, MI, The University of Michigan Museum of Zoology, Special Publication 2, p. 21-35

42. MacLeod, N., 1990, Effects of Last Eocene impacts on planktic foraminifera, in Sharpton, V. L., and Ward, P. D., eds., Global catastrophes in Earth history: an interdisciplinary conference on impacts, volcanism, and mass mortality: Boulder, Geological Society of America Special Paper, p. 595–606.

43. MacLeod, N., 1991, Punctuated anagenesis and the importance of stratigraphy to paleobiology: Paleobiology, v. 17, p. 167-188.

44. MacLeod, N., 1993, The Maastrichtian-Danian radiation of triserial and biserial planktic foraminifera: Testing phylogenetic and adaptational hypotheses in the (micro)fossil record: Marine Micropaleontology, v. 21, no. 1, p. 47-100.

45. MacLeod, N., 1994, An evaluation of criteria that may be used to identify species surviving a mass extinction, New Developments Regarding the K/T Event and Other Catastrophes in Earth History: Houston, Texas, Lunar and Planetary Institute, p. 75-77.

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- **Non-Peer-Reviewed Technical Articles**

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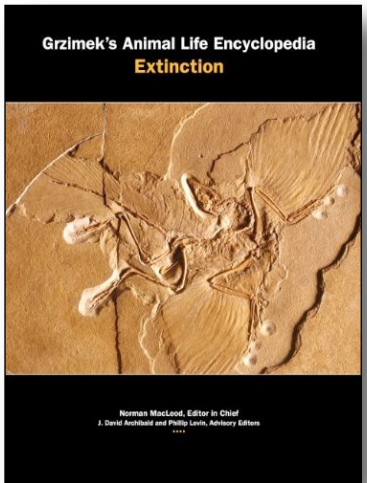

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