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SPECIAL ISSUE PAPER

New Perspectives on Taphonomy

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Q1 *Key words:* ▪▪

Taphonomy constitutes a rapidly evolving discipline that makes an increasingly important contribution to the study of all forms of past life in any ecosystem. It is by essence highly multidisciplinary, permeating practically all disciplines concerned with the scientific study of the past. Taphonomy is also all encompassing in the range of artefactual and ecofactual materials for which it is a concern and wide ranging in terms of the analytical techniques that it draws upon. Outside of palaeontology, taphonomic research has perhaps been most progressive in zooarchaeology. Since the 1970s, research carried out by Brain, Binford, Gifford-Gonzalez, Behrensmeyer, Haynes and Voorhies amongst others has placed zooarchaeology at the vanguard of taphonomic research in archaeology. This is typified in this volume, which in only nine papers, showcases a staggering range of new taphonomic research in zooarchaeology. *New Perspectives on Taphonomy* is a fitting title for this special issue and the International Council for Archaeozoology (ICAZ) 2010 conference session from which the papers derive new integrated modes of analysis and studies that cross disciplinary boundaries, as both comprise research concerning the development of analytical techniques.

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The study of taphonomy is now widely recognised as pivotal to understanding the formation of all archaeological and palaeontological sites and is crucial in reconstructing human–animal relationships and past environments. However, despite the intense research carried out in this area, until recently no formal international forum existed for zooarchaeologists to exchange knowledge and experiences, debate on specific issues and disseminate results. To fill this void, the Taphonomy Working Group (TWG) was approved in autumn 2009 by the International Committee of the ICAZ. The goal of the TWG is to provide a specialist forum for taphonomy researchers, to integrate the subfields of research, facilitate collaborations and promote the advancement of taphonomic studies in all their guises.

The first meeting of the TWG was held at the Paris ICAZ meeting in August 2010 in the form of a session entitled *New Perspectives on Taphonomy*. The session came about as an amalgamation of three complementary session proposals. Two were concerned with experimental and archaeological research into modification and accumulation by hominids, carnivores and other biological agents, and one had a broader focus including environmental modification, biomolecular/histological taphonomy and the effects of heating and fire. So, many research papers comprised themes pertinent to all three sessions that their integration was a natural step to showcase the spectrum of zooarchaeological taphonomic research being undertaken globally. The dynamism of this research culture and the

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increasing awareness of the crucial role taphonomy plays in the interpretation of all faunal assemblages is emphasised by the volume of abstracts that were submitted for the session. Fifty-five pieces of original research were put forward and although *New Perspectives on Taphonomy* was accordingly afforded the greatest length of time (9 h), still fewer than half of the submitted papers could be given podium presentations. This made for a large and highly vibrant poster session, which was exceptionally successful and even included a conference prize winning contribution (by Melanie Fillios). The breadth of research was most striking, with 20 countries from six continents represented and a chronological span from the Pleistocene to the recent past, along with a range of modern observational studies. Far from being limited to the interpretation of zooarchaeological assemblages, papers included original experimental, methodological and theoretical contributions. No taphonomy session ran at ICAZ 2006, but a notable difference between ICAZ 2010 and the taphonomy session of 2002 was the growth of research at a microscopic and molecular scale. This is perhaps unsurprising with the constant advancement of scientific techniques and unquestionably represents an area with vast potential for the future.

The special issue presented here comprises nine selected research papers from the *New Perspectives on Taphonomy* session. Limitations of space and a stringent schedule means that this issue only scratches the very surface in terms of the depth and breadth of research that was presented in Paris, and the organisers look forward to seeing the many excellent showcased research projects come to fruition and publication in the near future. The papers, in this special issue, are nonetheless representative of the session in being suitably diverse, yet displaying the wealth of common connections that make taphonomy such a vibrant field of study, entirely unconstrained by chronology or geography.

Papers by Madgwick and Mulville and Gonzalez *et al*. emphasise the need for a greater understanding of process and the nature of material remains for valid interpretation of taphonomic signatures. These two papers, though utilising very different methods, have similar aims and demonstrate the degree to which modification patterns cannot be interpreted at face value. Madgwick and Mulville seek to advance understanding of variation in the prevalence of weathering, an infrequently utilised taphonomic modification. This is achieved through a novel multivariate statistical approach applied to a large archaeological dataset and successfully establishes factors that have the greatest effect on weathering prevalence (e.g. element, site and taxon) and identifies classes of remains (e.g. mandibulae, long bones) that are inherently more likely to be modified. This represents substantial progress in the knowledge of weathering and considerably enhances the interpretative potential of the modification, as patterns can be more validly interpreted by taking account of variables that dictate prevalence. Research by Gonzalez *et al*. also aims to advance understanding of the manifestation of modifications to improve interpretation of taphonomic datasets. Their research, focussing on the guanaco (*Lama guanicoe*), employs an experimental approach on modern material in investigating the impact of ontogenetic development, skeletal element and density on the processes of weathering and fluvial transport. This insightful paper is a valuable addition to the relatively small corpus of research on these processes and highlights the value of tailored experimental designs for furthering understanding of patterns in the archaeological record.

Papers by Hollund *et al*. and Boschin and Crezzini are the principal representatives for the ever-advancing microscopic/biomolecular field of zooarchaeological taphonomy. In the paper by Hollund *et al*., concerned with histological taphonomy, microscopic modifications on samples from Castricum, a Roman settlement in the Netherlands, are convincingly utilised for the reconstruction of the taphonomic trajectories of bone deposits. Thought still in its relative infancy, the immense potential of histological analysis is clearly demonstrated. It is certain to represent a crucial line of enquiry in future research, particularly when used in combination with other taphonomic indices. Boschin and Crezzini's research tests the potential of a new tool in the taphonomists arsenal—the HIROX Digital Microscope KH-7700 (HIROX, Hackensack, NJ, USA). Building on previous studies using different microscopes, the paper demonstrates the benefits of the rapid acquisition of a range of metrical data in combination with high resolution morphological analysis for the differentiation of flint and metal-derived cut marks in both experimental and archaeological assemblages. The success of this research may provide impetus for the development of wide-ranging uses for microscopes of this type, for instance to identify gnaw marks of different taxa.

Unsurprisingly, the session in Paris had a very strong component of researchers concerned with Palaeolithic zooarchaeology. The volume of taphonomic research in zooarchaeology has tended to correlate with the chronological age of remains. This is perhaps driven by the need to maximise the interpretative potential of material by pursuing wider lines of enquiry when comparatively few remains are recovered. As such, much of the progress that has been made in

zooarchaeological taphonomy both through experimental and archaeological investigations is owed to research on the Palaeolithic period. The diverse ranges of chronological periods represented in the session testify that the balance is slowly being redressed, and a consideration of taphonomy is now widely acknowledged as crucial to all zooarchaeological interpretation. Regardless of this, Palaeolithic zooarchaeology remains the research area in which much of the most detailed programmes of analysis are undertaken. This is typified in this special issue, which includes two meticulous taxon-specific studies of modern and archaeological material conducted with the aim of characterising taphonomic signatures so that human and predator accumulations can be differentiated. Marín and Margalida focus on the bearded vulture (*Gypaetus barbatus*), a taphonomic agent that has been subject to very little study previously. A thorough approach including breakage patterns, skeletal element profiles, the morphology of modifications and a new bone utility index is applied. Analysis extends to several prehistoric, historic and modern accumulations. In this paper, a suite of criteria are established for identifying bearded vulture deposits that will unquestionably be of considerable value in future research on bone accumulations in caves and rock shelters. Lloveras *et al*. employ a fine-grained experimental approach in assessing the taphonomic signature of a more commonly recognised predator, the red fox (*Vulpes vulpes*). The research focussed on the effects on leporid remains, principally through the analysis of scats and undigested remains. The substantial variability observed between wild foxes and those in captivity demonstrates the need for caution in identifying accumulating agents and emphasises the need for multiple studies, even on an individual taxon. Enloe's research tackles the ever-challenging topic of cave taphonomy and again highlights the importance of studies to distinguish between human and non-human agents. Using a meticulous approach assessing taxon abundance, density of remains and spatial distribution in a Middle Palaeolithic cave context, Enloe convincingly differentiates deposits created predominantly by hyenas, early humans and birds of prey. Analysis of spatial distribution (in terms of density/abundance) is a particular focus of the research and emphasises the largely untapped, yet potentially fruitful line of enquiry that this represents.

The paper by Frontini and Ecosteguy aims to characterise the impact of a specific taphonomic agent, namely *Chaetophractus villosus*, a small armadillo. However, the research differs in that its aims are more aligned to establishing the degree and nature of changes caused by the armadillo to archaeological assemblages, rather than to identify accumulations caused by the agent in the distant past. Consequently it also has close links to papers by Madgwick and Mulville and Gonzalez *et al*. in that the research moves toward a model for predicting impacts on different classes of remains, with fragment size being a crucial variable. Stoezel *et al*. focus on herpetofaunal remains and present one of the most comprehensive taphonomic studies of this grossly understudied group in palaeoenvironmental and palaeoecological investigations. This multi-index study includes digestion, other surface modifications, fragmentation and skeletal element profiles. Although the research links with that of Marín and Margalida and Lloveras *et al*. in providing a detailed study of remains with a focus on maximising the interpretative potential of Pleistocene deposits, it differs in that the focus is very much more on the affected fragments rather than the modifying agent. As herpetofaunas occur relatively frequently in archaeological assemblages of all periods, this research makes a vital contribution to the limited corpus of research on this important group, and findings will undoubtedly be of value well beyond Palaeolithic archaeology.

The organisers would like to thank all oral presenters, poster contributors and discussants in the *New Perspectives on Taphonomy* session for making it such a success and look forward to further engaging meetings through the new ICAZ TWG. We are also grateful to the ICAZ organising committee for their efforts in delivering such an outstanding event. As editors, we are very thankful to all the external reviewers who helped us to put together this volume: P. Andrews, G. Avery, S. Bello, J. Enloe, D. Garvey, D. Grayson, J. L. Guadelli, G. Haynes, M. Mondini, O. Pearson, M. Pérez-Ripoll, M. D. Pesquero Fernandez and T. Steele. Their expertise and hard work on a tight deadline have contributed greatly to improve this special issue. Finally, we are indebted to Professor Terry O'Connor for his continued support for the session and his assistance with this publication.

Order of the papers in the issue

1. Madgwick and Mulville
2. Gonzalez *et al*.
3. Hollund *et al*.
4. Boschin and Crezzini
5. Marín and Margalida
6. Lloveras *et al*.
7. Enloe
8. Frontini and Ecosteguy
9. Stoezel *et al*.

Preface

This publication is one of the volumes of the proceedings of the 11th International Conference of the ICAZ, which was held in Paris (France) 23–28 August 2010. ICAZ was founded in the early 1970s and ever since has acted as the main international organisation for the study of animal remains from archaeological sites. The International Conferences of ICAZ are held every 4 years, with the Paris meeting—the largest ever—following those in Hungary (Budapest), the Netherlands (Groningen), Poland (Szczecin), England (London), France (Bordeaux), USA (Washington, DC), Germany (Constance), Canada (Victoria), England (Durham) and Mexico (Mexico City). The next meeting is scheduled be held in Argentina in 2014. The Paris conference—attended by some 720 delegates from 56 countries—was organised as one general and 30 thematic sessions, which attracted, in addition to archaeozoologists (zooarchaeologists), scholars from related disciplines such as bone chemistry, genetics, morphometry anthropology, archaeobotany and mainstream archaeology. This conference was also marked by the involvement in the international archaeozoological community of increasing numbers of individuals from countries of Latin America and of South and East Asia.

As nearly 800 papers were presented at the Paris conference in the form of either oral or poster presentations, it was not possible to organise a comprehensive publication of the proceedings. It was left up to the session organisers to decide if the proceedings of their session would be published and to choose the form such a publication would take. A comprehensive list of publication plan of the 11th ICAZ International Conference is regularly updated and posted on the ICAZ web site.

The conference organisers (Jean-Denis Vigne, Q4 Christine Lefèvre and Marylène Patou-Mathis, organisers of the 11th ICAZ International Conference) would like to take this opportunity to thank the Muséum national d'Histoire naturelle, the Université Pierre et Marie Curie, the Centre national de la Recherche scientifique and the ICAZ Executive Committee for their support during the organisation of the conference and all session organisers—some of them being now book editors—for all their hard work. The conference would not have met with such success without the help of the Alpha Visa Congrès Company, which was in charge of conference management. Further financial help came from the following sources: La Région Île-de-France, the Bioarch European network (French CNRS, Natural History Museum Brussels, Universities of Durham, Aberdeen, Basel and Munich), the LeCHE Marie Curie International Training Network (granted by the European Council), the Institute of Ecology and Environment of the CNRS, the Institut National de Recherche en Archéologie Préventive (INRAP), the European–Chinese Cooperation project (ERA-NET Co-Reach), the Centre National Interprofessionnel de l'Économie Laitière (CNIEL) and its Observatory for Food Habits (OCHA), the Ville de Paris, the Société des Amis du Muséum, the French Embassies in Beijing and Moscow, the laboratory 'Archaeozoology–Archaeobotany' (UMR7209, CNRS-MNHN), the School of Forensics of Lancaster, English Heritage and private donors.

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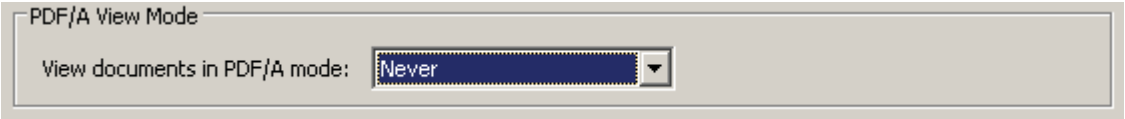

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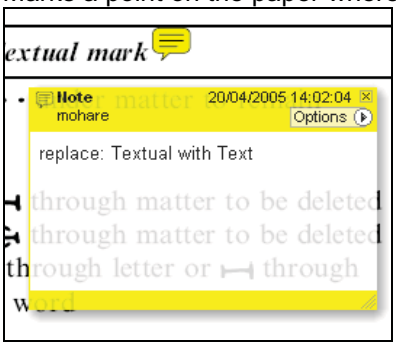

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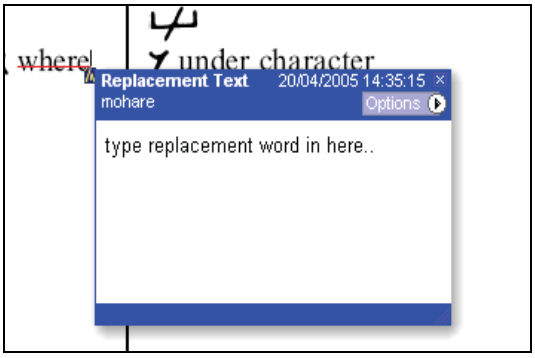

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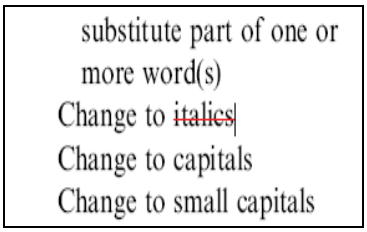

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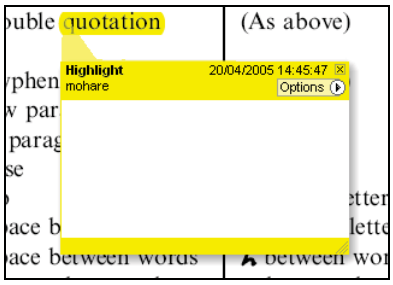

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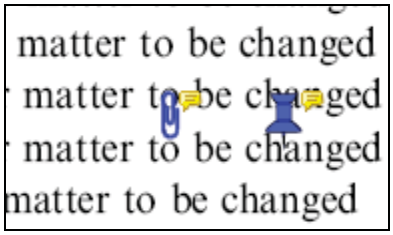

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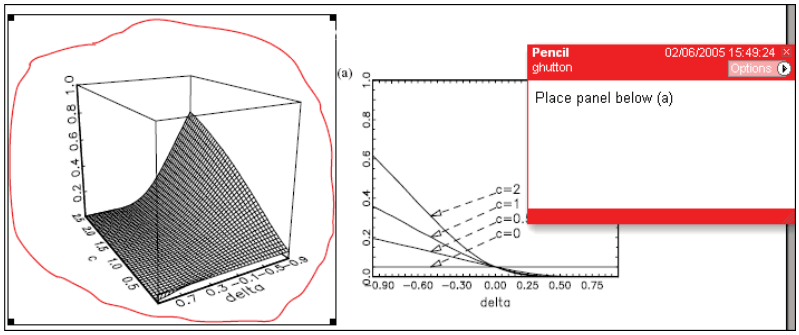

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