

8th International Meeting of the Society of Avian Paleontology and Evolution

Vienna, Austria, 11th -16th June 2012

Venue Naturhistorisches Museum Wien
 Burgring 7, 1010 Wien, Austria
 <http://www.nhm-wien.ac.at/information>

Organizer Ursula GÖHLICH (Vienna)
 Naturhistorisches Museum Wien – Natural History Museum Vienna
 Geologisch-Paläontologische Abteilung – Department for Geology and Paleontology
 Burgring 7, 1010 Wien – Vienna, Austria
 E-mail: ursula.goehlich@nhm-wien.ac.at

Scientific program committee: Luis M. Chiappe, Trevor H. Worthy, Ursula B. Göhlich

Conference assistants Li Ping, Olivier Maridet, Thomas Neubauer, Peter Sziemer (all Vienna)

Programme

Abstracts

Excursions

Programme by U.B. Göhlich

Citation for this volume:

Worthy, T.H. and U.B. Göhlich (eds), 2012. 8th International Meeting of the Society of Avian Paleontology and Evolution, Abstracts, pp ***.

Example citation for abstract in this volume:

Angst, D. and E. Buffetaut, 2012. A large Phorusrhacid bird from the middle Eocene of France, *In*: Worthy, T.H. and U.B. Göhlich (eds) 8th International Meeting of the Society of Avian Paleontology and Evolution, Abstracts, pp ***.

Conference Programme

- 11th (Monday) – 19:00 – 22:30 “Icebreaker Party” in the “Dinosaur Hall” of the Natural History Museum. Enter Museum via side entrance!
- 12th (Tuesday) – 9:00 – 9:30 Registration
9:30 – 16:15 Scientific sessions
16:15 – 17:00 guided tour on roof of the museum (depending on weather)
- 13th (Wednesday) – 9:00 – 15:30 Scientific sessions
15:50 – 17:30 Fossil Identification Session
guided Museum tours, possibility of visiting the Museum’s exhibit, which is open for the public until 21:00 exclusively on Wednesdays
- 14th (Thursday) – 6:30 – 9:00 early morning bird watching tour in the Park of the Imperial Schönbrunn Palace
9:30 – 15:00 Scientific sessions
15:30 – 17:30 Plenary meeting and Auction in lecture Hall
- 15th (Friday) – 9:00 – 10:20 Scientific sessions
11:00 – 12:30 Poster session
14:00 – 16:20 Symposium “Fossil African Avifaunas”
Evening: conference dinner
- 16th (Saturday) – 7:30 – 19:00 Field trip - ornithological excursion

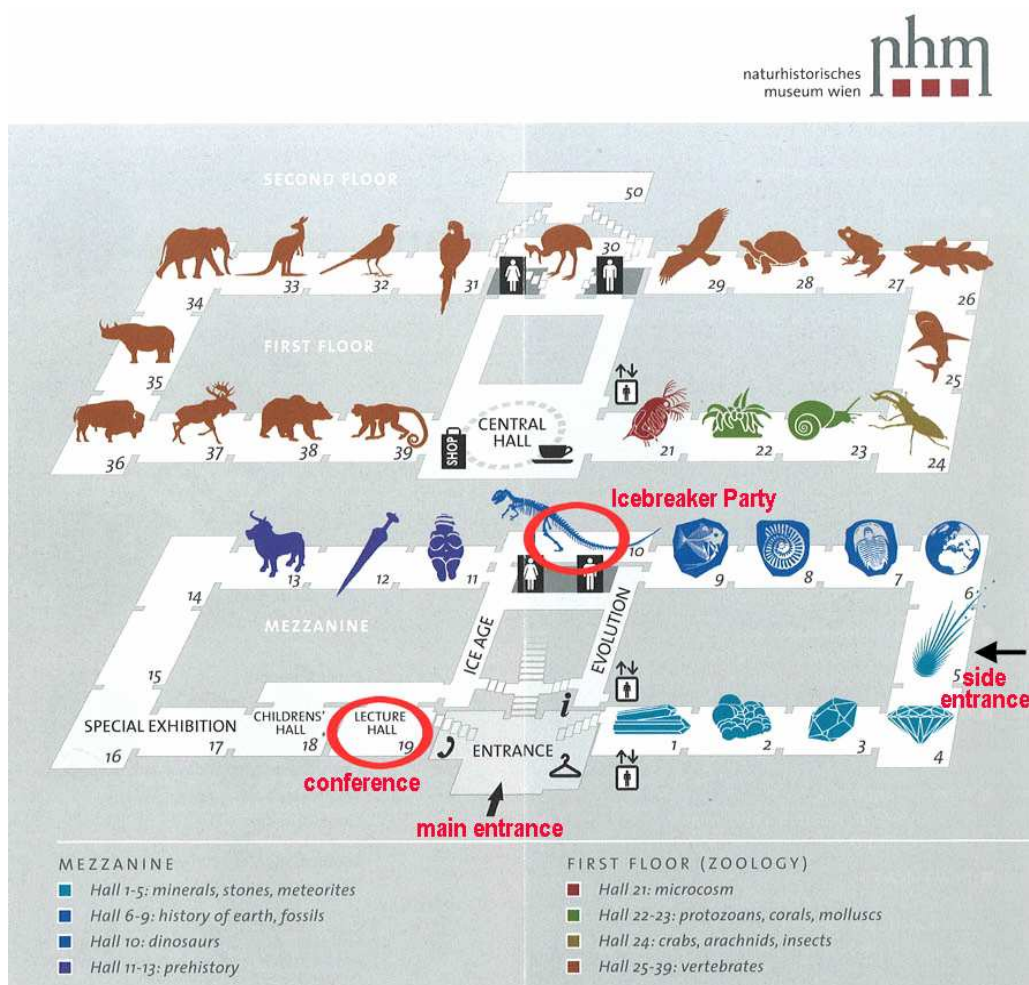


Fig. 1 map of the Naturhistorisches Museum Wien

Session Programme SAPE 11.-16. June 2012

11.6. MONDAY

19:00 – 22:30 **ICEBREAKER PARTY at the NHMW** (Dinosaur Hall - NHMW)
Registration

12.6. TUESDAY (lecture hall – NHMW)

9:00 – 9:30 **Registration**

9:30 – 9:40 GÖHLICH Ursula & KÖBERL Christian, Director of the NHMW- Welcome

9:40 – 10:00 BUFFETAUT Eric (France)
Cretaceous giant birds (real or not): a review

10:00 – 10:20 XU Li (China), BUFFETAUT Eric (France) & TONG Haiyan (Thailand)
A new, remarkably well preserved enantiornithine bird from the Late Cretaceous of Henan, central China

10:20 – 10:40 CHIAPPE Luis M. (USA), GAO Chunling (China), POMEROY Diana L. (USA), ZHANG Fengjiao (China), CHINSAMY-TURAN Anusuya (South Africa), & WALSH Maureen O. (USA)
A taxonomic review of the Early Cretaceous Sapeornithidae: Evicence from a new specimen

10:40 – 11:10 **coffee break (Registration)**

11:10 – 11:30 CHINSAMY-TURAN Anusuya (South Africa), CHIAPPE Luis M. (USA), & MARUGÁN-LOBÓN Jesus (Spain)
Osteohistology and life history of the Early Cretaceous bird *Confuciusornis*

11:30 – 11:50 HU Dongyu, LIU Ying, LI Jinhua, XU Xing, & HOU Lianhai (China)
A New Ornithuromorph (Aves: Ornithothoraces) Bird with Y-shaped furcula from the Jehol Biota, Northeastern China

11:50 – 12:10 O'CONNOR Jingmai (China)
A brief overview of the current data on Enantiornithes (Aves: Ornithothoraces)

12:10 – 12:30 ZHOU Shuang (China)
Anatomy of the basal ornithurine bird *Archaeorhynchus spathula* from the Early Cretaceous of Liaoning, China

12:30 – 14:00 **Noon break**

14:00 – 14:20 WANG Min (China), MAYR Gerald (Germany), ZHANG Jiangyong & ZHOU Zhonghe (China)
New materials with emended information of the enigmatic, rail-like avian taxon *Songzia* Hou, 1990 (Songziidae) from the Early Eocene of China

14:20 – 14:40 ANGST Delphine & BUFFETAUT Eric (France)
A large phorusrhacid bird from the Middle Eocene of France

14:40 – 15:00 BOCHEŃSKI Zbigniew M., TOMEK Teresa & SWIDNICKA Ewa (Poland)
Avian remains from the Oligocene of Poland

15:00 – 15:20 MAYR Gerald (Germany)
Birds from the Rupelian stratotype of Belgium

15:20 – 15:50 **coffee break**

15:50 – 16:15 Tribute to Cécile MOURER-CHAUVIRE

16:15 – 17:00 tour on roof of the museum (depending on weather)

13.6. WEDNESDAY (lecture hall – NHMW)

9:10 – 9:30 DE PIETRI Vanesa, GÜNTERT Marcel (Switzerland) & MAYR Gerald (Germany)
A Haematopus-like skull and other remains of Charadrii from the Early Miocene of Saint-Gérard-le-Puy (Allier, France).

9:30 – 9:50 MOURER-CHAUVIRE Cécile, PEYROUSE Jean-Baptiste & HUGUENEY Marguerite (France)
A new roller (Aves: Coraciiformes s. s.: Coraciidae) from the early Miocene of Saint-Gérard-le-Puy area, Allier, France

9:50 – 10:10 GÖHLICH Ursula (Austria) & BALLMANN Peter (Germany)
A new barn owl (Aves Strigiformes) from the Middle Miocene of the Nördlinger Ries, Germany.

10:10 – 10:30 PAVIA Marco (Italy), LOUCHART Antoine (France) & MOURER-CHAUVIRE Cécile (France)
The extinct barn owls (*Tyto* spp.) of the Western Palearctic Neogene

10:30 – 11:00 **coffee break (Registration)**

11:00 – 11:20 ZELENKOV Nikita (Russia)
Dynamics of the avifauna during the Neogene of Central Asia

11:20 – 11:40 WORTHY Trevor H. (Australia), TENNYSON Alan J.D. (New Zealand), SALISBURY Steven, HAND Suzanne J. (Australia) & SCOFIELD R. Paul (New Zealand)
A fossil kiwi (Apterygiformes) from the Early Miocene St Bathans Fauna, New Zealand

11:40 – 12:00 WORTHY Trevor H. (Australia)
The fossil cormorants and darters of the Australian Tertiary

12:00 – 12:20 NGUYEN Jacqueline (Australia)
Interpreting new passerine remains from the Tertiary of Riversleigh, Australia and St Bathans, New Zealand

12:20 – 14:00 **noon break**

14:00 – 14:20 COOPER Joanne H. (UK)
A bit of a Bustard: a tantalising terrestrial avian megafauna from the Late Pleistocene of Morocco

14:20 – 14:40 MEIJER Hanneke J.M. (USA), JAMES HELEN F. (USA), SUTIKNA THOMAS (Indonesia), DUE RUKHUS A. (Indonesia), TOCHERI MATTHEW W. (USA) & MORWOOD MICHAEL J. (Australia)
Comparing Pleistocene with Present-day avian community structure on Flores, Indonesia

- 14:40 – 15:00 MICHAILIDIS Dimitrios & THEODOROU George E. (Greece)
The fossil avifauna of Charkadio Cave, Tilos Island, Dodecanese, Greece
- 15:00 – 15:20 SCOFIELD Paul, MONTELLE Yann-Piere & WOOD Jamie (New Zealand)
A significant Holocene mainly avian deposit from southern New Zealand: predator assemblage or pitfall?
- 15:20 – 15.50 **coffee break**
- 15:50 – 17:30 FOSSIL IDENTIFICATION SESSION
- 17:30 – 21:00 Possibility of visiting the Museums-exhibit until 9 p.m.

14.6. THURSDAY (lecture hall – NHMW)

- 6:30 – 9:00 Early morning bird watching (Park of the Imperial Schönbrunn Palace)
- 9:30 – 9:50 CAMPBELL Kenneth (USA)
Revisiting the extinct eared owl, *Asio priscus*, of the California Channel Islands
- 9:50 – 10:10 TENNYSON, Alan J.D. & SCOFIELD Paul. R. (New Zealand)
Holocene bird remains from subantarctic Macquarie Island
- 10:10 – 10:30 PANDIT, Meelyn. M., SHAW Jessica & CHINSAMY-TURAN Anusuya (South Africa)
The effects of power line collisions on the age structure and sex ratio of the Ludwig's bustard
- 10:30 – 11:00 **coffee break**
- 11:00 – 11:20 ZINOVYEV Andrey V. (Russia)
Notes on pelvic and hindlimb myology and syndesmology of *Emeus crassus* and *Dinornis robustus* (Aves: Dinornithiformes)
- 11:20 – 11:40 TYRBERG Tommy (Sweden)
A Bibliography of Avian Palaeontology
- 11:40 – 12:00 WORTHY Trevor (Australia)
Avian palaeontology in Australasia in the 21st Century.
- 12:00 – 14:00 **noon break**
- 14:00 – 14:20 CANOVILLE Aurore, CHINSAMY, Anusuya (South Africa) & DE BUFFRÉNIL, Vivian (France)
Aquatic adaptations and long bone microanatomy and histology of marine birds
- 14:20 – 14:40 SMITH Adam (USA)
The fossil record and phylogeny of the Pan-Alcidae
- 14:40 – 15:10 **coffee break**
- 15:10 – 16:30 **PLENARY MEETING** (lecture hall – NHMW)
- 16:30 – 18:00 **AUCTION** (lecture hall – NHMW)

15.6. FRIDAY

- 9:10 – 9:20 BOURDON Estelle, MILNER, Angela C.& WALSH, Stig A. (UK)
Brain morphology and the evolution of modern birds (Neornithes)
- 9:20 – 9:40 WALSH Stig (UK), IWANIUK Andrew(Canada), KNOLL Monja, BOURDON Estelle , BARRETT Paul, MILNER Angela C., ABEL Richie & STERPAIO Patricia D. (UK)
Can the size of the avian cerebellar flocculus be used as a proxy for flying ability in extinct birds?
- 9:40 – 10:00 ATTERHOLT Jessie & MATZKE Nikolas J. (USA)
Phylogenetic mapping of the traits of the avian altricial-precocial spectrum and a preliminary new avian phylogeny based on morphological and molecular data
- 10:00 – 10:20 VAN TUINEN Marcel (USA)
Do transposable elements track neornithine phylogeny?
- 10:20 – 10:50 **coffee break**
- 10: 50 – 12:30 **POSTER SESSION**
- 12:30 – 14:00 **Noon break**
- 14:00 – 14:10 **Symposium – Fossil African Avifaunas**
MANEGOLD Albrecht (Germany) - Introduction
- 14:10 – 14:30 MOURER-CHAUVIRÉ Cécile (France), TABUCE Rodolphe (France), ESSID El Mabrouk, (Tunisia) MARIVAUX Laurent (France), KHAYATI Hayet (Tunisia), VIANEY-LIAUD Monique (France) and BEN HAJ ALI Mustapha (Tunisia)
A small Galliform and a small Cuculiform from the Eocene of Tunisia
- 14:30 – 14:50 HAARHOFF Philippa (South Africa)
The West Coast Fossil Park incorporating the Early Pliocene Langebaanweg palaeontological site
- 14:50 – 15:10 MANEGOLD Albrecht (Germany) & LOUCHART Antoine (France)
The avifauna of Langebaanweg (early Pliocene, South Africa)
- 15:10 – 15:40 **coffee break**
- 15:40 – 16:00 HUME Julian (UK)
A synopsis of the fossil avifauna of the Mascarene Islands
- 16:00 – 16:20 ELZANOWSKI, Andrzej (Poland), LOUCHART, Antoine (France) & AVERY, Graham (South Africa)
Fossil ostriches (*Struthio*) of southern Africa: a preliminary report
- 19:30 – 23:30 **Conference dinner**

POSTER

BELL Alyssa & CHIAPPE Luis M.(USA)

Use of morphometric data in taxonomic assessments: a case study of the Hesperornithiformes

DE PIETRI Vanesa, & COSTEUR Loic (Switzerland)

The fossil bird collection of the Natural History Museum Basel

KESSLER Eugen (Hungary)

On the aquatic origin of Birds

PAVIA Marco & C. BEDETTI Claudia (Italy)

Early Pleistocene fossil birds from Cava Sud, Soave (Verona, North-eastern Italy)

SERRANO-ALARCÓN Francisco J., A. MARTIN, P. PALMQVIST, & SANZ J. Luis (Spain)

Increasing knowledge about flight skill of the Early Cretaceous enantiornithine *Eoalulavis hoyasi*

SHUTE Elen, PRIDEAUX Gavin & WORTHY Trevor H. (Australia)

A Pleistocene avifauna from Australia's Nullarbor Plain: an unprecedented half-million-year record

TORRES Chris & VAN TUINEN Marcel (USA)

The evolution of flamingos as informed by genetic and digital morphological data

VAN TUINEN Marcel, SMITH Adam & KSEPKA Daniel T. (USA)

The fossil calibration database: A new bioinformatics tool for dating divergences of extant lineages by synthesizing paleontological and molecular sequence data.

WANG, Xia (Ireland)., GODEFROIT Pascal (Belgium), DYKE Gareth (UK), ATTERHOLT Jessie (USA), HU Dongyu (China) & ESCUILLE François (France)

A new specimen shows that *Jeholornis* and *Jixiangornis* are the same species

WATANABE Junya & MATSUOKA Hiroshige (Japan)

Ontogenetic change of long bone morphology and surface texture in the extant Gray Heron *Ardea cinerea*

WATANABE Junya (Japan)

Comparisons of skeletal measurements between volancy and flightlessness in Anatidae

List of participants SAPE 2012 - Vienna

in alphabetical order

ANGST Delphine (France, Lyon)	angst.delphine@gmail.com
ATTERHOLT Jessie (USA, Albany)	ajes@berkeley.edu
BOCHEŃSKI Zbigniew (Poland, Kraków)	bochenski@isez.pan.krakow.pl
BOURDON Estelle (United Kingdom, London)	e.bourdon@nhm.ac.uk
BUFFETAUT Eric (France, Paris)	eric.buffetaut@sfr.fr
CAMPBELL Kenneth (USA, Los Angeles)	kcampbell@nhm.org
CANOVILLE Aurore (South Africa, Cape Town)	canoville.aurore08@gmail.com
CHIAPPE Luis (USA, Los Angeles)	luischiappe@gmail.com
CHINSAMY-TURAN Anusuya (South Africa, Cape Town)	anusuya.chinsamy-turan@uct.ac.za
COOPER Joanne (United Kingdom, Tring)	jhc@nhm.ac.uk
DE PIETRI, Vanesa (Switzerland, Basel)	vanesa.depietri@gmail.com
ELZANOWSKI Andrzej (Poland, Warsaw)	elzanowski@miiz.waw.pl
ERICSON Per (Sweden, Stockholm)	per.ericson@nrm.se
GAMAUF Anita (Austria, Vienna)	anita.gamauf@nhm-wien.ac.at
GÖHLICH Ursula (Austria, Vienna)	ursula.goehlich@nhm-wien.ac.at
GREGOROVÁ Ruzena (Czechia, Brno)	rgregorova@mzm.cz
GOEDERT James (USA, Wauna)	jgoedert@u.washington.edu
HAARHOFF Philippa (South Africa, Langebaanweg)	pjh@fossilpark.org.za
HU Dongyu (China, Schenyang)	hudongyu@synu.edu.cn
HUME Julian (United Kingdom, Tring)	j.hume@nhm.ac.uk
KAISER Gary (Canada, Victoria)	gansus@shaw.ca
KESSLER Eugen (Hungary, Szigetszentmiklós)	kessler_jeno@yahoo.com
MANEGOLD Albrecht (Germany, Frankfurt)	albrecht.manegold@senckenberg.de
MARJANOVIĆ David (Germany, Berlin)	david.marjanovic@gmx.at
MAYR Gerald (Germany, Frankfurt)	gerald.mayr@senckenberg.de
MEIJER Hanneke J.M. (USA, Washington)	meijerh@si.edu
MICHAILIDIS Dimitrios (Greece, Athens)	dmichailidis@geol.uoa.gr
MOURER-CHAUVIRE Cécile (France, Lyon)	cecile.mourer@univ-lyon1.fr
NGUYEN Jacqueline (Australia, Sydney)	jacqueline.nguyen@unsw.edu.au
O'CONNOR Jingmai (China, Beijing)	jingmai.oconnor@gmail.com
PANDIT Meelyn (USA, Noblesville)	mpandit@indiana.edu
PAVIA Marco (Italy, Turino)	marco.pavia@unito.it
SCOFIELD Paul (New Zealand, Christchurch)	pscofield@canterburymuseum.com
SERRANO-ALARCÓN Francisco J. (Spain)	fjsa@uma.es
SHUTE Elen (Australia, Adelaide)	elen.shute@gmail.com
SMITH Adam (USA, Durham)	adam_smith@nescent.org
SZIEMER Peter (Austria, Vienna)	peter.sziemer@utanet.at
TENNYSON Alan (New Zealand, Wellington)	alant@tepapa.govt.nz
TORRES Chris (USA, Wilmington)	crt5524@uncw.edu
TYRBERG Tommy (Sweden, Kimstad)	tommy.tyrberg@hotmail.se
VAN TUINEN Marcel (USA, Wilmington)	vantuinenm@uncw.edu
WALSH Maureen (USA, Los Angeles)	mwalsh@nhm.org
WALSH Stig (United Kingdom, Edinburgh)	s.walsh@nms.ac.uk
WANG Min (China, Beijing)	wangmin_nju@163.com
WANG Xia (Ireland, Dublin)	xia.wang@ucdconnect.ie
WATANABE Junya (Japan, Kyoto)	watanabe-j@kueps.kyoto-u.ac.jp
WORTHY Jennifer (Australia, Adelaide)	trevor.worthy@adelaide.edu.au
WORTHY Trevor (Australia, Adelaide)	trevor.worthy@adelaide.edu.au
ZELENKOV Nikita (Russia, Moscow)	nzelen@paleo.ru
ZHOU Shuang (China, Beijing)	zhoushuang_ivpp@163.com
ZINOVIEV Andrei V. (Russia, Tver)	nyroca2002@gmail.com
Conference assistants	
Li Ping (Austria, Vienna)	ppli_chine@yahoo.cn
MARIDET Olivier (Austria, Vienna)	olivier.maridet@nhm-wien.ac.at
NEUBAUER Thomas (Austria Vienna)	thomas.neubauer@nhm-wien.ac.at

Abstracts

List of oral presentations

The abstracts are listed in alphabetical order by first author.

A LARGE PHORUSRHACID BIRD FROM THE MIDDLE EOCENE OF FRANCE

DELPHINE ANGST¹ and ERIC BUFFETAUT²

¹Laboratoire de Géologie de Lyon, CNRS UMR 5276, 2 rue Dubois, 69622 Villeurbanne Cedex, France;
E-mail: angst.delphine@gmail.com

²Centre National de la Recherche Scientifique, UMR 8538, Laboratoire de Géologie de l'Ecole Normale Supérieure, 24 rue Lhomond, 75231 Paris Cedex 05, France; E-mail: eric.buffetaut@sfr.fr

Foot bones of large birds, including a fragmentary tarsometatarsus and several phalanges, from the Middle Eocene of Lissieu (France) were described by Gaillard (*Annales de la Société Linnéenne de Lyon*, 1937, 80, 111-126) as *Diatryma* (?) *cotei*. Although it is generally accepted that it is in fact not a gastornithid, the systematic position of this bird has remained uncertain. A re-examination of the material shows that it is indeed very different from *Gastornis* and actually belongs to a large phorusrhacid, about the size of *Patagornis marshi* from the Miocene of Patagonia (Ameghino, *Boletín del Instituto Geográfico Argentino*, 1895, 15, 501-602). Previous reports of European phorusrhacids (Mourer-Chauviré, *Geobios*, 1981, 14, 637-647; Peters, *Documents des Laboratoires de Géologie de Lyon*, 1987, 99, 71-87) have been dismissed (Alvarenga & Höfling, *Papéis Avulsos de Zoologia*, 43, 55-91) as based on much smaller non-phorusrhacid Cariamae. The large bird from Lissieu must therefore be considered as the first firm evidence of a phorusrhacid in Europe. As phorusrhacids are otherwise known mainly from South America, with isolated occurrences in Antarctica and North America, the presence of such a bird in Europe needs a palaeogeographical explanation. The recent description of a phorusrhacid from the Eocene of Algeria (Mourer-Chauviré *et al.*, 2011, *Naturwissenschaften*, 98, 815-823) strongly suggests that the European form was an immigrant from Africa during an Eocene phase of faunal interchange also supported by other evidence (Gheerbrant & Rage, *Palaeogeography, Palaeoclimatology, Palaeoecology*, 2006, 241, 224-246). The re-interpretation of the bird from Lissieu also raises the question of a possible co-occurrence of gastornithids and phorusrhacids in Europe, and of a possible competition between these two groups of giant birds.

PHYLOGENETIC MAPPING OF TRAITS OF THE AVIAN ALTRICIAL- PRECOCIAL SPECTRUM, AND A PRELIMINARY NEW AVIAN PHYLOGENY BASED ON MORPHOLOGICAL AND MOLECULAR DATA

JESSIE ATTERHOLT¹ and NICHOLAS J. MATZKE¹

¹*Department of Integrative Biology, University of California, Berkeley, CA, USA;
E-mail: ajes@berkeley.edu*

Extant birds can be classified according to the condition of offspring at hatching along an altricial- precocial spectrum, with fully-functional, feathered individuals at one end (precocial) and helpless, blind, naked chicks at the other (altricial). However, the evolution of the various reproductive strategies along this spectrum has been difficult to understand because few studies have placed these data in phylogenetic context. For this project, the altricial-precocial spectrum was discretised seven character states to map life-history data onto current molecular and morphological avian phylogenies. The two trees imply different results: the former suggests that altriciality was evolved independently at least four times (by Passeriformes, Coraciiformes, Cuculiformes, and Apodiformes), while the latter implies a single origin. Both outcomes underscore the need for an avian phylogeny that integrates morphological and molecular data. We present for the first time such a tree, based on a combined analysis. This new cladogram implies that extreme altriciality was evolved independently at least three times, but that there is an overall trend of reverting back to more precocial developmental modes.

AVIAN REMAINS FROM THE OLIGOCENE OF POLAND

ZBIGNIEW M. BOCHENSKI¹, TERESA TOMEK^{1,2}, and EWA ŒWIDNICKA³

¹ *Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Slawkowska 17, 31–016 Krakow, Poland;*

Email: bochenski@isez.pan.krakow.pl and ² tomek@isez.pan.krakow.pl;

³ *Department of Palaeozoology, Zoological Institute, University of Wrocław, Sienkiewicza 21, 50–335 Wrocław, Poland; Email: gama@biol.uni.wroc.pl*

The Oligocene bird remains of Poland have been found in marine deposits of the Menilite Formation of the Outer Carpathians, SE Poland. The marine deposits are primarily known for their very rich fauna of fishes – fossils of other taxa are very scarce. The avian fossils described so far were collected from several exposures located in small villages of Bachów, Jamna Dolna, Pogorzany, Przysietnica and Winnica. They include a hummingbird *Eurotrochilus noniewiczzi* (Bochenski and Bochenski 2008: Journal of Ornithology), two passerines – *Jamna szybiaki* (Bochenski et al. 2011: Journal of Ornithology) and Passeriformes indet. (Bochenski et al. in print: Acta Palaeontologica Polonica), a procellariiform ?*Diomedeoides lipsiensis* (Elzanowski et al. in print: Palaeontology) and a bird with a columbid-like foot of unknown affinities (Bochenski et al. 2010: Acta Ornithologica). Noteworthy is the fact that most of the remains represent birds that are not associated with water environment whereas the sediments include also marine fauna and flora. In this paper, we provide an overview of the sites and give some more information on the geological settings.

BRAIN MORPHOLOGY AND THE EVOLUTION OF MODERN BIRDS (NEORNITHES)

ESTELLE BOURDON¹, ANGELA C. MILNER¹ and STIG A. WALSH²

¹*Department of Palaeontology, the Natural History Museum, Cromwell Road, London SW7 5BD, United Kingdom; Email: e.bourdon@nhm.ac.uk; a.milner@nhm.ac.uk.*

²*National Museums Scotland, National Museums Collection Centre, 242 West Granton Road, Edinburgh EH5 1JA, United Kingdom; Email: S.Walsh@nms.ac.uk*

Although a consensus has been reached concerning the basal divergences of modern birds (Neornithes), the phylogenetic position of key Palaeogene fossil taxa is still poorly understood. Recent studies of the brain anatomy of Palaeogene birds using high resolution X-ray computed tomography (CT) have yielded a whole new set of characters for avian phylogenetics [e.g. WALSH and MILNER, 2011. *Journal of Systematic Palaeontology* 9(1): 173–181]. We obtained virtual brain endocasts for a wide range of fossil and extant birds from CT slice data. These endocasts are being used to define new characters of the brain and endocranium to be used for phylogenetic analysis. The sample consists of 48 extant bird species encompassing all neornithine orders, plus six Palaeogene taxa including *Lithornis* (Lithornithidae), *Dasornis* (Odontopterygiformes), *Presbyornis* (Anseriformes), *Prophaethon* (Phaethontiformes), *Halcyornis* (Halcyornithidae) and *Septentrogon* (Trogoniformes). Several non-neornithine birds including *Archaeopteryx*, *Cerebavis* and *Enaliornis* are being included as outgroups in the analysis. Early results show that brain morphology is highly variable across clades. Anatomical characters include: (1) discrete features such as cranial nerves pathways and position/shape of the wulst; (2) quantitative features such as size of various brain regions relative to overall brain size. Our result will contribute to elucidating higher-level relationships of Neornithes and will provide a clearer picture of the evolution of key features of the avian brain through time. This will enable testing of the hypothesis that forebrain expansion conferred modern birds with an advantage over non-neornithine birds at the Cretaceous-Tertiary boundary [MILNER and WALSH, 2009. *Zoological Journal of the Linnean Society* 155: 198–219].

CRETACEOUS GIANT BIRDS (REAL OR PURPORTED): A REVIEW

ERIC BUFFETAUT

Centre National de la Recherche Scientifique, UMR 8538, Laboratoire de Géologie de l'Ecole Normale Supérieure, 24 rue Lhomond, 75231 Paris Cedex 05, France; E-mail: eric.buffetaut@sfr.fr

The first large Cretaceous bird to be reported, in the 1870s, was *Hesperornis*, with an estimated total length of 1.80 m (Marsh, *Odontornithes*, Government Printing Office, Washington, 1880). However, *Hesperornis* is not generally considered as a “giant bird”, possibly because of its aquatic habits. More recently, Late Cretaceous giant birds were reported from France (*Gargantuavis philoinos* Buffetaut & Le Loeuff, *Journal of the Geological Society*, 1998, 155:1-4) and Kazakhstan (*Samrukia nessovi* Naish *et al.*, *Biology Letters*, 2012, 8:97-100). A simple anatomical comparison shows that *Samrukia nessovi*, which is based on mandibular rami, is clearly not a giant bird, but a large pterosaur, probably an azhdarchid (Buffetaut, *Annales de Paléontologie*, 2011, 97:133-138). As to *Gargantuavis philoinos*, based on sacral and pelvic elements and a femur, the suggestion that it may be a pterosaur (Mayr, *Paleogene fossil birds*, 2009, Springer Verlag, Berlin) is untenable because of lack of anatomical similarities between *Gargantuavis* bones and those of pterosaurs (Buffetaut &

Le Loeuff, *Annales de Paléontologie*, 2010, 96:135–141; Mourer-Chauviré *et al.*, *Naturwissenschaften*, 2011, 98: 815-823). Furthermore, a recently discovered cervical vertebra of a cassowary-sized bird from the Late Cretaceous of southern France (Buffetaut, *Eighth Romanian Symposium on Paleontology, Abstract Book*, 2011, Ars Docendi, Bucharest, 13-14), which can be referred to *Gargantuavis*, shows unmistakably avian characters, suggesting a fairly advanced form, probably close to ornithurines. *Gargantuavis philoinos* thus remains the only well-attested terrestrial giant bird from the Cretaceous, although many aspects of its osteology remain unknown. The need for careful anatomical comparisons (rather than premature phylogenetic analyses) when dealing with fragmentary remains of possible Cretaceous giant birds is emphasized.

REVISITING THE EXTINCT EARED OWL, *ASIO PRISCUS*, OF THE CALIFORNIA CHANNEL ISLANDS

CAMPBELL, KENNETH E. JR.

Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, CA 90007 USA; E-mail: kcampbell@nhm.org

Hildegard Howard described *Asio priscus* from upper Pleistocene (late Wisconsin Glacial Episode) deposits of Santa Rosa Island, one of the Channel Islands in the Pacific Ocean off the southwestern coast of southern California. The holotype, and only known specimen at the time of description, was a tibiotarsus. Since the original description, several additional specimens referable to this extinct species have been recovered, including what appear to be several bones of one individual. Most of the new specimens came from San Miguel Island ~6.0 km northwest of Santa Rosa Island. The new specimens are described for the record and substantiate the original description of the species as distinct from living eared owls. Although the holotypic specimen and other leg bones suggest that *A. priscus* was larger than the Short-eared Owl, *Asio flammeus*, wing bones associated with leg bones suggest that *A. priscus* had smaller wings relative to its legs than does *A. flammeus*, a condition not uncommon in island birds relative to mainland relatives.

AQUATIC ADAPTATIONS AND LONG BONE MICROANATOMY AND HISTOLOGY OF MARINE BIRDS

AUORE CANOVILLE¹, ANUSUYA CHINSAMY¹, VIVIAN DE BUFFRÉNIL²

¹*University of Cape Town, Zoology Department, Private Bag X3, Rhodes Gift 7700, South Africa, E-mail: aurore.canoville@uct.ac.za; anusuya.chinsamy-turan@uct.ac.za*

²*Muséum national d'Histoire Naturelle, Département Histoire de la Terre, UMR 7207 (CR2P), Bâtiment de Géologie, CC 48, 57 rue Cuvier, F-75005 Paris; E-mail: vdebuff@mnhn.fr*

Birds colonized various ecological niches during their evolution. Besides the appearance of flight in the Late Jurassic, by the Early Cretaceous several lineages independently adapted to the aquatic environment and developed swimming and diving specialisations. The degree of aquatic adaptation in avian taxa is directly related to their foraging behaviour. Surface piscivores have an efficient flight and do not swim under water. Several marine birds such as gannets and cormorants have a bimodal locomotion (aerial and sub-aquatic). On the other hand, some lineages have lost the ability to fly, but exhibit remarkable swimming and diving capabilities - a striking example are the

Spheniscidea. Birds have developed contrasting strategies for subaquatic locomotion: while some diving birds, such as cormorants, use their hindlimbs for swimming (hindlimb-propelled divers), others use their modified forelimbs/wings such as the Spheniscidae (forelimb-propelled divers), whereas birds such as gannets seem to have an intermediate adaptation using either wings or feet for underwater propulsion.

A few earlier studies on limb bone have suggested that bone compactness in birds varies according to their lifestyle adaptations. However, most of the previous works encompassed broad, taxonomic comparisons of one or two limb bones, and often consisted of a single adult specimen per species. Very few studies focused on the development of aquatic adaptations in bone during ontogenesis and the difference in bone architecture and microstructure between fore- and hind limbs.

Our study examines the main limb bones (humerus, radius, femur, and tibiotarsus) of specimens of four marine bird species (two spheniscids, one cormorant and one gannet) at different ontogenetic stages (from hatchling to adult stage). The sampled species represent different degrees of adaptation to the aquatic environment, different strategies of locomotion and different developmental patterns.

Our results demonstrate inter-specific variability in long bone compactness in terms of the degree of aquatic adaptation, and the mode of underwater propulsion. The study also highlights differences in the timing of development of the different limb bones and their function in the locomotion. In addition, our study shows the effect of physiological factors, such as moulting and egg laying on the microstructure of bones.

A TAXONOMIC REVIEW OF THE EARLY CRETACEOUS SAPEORNITHIDAE: EVIDENCE FROM A NEW SPECIMEN

LUIS M. CHIAPPE¹, CHUNLING GAO², DIANA L. POMEROY¹, FENGJIAO ZHANG², ANUSUYA CHINSAMY³, and MAUREEN O. WALSH¹

¹*Dinosaur Institute, Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, California 90007, U.S.A; E-mail: luischiappe@gmail.com;*

²*Dalian Natural History Museum, No. 40 Xicun Street, Heishijiao, Shahekou District, Dalian 116023, China, E-mail: homegcl@163.com;*

³*University of Cape Town, Zoology Department, Private Bag X3, Rhodes Gift, 7701 South Africa; E-mail: anusuya.chinsamy-turan@uct.ac.za*

Sapeornithids are in many ways distinctive among the diversity of Early Cretaceous birds of northeastern China. Not only do these birds have a size that exceeds that of any other bird of comparable age, but their wings are remarkably long, and their skeletons display a notable mosaic of primitive (e.g., broad, non-columnar coracoids) and derived (e.g., reduced minor digit of the hand) characters. To date, these birds are known by four named species—*Sapeornis chaoyangensis*, *Sapeornis angustis*, *Didactylornis jii*, and *Shenshiornis primita*—whose validity needs to be critically assessed. We describe the anatomy of a new subadult specimen of *Sapeornis chaoyangensis*, which is the first sapeornithid to preserve substantial portions of its plumage. Found in the Yixian Formation, it also represents the oldest known sapeornithid, and extends the stratigraphic range of this lineage to between 3 and 5 million years. Examination of the characters used to diagnose other previously named sapeornithid species show that such diagnoses have mistakenly incorporated either taphonomic biases or ontogenetic characters. Based on qualitative and quantitative comparisons with other sapeornithid species, we argue that all other named sapeornithids are synonyms of *S. chaoyangensis*.

OSTEOHISTOLOGY AND LIFE HISTORY OF THE EARLY CRETACEOUS BIRD *CONFUCIUSORNIS*

ANUSUYA CHINSAMY¹, LUIS M. CHIAPPE² and JESUS MARUGÁN-LOBÓN³

¹ University of Cape Town, Zoology Department, Private Bag, Rondebosch, 7700, South Africa;

Email: anusuya.chinsamy-turan@uct.ac.za;

² Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles CA 9007, USA;

³ Unidad de Paleontología, Dpto. Biología. Universidad Autónoma de Madrid. 28049 Cantoblanco (Madrid), Spain

Abundant remains of the basal pygostylian bird *Confuciusornis sanctus* have been recovered from the Early Cretaceous of Northeastern China. The specimens are distinctive in showing variation in body size and plumage. Traditionally specimens with long, ornamental tail feathers were interpreted as males and those without them as females. Morphometric data has suggested a lack of correlation between the presence/absence of these feathers and size—they occur in specimens belonging to the two size clusters demarcated by morphometric data. While such distribution did not exclude the possibility of these feathers being a sexual trait, such variation hints that a more complex phenomenon may be at play. Here we investigate the bone microstructure of long bones of different sized individuals of *Confuciusornis* to assess life history patterns. In addition we examine multiple bones from single skeletons of *C. sanctus* to assess skeletal variation, as well as multiple bones from individuals which show obvious differences in plumage. Our results demonstrate variations in terms of histological characteristics such as bone texture, extent of vascularization and presence of growth marks. We document these histological features and assess how they relate to ontogeny, as well as histological variation within the skeleton of *C. sanctus*. On the basis of the histological data derived from this study we deduce information about the life history and overall biology of *Confuciusornis*. Our results agree with earlier hypotheses that like *Archaeopteryx* and other basal birds, *Confuciusornis* experienced a slower growth rate than most extant birds.

A BIT OF A BUSTARD: A TANTALISING TERRESTRIAL AVIAN MEGAFaUNA FROM THE LATE PLEISTOCENE OF MOROCCO

JOANNE H. COOPER

Bird Group, Natural History Museum, Akeman Street, Tring, HERTS, HP23 6AP, UK;

Email: jhc@nhm.ac.uk

The Grotte des Pigeons, Taforalt, in north-eastern Morocco, is one of the most important late Pleistocene archaeological sites in North Africa, placed on the UNESCO World Heritage tentative list in 1995. Recent excavations at the cave have amassed considerable new faunal evidence from its complex archaeological horizons, notably from a cemetery of well-preserved Iberomaurusian human burials, c.20-8kaBP. Still in the final stages of analysis, the avifaunal assemblage is believed to be the richest yet described from the Pleistocene of Morocco. Most of the taxa present probably represent natural input from the site's local avian community, including the pigeons for which the cave is named, and shows strong similarities with the present day communities. However, birds were also important to the human users of the cave, who were exploiting large birds and mammals for both subsistence and symbolic purposes. Remains of ostrich and a significant assemblage of butchered bones from one or more species of large bustard have been found amongst the Iberomaurusian burial contexts. Resolving the identity of the bustards is proving awkward, in part due to the partial nature of the remains and also a lack of modern comparative specimens from key taxa. I will be discussing the results of the latest field season in April 2012, and considering the implications of the Taforalt finds for the palaeobiogeography of this now largely extirpated North African avian megafauna.

A HAEMATOPUS-LIKE SKULL AND OTHER REMAINS OF CHARADRII FROM THE EARLY MIOCENE OF SAINT-GÉRAND-LE-PUY (ALLIER, FRANCE)

VANESA L. DE PIETRI¹, MARCEL GÜNTERT², and GERALD MAYR³

¹*Naturhistorisches Museum Basel, Augustinergasse 2, CH-4001 Basel, Switzerland;*

E-mail: vanesa.depietri@bs.ch;

²*Naturhistorisches Museum der Burgergemeinde Bern, Bernastrasse 15, CH-3005 Bern, Switzerland;*

E-mail: marcel.quentert@nmbe.ch;

³*Senckenberg Forschungsinstitut, Sektion für Ornithologie, Senckenberganlage 25, D-60325 Frankfurt am Main, Germany; E-mail: gerald.mayr@senckenberg.de*

Among shorebirds, Charadrii have the poorest fossil record. The lacustrine, early Miocene deposits of Saint-Gérard-le-Puy in France have yielded several charadriiform birds, but so far no members of the Charadrii. We identified a *Haematopus* (oystercatcher)-like skull from the early Miocene locality of Montaigu-le-Blin, in the Saint-Gérard-le-Puy area. Affinities to Haematopodidae are also supported by a phylogenetic analysis, but the fossil differs in some osteological features from extant oystercatchers. We additionally report two further remains of the Charadriidae, a humerus and a tarsometatarsus, which not only represent the first record of plovers in Saint-Gérard-le-Puy, but, to our knowledge, the earliest Neogene record of this family.

FOSSIL OSTRICHES (*STRUTHIO*) OF SOUTHERN AFRICA: A PRELIMINARY REPORT

ANDRZEJ ELZANOWSKI¹, ANTOINE LOUCHART², and GRAHAM AVERY³

¹ Museum and Institute of Zoology, Polish Academy of Sciences, 64 Wilcza Street, 00-679 Warsaw, Poland; E-mail elzanowski@miiz.waw.pl

² Institut de Génomique Fonctionnelle de Lyon, École Normale Supérieure de Lyon, 46 Allée d'Italie, 69364 Lyon Cedex 07, France; E-mail antoine.louchart@ens-lyon.fr

³ Natural History Collections Department, Iziko South African Museum, Box 61, Cape Town 8000, South Africa; E-mail: gavery@iziko.org.za

We measured some 100 postcranial bones (mostly fragments) of fossil ostriches from eight localities in southern Africa: Grillental (E Mio), Hondeklipbaai (L Mio or E Plio), Langebaanweg (E Plio), Elandsfontein (M-L Pleist), Duinefontein (M Pleist), Swartklip (M-L Pleist), Hoedjiespunt (M-L Pleist), Ysterfontein (L Pleist), and Spreeuwalle (L Pleist). The measurements of femur, tibiotarsus, fibula, tarsometatarsus, and pedal digits III phalanges 1 and 2 and IV phalanx 1 have been compared to those in 16 skeletons of *S. camelus* representing all its subspecies (including the smallest, now extinct *S. c. syriacus*). Consistent with the small size of the Early Miocene *S. coppensi* Mourer-Chauviré, Senut, Pickford, and Mein, 1996, the Grillental femur represents a small ostrich of the size close to that of *S. c. syriacus*. The largest ostriches, some of them much larger than the largest extant *S. camelus*, appear in the Early Pliocene, suggesting a response to the predator pressure of hyenas and machairodontines that is known to have increased in the Miocene. The Pleistocene ostriches did not reach the size of their predecessors but at least some of them were significantly larger than any extant *S. camelus* and persisted through the Late Pleistocene. At least for Hondeklipbaai and Pleistocene localities there is some evidence of the coexistence of two (sub)species that greatly differed in size.

A NEW BARN OWL (AVES: STRIGIFORMES: TYTONIDAE) FROM THE MIDDLE MIOCENE OF SOUTHERN GERMANY

URSULA B. GÖHLICH¹ & PETER BALLMANN²

¹ Naturhistorisches Museum Wien, Geologisch-Paläontologische Abteilung, Burgring 7, A-1010 Wien, Austria; E-mail: ursula.goehlich@nhm-wien.ac.at

² Am Nordpark 1b, D-50733 Köln; E-mail: peterballmann@web.de

The Nördlinger Ries is an approximately 15 million years old impact crater in a Jurassic limestone plateau in Southern Germany. Its Middle Miocene lacustrine deposits are known for their rich vertebrate fossil fauna, which is dominated by micro mammals and small sized birds. The great variety of the bird fauna, comprising Pelecanidae, Phalacrocoracidae, Paelodidae, Anatidae, Rallidae, Charadriidae, Scolopacidae, Glareolidae, Phasianidae, Psittacidae, Coliidae, Apodidae, Capitonidae, and Passeriformes as well as several still undescribed taxa, makes the Nördlinger Ries one of the most important sites of Miocene birds in Europe.

We present a new genus and species of barn owl (Tytonidae) from the Middle Miocene (Astaracium, Mammalian Neogene Unit MN6) of the Nördlinger Ries localities Steinberg and Goldberg. A single individual is represented by well preserved long bones of the extremities, the shoulder girdle and by phalanges of wing and foot. Though clearly belonging to the Tytonidae the new taxon shows some characters intermediate to Strigidae. Additional juvenile bones indicate that the species was breeding at the Middle Miocene Ries Lake.

THE WEST COAST FOSSIL PARK INCORPORATING THE EARLY PLIOCENE LANGEBAANWEG PALAEONTOLOGICAL SITE

PHILIPPA HAARHOFF

West Coast Fossil Park, South Africa, Email: pjh@fossilpark.org.za

Fossils were first discovered at Langebaanweg, Western Cape, South Africa, in the late 1950's during the course of phosphate mining operations by Chemfos Mine. Since then it has been established that this deposit possibly contains the greatest diversity of 5 million year old fossils in the world. Over 200 taxa have been recorded and some of the important discoveries include *Agriotherium africanum*, the first bear ever found in Africa south of the Sahara; *Homiphoca capensis*, an extinct true seal; and four extinct species of penguins.

When mining operations ceased in 1993 the South African Museum, now part of Iziko Museums of Cape Town, together with SAMANCOR, now part of Bhpbilliton, recognized the potential for developing a West Coast Fossil Park. Phase one of this project was launched in September 1998. This enabled a first phase field center for further palaeontological research, education and specialist tourism programmes to operate from the site. A 14 ha area of the mine floor was proclaimed a National Monument Site in 1996 and the entire Park is now a Provincial Heritage site and is in the process of being designated a National Heritage Site in an effort to protect the fossil deposits for posterity.

The Park has the following aims:

- To ensure protection of the fossil heritage of the site and in collaboration with the South African Heritage Resources Agency (SAHRA) to mindfully develop its research, education and tourism potential.
- To offer students, school children and tourists an "on site" fossil experience.
- To provide facilities which enable visitors to learn about environmental changes that have taken place in the West Coast region of South Africa over the past 5 million years.
- To use the area surrounding the fossil site as a model for rehabilitation programmes by demonstrating various ways of reducing human impact on the natural environment.

To realise the aims of the Park several public facilities are being created. Simple structures covering the excavation sites allow visitors to view *in situ* fossils. Existing mine buildings are being converted into education and scientific facilities which provide space for research, store rooms, displays, a library, lecture room, laboratory, curio shop and tea room. The Master Plan provides for further expansion of these facilities.

The West Coast Fossil Park project is addressing socio-economic, environmental, research and educational issues. To achieve this, it is encouraging as much community participation as possible as well as providing a service to the immediate, local, national and international community. In numerous different forums the West Coast Fossil Park has been recognized as being a potential major attraction on the West Coast. Along with the West Coast National Park it provides the necessary balance to the industrial development taking place in this region, and creates an opportunity for people to satisfy their ever-present need to get in touch with the natural world. At present the Park is open to the public seven days of the week for guided tours and school programmes. This presentation will focus on how the fossil birds can be used to foster public interest in the site.

A NEW ORNITHUROMORPH (AVES: ORNITHOTHORACES) BIRD WITH Y-SHAPED FURCULA FROM THE JEHOL BIOTA, NORTHEASTERN CHINA

DONGYU HU,¹ YING LIU,¹ JINHUA LI,¹ XING XU,^{1,2} and LIANHAI HOU^{1,2}

¹*Paleontological Institute of Shenyang Normal University, 253 North Huanghe Street, Shenyang 110034, China; E-mail: hudongyu@synu.edu.cn*

²*Key Laboratory of Evolutionary Systematics of Vertebrates, Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, 142 Xiwai Street, Beijing 100044, China; E-mail: xu.xing@ivpp.ac.cn*

New discoveries from the Early Cretaceous Jehol Group of northeastern China have increased the taxonomic diversity of the clades Enantiornithes and Ornithuromorpha, and meanwhile have blurred the distinctness of the two groups. Here we report a new specimen (PMOL-AB00253) from the upper Jiufotang Formation, Jehol Group, which represents a new basal ornithuromorph with an unusual combination of characters. The bird exhibits several basal ornithuromorpha features, e.g., the synsacrum has a greater number of incorporated vertebrae than more basal birds, the pygostyle is small and plow-shaped as in modern taxa, the coracoid has a procoracoid, a concave lateral margin and a sternolateral process, the scapula is curved and distally tapered, the pubes form a distal symphysis, and the minor metacarpal does not extend further distally than the major metacarpal. Furthermore, it closely resembles the basal ornithuromorph *Archaeorhynchus spathula* from the Lower Yixian Formation in having toothless jaws, the sternum strongly notched caudally with a pair of long lateral trabeculae and longer forelimbs than hind limbs, but it has a bigger body size than the latter. However, it retains a Y-shaped furcula with a significantly elongated hypocleidium and the furcular ramus appears concave laterally as in most known enantiornithines, but unlike a U-shaped element in all known ornithuromorphs. This new find further reduces the morphological gap between the Enantiornithes and Ornithuromorpha and demonstrates the complex distribution of salient morphological features in avialan tree.

This study was supported by the National Natural Science Foundation of China (41172026) and Natural Science Foundation of Liaoning Province (201102199).

A SYNOPSIS OF THE FOSSIL AVIFAUNA OF THE MASCARENE ISLANDS

JULIAN P. HUME

Bird Group, Department of Zoology, The Natural History Museum, Akeman Street, Tring, Hertfordshire HP23 6AP. UK. Email: j.hume@nhm.ac.uk

The isolated Mascarene Islands of Mauritius, Réunion and Rodrigues are situated in the southwestern Indian Ocean. All are volcanic in origin and have never been connected to each other or any other land mass. Despite their comparatively close proximity to each other, each island differs topographically and the islands have generally distinct avifaunas. The Mascarenes remained pristine until recently, so documented accounts were made about the ecology before the islands were irreversibly destroyed by humans in the early 17th century. The first major fossil discoveries were made in the second half of the 18th century on Mauritius and Rodrigues; and in the late 20th century on Réunion, but for Mauritius and Rodrigues in particular, the fossil record was biased toward larger bird species, especially the Dodo *Raphus cucullatus* and Solitaire *Pezophaps solitaria*. This paper provides a synopsis of the fossil Mascarene avifauna, including the hitherto generally

neglected avian orders, especially passerines, which demonstrates that the Mascarene avifauna was much more diverse than previously realised. Therefore, as the islands have suffered severe anthropogenic changes and the fossil record is far from complete, any conclusions based on present avian biogeography must be viewed with caution.

THE AVIFAUNA OF LANGEBAANWEG (EARLY PLIOCENE, SOUTH AFRICA)

ALBRECHT MANEGOLD¹ and ANTOINE LOUCHART²

¹*Senckenberg Forschungsinstitut und Naturmuseum, Sektion Ornithologie, Frankfurt/Main, Germany;
E-mail: albrecht.manegold@senckenberg.de*

²*Department of Cenozoic Palaeontology, Iziko South African Museum, P.O. Box 61, Cape Town 8000, South Africa; present address: Institut de Génomique Fonctionnelle de Lyon, CNRS, UMR 5242, Université de Lyon, École Normale Supérieure de Lyon, 46 Allée d'Italie, 69364 Lyon Cedex 07, France;
E-mail: antoine.louchart@ens-lyon.fr*

The present paper provides an overview on the already famous, but still insufficiently known avifauna from the early Pliocene Varswater Formation at Langebaanweg (South Africa). This site yielded one of the largest pre-Pleistocene bird bone accumulations worldwide. According to conservative estimates, at least 60 bird species of 25 family-taxa are represented here, and most of them mark the earliest record for these taxa on the African continent. Especially diverse is the fossil record of seabirds such as petrels, prions, and shearwaters (Procellariidae), penguins (Spheniscidae), as well as terrestrial taxa such as shorebirds (Charadriiformes) and songbirds (Oscines, Passeriformes). Recent identifications of new bird species shed new light to current hypotheses on the palaeoenvironment and palaeoecology at Langebaanweg. For instance, honeyguides and several cavity nesting birds such as parrots and woodpeckers indicate presence of forested habitats, but evidence for two species of sandgrouse (Pteroclididae), a taxon generally associated with arid to semi-arid landscapes, reveal a little known component of the palaeoenvironment of Langebaanweg area during the Early Pliocene.

BIRDS FROM THE RUPELIAN STRATOTYPE OF BELGIUM

GERALD MAYR

Forschungsinstitut Senckenberg, Sektion Ornithologie, Senckenberganlage 25, D-60325 Frankfurt am Main, Germany; E-mail: Gerald.Mayr@senckenberg.de

The Institut royal des Sciences naturelles de Belgique houses a comprehensive collection of avian bones from the Rupelian stratotype of the Antwerp area in Belgium, which was assembled in the late 19th/early 20th century. Despite its considerable size and taxon richness, however, these fossils remained poorly studied. The first descriptions were published in 1871 by the parasitologist Pierre-Joseph van Beneden, whose identifications are probably erroneous throughout. Here I present the first comprehensive review of the material. The bulk of the fossils belongs to the procellariiform taxon Diomedoididae, which are represented by bones of numerous individuals. In addition to previously described taxa (the possibly anseriformes *Cygnopterus*, the gaviiformes *Colymboides*, and the strigiformes *Selenornis*), I further identified remains of Galliformes, Diomedidae, Parvigruidae, Trogonidae, and Upupiformes. These fossils not only add to a better understanding of the poorly known early Oligocene avifauna of Central Europe, but also provide critical new information on the evolutionary history of some of the above avian groups.

COMPARING PLEISTOCENE WITH PRESENT-DAY AVIAN COMMUNITY STRUCTURE ON FLORES, INDONESIA

HANNEKE J.M. MEIJER^{1,2}, HELEN F. JAMES¹, THOMAS SUTIKNA^{3,4}, ROKHUS AWE DUE³, MATTHEW W. TOCHERI⁵ and MICHAEL J. MORWOOD⁴

¹ Division of Birds, Department of Vertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, DC 20013-7012, USA; E-mail: meijerh@si.edu, jamesh@si.edu

² Naturalis Centre for Biodiversity, Darwinweg 2, 2333 CR Leiden, the Netherlands

³ The National Research and Development Centre for Archaeology, Jl. Raya Condet Pejaten No. 4, Jakarta 12510, Indonesia; E-mail: thomasutikna@yahoo.com

⁴ GeoQuEST Research Centre, School of Earth and Environmental Sciences, University of Wollongong, Wollongong, New South Wales 2522, Australia; E-mail: mikem@uow.edu.au

⁵ Human Origins Program, Department of Anthropology, National Museum of Natural History, Smithsonian Institution, Washington, DC 20013, USA; E-mail: tocherim@si.edu

The avifauna from Liang Bua cave on the Indonesian island of Flores represents the first Pleistocene record of an avian community in Wallacea. The fossil sequence spans ~95.000 years and covers the Late Pleistocene-Holocene transition. We compared community structure of the Pleistocene avifauna with that represented by the modern-day avifauna of Flores by looking at the body size distribution, feeding guild membership, and habitat preference of the species in each faunal list. The results indicate that despite an extinction event at the end of the Late Pleistocene (indicated by the loss of the giant marabou *Leptoptilos robustus* and the vulture *Trigonoceps* sp.), the Late Pleistocene avifauna is quite similar to the extant one in terms of body size, feeding guild membership and habitat spectrum. This is unlike other fossil avifaunas, such as those on Hawaii and New Caledonia, where prehistoric extinctions significantly altered avian community structure. This suggests that, despite a highly endemic mammalian fauna, the Late Pleistocene Flores avifauna maintained faunal exchange with nearby islands.

THE FOSSIL AVIFAUNA OF CHARKADIO CAVE, TILOS ISLAND, DODECANESE, GREECE

D. MICHAILIDIS¹ and G. E. THEODOROU,²

University of Athens, Department of Historical Geology and Palaeontology, 15784 Zografou, Greece,

¹E-mail: dmichailidis@geol.uoa.gr, ² E-mail: gtheodor@geol.uoa.gr

Charkadio cave on Tilos Island is well known for its abundance of Upper Pleistocene- Holocene dwarf elephant material consigned to *Elephas tiliensis* [Theodorou, G., Symeonidis, N. & Stathopoulou, E., 2007. *Elephas tiliensis* n. sp. from Tilos Island (Dodecanese, Greece). *Annales Géologiques des Pays Helléniques*. Vol. 42, p. 19-32.]. Several excavation periods, from 1971 to 2011, apart from mammalian remains, have also yielded about 380 avian remains which represent at least twenty taxa. Specifically these taxa are distributed to eight orders and thirteen families. The most abundant avian remains belong to the Little Owl (*Athene noctua*, more than one hundred skeletal elements) followed by remains of Red-breasted Geese (*Branta cf. ruficollis*, more than forty skeletal elements).

The palaeoavifauna described suggests different ecological conditions for Tilos during the time of deposition than the conditions currently observed. The presence of some species, like the

Boreal Owl (*Aegolius funereus*), indicates more wooded environment, while other species, like the Red-breasted Geese (*Branta cf. ruficollis*), indicate colder conditions. The discovery of several skeletal elements of juvenile geese might suggest that Tilos was used as breeding ground and not for wintering. This data is further supported by a study of gravity cores from the Aegean area whose palynological results proclaim the dominance of steppe vegetation in the region during 20 ka BP and increased forest cover from about 11 ka BP [Kouli, K., Gogou, A., Bouloubassi, I., Triantaphyllou, M. V., Ioakim, Chr., Katsouras, G., Roussakis, G., and Lykousis, V. Late postglacial paleoenvironmental change in the northeastern Mediterranean region: Combined palynological and molecular biomarker evidence. *Quaternary International* (2011), doi:10.1016/j.quaint.2011.10.036].

The lack of evidence of cultural modification (cut marks, fire related bone alteration), the lack of marks from predatory activity and the presence of some skeletal elements in anatomical position, suggest that the majority of the avifaunal accumulation of Charkadio cave represents a natural deposition.

Palaeontological research on Tilos Island has been funded by the Secretariat General for the Aegean and Island Policy of the Ministry of Maritime Affairs, Islands and Fisheries and the Prefecture of the Dodecanese, while research specific to avian remains by the Synthesys project.

A SMALL GALLIFORM AND A SMALL CUCULIFORM FROM THE EOCENE OF TUNISIA

CÉCILE MOURER-CHAUVIRÉ¹, RODOLPHE TABUCE², EL MABROUK ESSID³, LAURENT MARIVAUX²,
HAYET KHAYATI³, MONIQUE VIANEY-LIAUD² and MUSTAPHA BEN HAJ ALI³

¹ Laboratoire de Géologie de Lyon, Université Claude Bernard-Lyon 1, UMR-CNRS 5276, Terre, Planètes et Environnement, 2 rue Dubois, 69622 Villeurbanne Cedex, France. E-mail: cecile.mourer@univ-lyon1.fr

² Institut des Sciences de l'Évolution, UMR-CNRS 5554, cc064, Université Montpellier 2, place Eugène Bataillon, 34095 Montpellier Cedex 05, France. E-mails: Rodolphe.Tabuce@univ-montp2.fr; Laurent.Marivaux@univ-montp2.fr; monique.vianey-liaud@univ-montp2.fr

³ Office National des Mines de Tunis (Service Géologique National), 24 rue 8601, 2035 BP215, ZI la Charguia, 2035 Ariana, 1080 Tunis, Tunisia. E-mails: El Mabrouk Essid: mab_04@yahoo.fr; Hayet Khayati: khayatihayet@yahoo.fr; Mustapha Ben Haj Ali: mustapha.belhajali@onm.nat.tn

A distal tarsometatarsus and a fragment of carpometacarpus of a small Galliform, the size of a Recent quail, have been found in the late early, or early middle, Eocene of Chambi, in Tunisia. Although a large number of stem group representatives of Galliformes are known from the Eocene of the Northern Hemisphere, and one from the middle Eocene of Namibia, the taxon from Chambi differs from them and is described as a new genus and species. A very small zygodactyl form, represented by three distal tarsometatarsi, is also present in the same locality. This form, described as a new genus and species, is attributed to the Recent family Cuculidae. It shows a plesiomorphic character compared to the Recent members of the Cuculidae, but it is, however, more derived than the younger genus *Eocuculus*. It is the earliest Cuculidae known so far.

A NEW ROLLER (AVES: CORACIIFORMES S. S.: CORACIIDAE) FROM THE EARLY MIOCENE OF THE SAINT-GÉRAND-LE-PUY AREA, ALLIER, FRANCE

CÉCILE MOURER-CHAUVIRÉ¹, JEAN-BAPTISTE PEYROUSE² and MARGUERITE HUGUENY¹

¹*Laboratoire de Géologie de Lyon : Terre, planètes, environnement, CNRS UMR 5276, Université Lyon 1, 2 rue Dubois, 69622 Villeurbanne Cedex, France;*

E-mail: cecile.mourer@univ-lyon1.fr and marguerite.hugueney@univ-lyon1.fr

²*7 rue de la Grange Vertu, 71400 Autun, France; E-mail: jbpeyrouse@wanadoo.fr*

A new genus and species of roller (Aves: Coraciiformes s. s.: Coraciidae) is described from the early Miocene of Saint-Gérard-le-Puy. This family had not yet been reported from the rich fossil avifauna of this area. Although the material is fragmentary it shows morphological characteristics different from those of the extinct family Geranoptoridae, and can be attributed to the Recent family Coraciidae. Rodents found in the same locality make it possible to relate it to the MN2a zone. An appendix gives an updated list of the fossil birds identified in the Saint-Gérard-le-Puy area.

INTERPRETING NEW PASSERINE REMAINS FROM THE TERTIARY OF RIVERSLEIGH, AUSTRALIA AND ST BATHANS, NEW ZEALAND

JACQUELINE M.T. NGUYEN

School of Biological, Earth and Environmental Sciences, University of New South Wales, Sydney NSW 2052, Australia; E-mail: jacqueline.nguyen@unsw.edu.au

Molecular studies propose that the passerines (songbirds) originated in the Southern Hemisphere before dispersing north. The oscines, which form 80% of all passerines, are suggested to have originated and radiated in the Australo-Papuan region. Therefore, the Australasian fossil record potentially plays an important role in our understanding of the evolutionary history of these birds. The Riversleigh World Heritage Area, in northwestern Queensland, is one of the richest Tertiary localities for passerine material in Australia. Many remains of fossil passerines have been recovered from Riversleigh, but most of these have not yet been studied in detail. Fossil passerines have also been recovered from the St Bathans Fauna, in Central Otago, New Zealand, considered to be early Miocene (19-16 Ma). Recently described from this avifauna is the only Tertiary record of the New Zealand wrens (Acanthisittidae).

In this talk, I will describe some of the fossil passerines from the Riversleigh avifauna and reveal some families that have not previously been recorded from it, such as the Artamidae and Megaluridae. I will also present new specimens of an acanthisittid wren from the St Bathans avifauna. I am conducting a detailed osteological study that identifies diagnostic characters for the modern passerine families of Australasia and enables a phylogenetic analysis for this radiation. I will use this phylogenetic framework to examine the relationships of the fossil passerines from Riversleigh, as well as comparing it with phylogenies derived from molecular data.

A BRIEF OVERVIEW OF THE CURRENT DATA ON ENANTIORNITHES (AVES: ORNITHOTHORACES)

JINGMAI K O'CONNOR

Institute of Vertebrate Paleontology and Paleoanthropology, 142 Xizhimenwai Dajie, Beijing, China 100044; E-mail: Jingmai.oconnor@gmail.com

Enantiornithes, sister group to Ornithuromorpha – the clade that includes living birds (and together forming Ornithothoraces), is the most diverse known group of Mesozoic birds: over seventy species have been named. A review of the current diversity leaves approximately 45 valid species remaining. The other almost thirty species are mostly *nomina nuda* known from extremely fragmentary specimens that, in light of more recent discoveries, are no longer distinguishable as species. As new specimens and taxa continue to be collected at an unprecedented rate, knowledge of the enantiornithines accumulates revealing important new information. Newly uncovered basal ornithothoracines such as *Schizooura* and *Pengornis* have helped to close the morphological gap that existed between more derived taxa, and clade specific morphological trajectories are becoming apparent. Although experiencing a rapid growth phase, enantiornithines possessed a unique ontogenetic strategy, and also grew slowly for extended periods of time. Exceptional juvenile specimens are also beginning to reveal differences between the ornithothoracine clades in the development of compound skeletal elements. Preserved indicators of diet, such as the wide range of dental morphologies and the complete absence of a single specimen with gastroliths, suggest dietary differences compared to other groups of Mesozoic birds. These biological differences may have factored into the extinction of the enantiornithine clade at the end Cretaceous. Although possessing modern wing integument and advanced aerodynamic structures, such as an alula, enantiornithines also possessed feather morphotypes unknown among more derived birds; the known diversity of integument suggests that, like in other paravian groups, sexual or interspecific display was a major force driving feather evolution in the clade.

THE EFFECTS OF POWER LINE COLLISIONS ON THE AGE STRUCTURE AND SEX RATIO OF THE LUDWIG'S BUSTARD

MEELYN M. PANDIT¹, JESSICA SHAW² and ANUSUYA CHINSAMY-TURAN¹

¹University of Cape Town, Department of Zoology, Rondebosch, Cape Town, South Africa, 7701;
E-mail: Meelyn M. Pandit pndmee001@myuct.ac.za

²University of Cape Town, Percy FitzPatrick Institute of African Ornithology, Rondebosch, Cape Town, South Africa, 7701

Ludwig's Bustard *Neotis ludwigii*, a large terrestrial bird endemic to the dry biomes of South Africa and Namibia, is extremely susceptible to collisions with overhead power lines. Its global conservation status was upgraded to Endangered in 2010, because of the potentially unsustainable mortality caused by these collisions (Jenkins et al. 2011). Power line collision mortality may unequally affect different age and sex classes of collision prone birds, with implications for the long-term survival of the population (Martin et al. 2007). In order to understand how these collisions affect the age structure and the sex ratios of bustard populations, this project examined the bone morphometrics. The lengths of the humerus, as well as the width of the proximal end, the distal end, and the midshaft were measured to confirm the initial sexing based on the sexual dimorphism

in body size. Preliminary results show that males have longer humeri, as well as larger proximal and distal ends than females. Due to the larger body size, male bustards may suffer from higher collision rates, affecting the sex ratio in bustard populations. Future research will focus on examining the bone microstructure to determine if age is a factor in power line collisions.

THE EXTINCT BARN OWLS (*TYTO* SPP.) OF THE WESTERN PALEARCTIC NEOGENE

MARCO PAVIA¹, ANTOINE LOUCHART², CÉCILE MOURER-CHAUVIRÉ³

¹ Museo di Geologia e Paleontologia, Dipartimento di Scienze della Terra, Via Valperga Caluso 35, I-10125 Torino ITALY; E-mail: marco.pavia@unito.it

² Team 'Evo-devo of vertebrate dentition', Institut de Génomique Fonctionnelle de Lyon, CNRS, UMR 5242, ENS de Lyon, Université de Lyon, Université Lyon 1, Ecole Normale Supérieure de Lyon, 46 allée d'Italie, 69364 Lyon Cedex 07, France, E-mail: antoine.louchart@ens-lyon.fr

³ Laboratoire de Géologie de Lyon: Terre, planètes et environnement, CNRS UMR 5276, Université Lyon 1, 2 rue Dubois, 69622 Villeurbanne Cedex, France; E-mail: cecile.mourer@univ-lyon1.fr

The aim of this work is to review all the records of the genus *Tyto* in the Western Palearctic, with the exception of the extant *Tyto alba*, which is known since the Early Pleistocene of Europe, and since the Late Pliocene of Morocco. We propose some revisions and hypothesize possible relationships between some of the various species. The oldest record of *Tyto* is from the Middle Miocene (MN 6) of Steinberg, in the Nordlinger Ries basin, Germany. Then follows the records of *Tyto sanctialbani* from MN 7+8 onwards. The next occurring species is *Tyto campiterrae* (MN 13), then *Tyto balearica* from MN 17 and 18 of Balearic Islands. This species was also identified in older continental deposits of Mediterranean basin and, with the subspecies *T. b. cyrneichnusae*, from the Pleistocene of Corsica and Sardinia. Recently it was also found in the Late Pliocene of Morocco together with the extant *Tyto alba*. There are also three large-sized extinct species, two of them endemic to the Late Miocene of Gargano, *T. gigantea* and *T. robusta*, and the other endemic to the Middle Pleistocene of Sicily, *T. mourerchauvireae*. In addition to these species there is an hitherto undescribed *Tyto* species from the Late Miocene of the Gargano (Southern Italy), previously identified as *Tyto sanctialbani* or *T. balearica*. Recent studies with new fossil material indicate that it is a different new species of *Tyto*. Here we revise the status of some taxa. In particular, part of the continental records of *Tyto balearica* comprises specimens the dimensions of which are very different from those of the type series of *T. balearica*, and that probably represent an additional species. The taxon *cyrneichnusae* is well distinct from *T. balearica* and we argue that it deserves a full species status, even if it is related with *T. balearica*.

A SIGNIFICANT HOLOCENE MAINLY AVIAN DEPOSIT FROM SOUTHERN NEW ZEALAND: PREDATOR ASSEMBLAGE OR PITFALL?

R. PAUL SCOFIELD¹, YANN-PIERRE MONTELLE² and JAMIE WOOD³,

¹ Canterbury Museum, Rolleston Avenue, Christchurch 8001, New Zealand;

E-mail: pscofield@canterburymuseum.com

² 140a Condell Ave, Christchurch, New Zealand;

³ Landcare Research, Gerald Street, Lincoln 7608, New Zealand.

Between 2006 and 2012, we excavated a cave deposit in rural South Canterbury on New Zealand's South Island. The site is a 5 meter deep pit with associated side passages. We will present data showing how the sub-fossil material had accumulated in the pit, which had probably filled in completely. We hypothesise that deforestation, which occurred in the last 200 years, and the associated changes in drainage patterns, the water table and erosion have reactivated the cave diagenesis which has washed the material out. This site is now in developed pasture but the fauna excavated and palynology indicate that this site was previously at the edge of a podocarp/*Nothofagus* woodland. In decreasing order of abundance we have found Finsch's Duck *Chenonetta finschi*, Kakapo *Strigops habroptilus*, Kiwi *Apteryx* spp., Weka *Gallirallus australis*, Tuatara *Sphenodon punctatus* (Reptilia: Sphenodontia) and at least 9 species of passerines. The bones of two significant predators (Eyles' Harrier *Circus teauteensis* and Laughing Owl, *Sceloglaux albifacies*) are also present at the site. Many of the Kakapo crania have marks that could be interpreted as predation sign – we discuss whether this interpretation is valid and which predator might have been responsible.

THE FOSSIL RECORD AND PHYLOGENY OF THE PAN-ALCIDAE

N. ADAM SMITH

The National Evolutionary Synthesis Center, 2024 W. Main Street, Suite A200

Durham, NC 27705-4667; E-mail: adam_smith@nescent.org

Pan-Alcidae is a clade of pelagic charadriiforms that are characterized by wing-propelled diving and anatomical modifications associated with this derived method of prey pursuit. The fossil record of Pan-Alcidae is the richest among Charadriiformes, with approximately 17,000 specimens representing at least 30 extinct species known from localities across the northern Hemisphere. The age range of pan-alcid fossil producing localities spans more than 35 million years from the Late Eocene through the Holocene. Despite the large quantity of remains referred to Pan-Alcidae, the abundance of taxa described from isolated and fragmentary specimens complicated previous attempts to assess paleodiversity in this clade. Evaluation of all remains referred to Pan-Alcidae resulted in taxonomic revision of 12 previously named species and the recognition of 10 previously undescribed species. Furthermore, the results of a combined phylogenetic analysis (morphological and molecular sequence data) including all 23 extant and 29 extinct species of pan-alcid suggest that incongruence between previous systematic hypotheses for the clade are due in part to the restriction of previous analyses to extant taxa. Additionally, the resolution of the systematic position of extinct pan-alcid species provided robust fossil calibrations that facilitated molecular sequence-based divergence time estimation for the clade. Comparison of divergence time estimates and hypothesized paleoclimatic drivers of pan-alcid evolution resulted in a substantially refined understanding of the potential role of environmental factors and the timing of cladogenesis across Pan-Alcidae.

HOLOCENE FOSSIL BIRD REMAINS FROM SUBANTARCTIC MACQUARIE ISLAND

ALAN J.D. TENNYSON¹ & R. PAUL SCOFIELD²

¹Museum of New Zealand Te Papa Tongarewa, P.O. Box 467, Wellington, New Zealand

²Canterbury Museum, Rolleston Avenue, Christchurch 8001, New Zealand;

E-mail: alant@tepapa.govt.nz; pscofield@canterburymuseum.com

Holocene fossil bird bones recovered from several sites on subantarctic Macquarie Island, southwest of New Zealand, provide a novel source of information about the island's history. There has been heavy modification through human activities, including the introduction of foreign mammals and a predatory flightless bird, the weka (*Gallirallus australis*). The extinction of two endemic birds - the Macquarie Island rail (*Gallirallus macquariensis*) and the Macquarie Island parakeet (*Cyanoramphus novaezelandiae erythrotis*) - was documented in historic times. Fossils from the island include both these extinct species and provide evidence of a third global bird extinction - a teal (*Anas* sp.). Most fossil remains are from king penguins (*Aptenodytes patagonicus*) and royal penguins (*Eudyptes schlegeli*) but several other species of seabird are represented, including one widespread species not previously reported from the island - the subantarctic little shearwater (*Puffinus elegans*). The fossils provide evidence of population declines of several species.

A BIBLIOGRAPHY OF AVIAN PALEONTOLOGY

TOMMY TYRBERG

Kimstads v. 37, SE-610 20 Kimstad, Sweden

Email: tommy.tyrberg@hotmail.se

A bibliography of Avian Paleontology comprising about 12,000 references has been compiled and will be made available online. In addition to conventional bibliographic data the bibliography for each reference contains geographic and chronological data, any new taxa described and the type of fossil remains as well as links to those publications that are available on the internet (about 35 % of all). The bibliography will be briefly described, as will some other datasets of interest to avian paleontologists that will become available online.

CAN THE SIZE OF THE AVIAN CEREBELLAR FLOCCULUS BE USED AS A PROXY FOR FLYING ABILITY IN EXTINCT BIRDS?

STIG WALSH¹, ANDREW IWANIUK², MONJA KNOLL³, ESTELLE BOURDON⁴, PAUL BARRETT⁴, ANGELA MILNER⁴, RICHIE ABEL⁵ & PATRICIA DELLO STERPAIO⁶

¹National Museums Scotland, Edinburgh, UK; E-mail: s.walsh@nms.ac.uk;

²Lethbridge University, Lethbridge, Canada; E-mail: andrew.iwaniuk@uleth.ca;

³University of the West of Scotland, Paisley, UK; E-mail: monja.knoll@uws.ac.uk;

⁴The Natural History Museum, London, UK; E-mail: e.bourdon@nhm.ac.uk, p.barrett@nhm.ac.uk,
a.milner@nhm.ac.uk;

⁵Imperial College London, UK; E-mail: richard.abel@imperial.ac.uk;

⁶University of Abertay, Dundee, UK; E-mail: p.dellosterpaio@abertay.ac.uk.

Jerison's Principle of Proper Mass predicts that the relative importance of sensory modalities in a particular taxon should be reflected by the size of brain regions engaged in processing those stimuli. In birds, the principle holds true to the extent that it has even been possible to characterise the avian brain relative to behaviour on the basis of the relative size of brain regions (behavioural 'cerebrotypes'). Such approaches require time-intensive sectioning of fixed Nissl-stained brain tissue to derive volumetric measurements that are not applicable to fossil species. Current X-ray computed tomographic (CT) techniques allow creation of 'virtual' endocasts of fossil and extant taxa, but until recently the only quantitative analysis possible centred on measurements of overall brain volume. As such the CT approach offers few advantages over traditional volume measurements derived from filling the endocranium with particles or fluid displacement of natural endocasts. New quantitative approaches clearly are needed to widen and improve CT endocast analysis. Behaviour of extinct animals has long been inferred from qualitative assessments of brain region size in natural, synthetic and now 'virtual' endocasts. For instance, flight capability in pterosaurs, early neornithines and *Archaeopteryx* has been inferred from the relative size of the cerebellar flocculus, which protrudes from the lateral surface of the cerebellum. Its primary function is to integrate sensory information about rotation and translation of the head in order to ensure gaze stabilisation via the vestibulo-ocular reflex (VOR). Since the VOR is more important in species capable of highly manoeuvrable flight, the flocculus should be larger in such species than in less manoeuvrable fliers. However, this assumption has never been tested empirically. Here, we used CT analysis of the skulls of 60 extant bird species to reconstruct 'virtual' endocasts, and measured the size of the flocculus relative to that of the brain. We then compared this index of relative flocculus size with indices of flying behaviour to provide the first comprehensive test of whether the size of the floccular fossa can be used to infer flight capability in extinct birds and dinosaurs. Our results suggest that a cerebrototype approach has huge potential for bettering understanding of extinct species' behaviour based on endocasts.

DO TRANSPOSABLE ELEMENTS TRACK NEORNITHINE PHYLOGENY?

MARCEL VAN TUINEN

Department of Biology and Marine Biology, UNC at Wilmington, Wilmington NC 28403;

Email: vantuinenm@unwc.edu

Retrotransposable element (RE) insertions are molecular fossils that document evolutionary history. The sequencing of the chicken and zebra finch genome has brought great promise for resolving neognath phylogeny by careful documentation of RE insertion patterns in close galliform and passeriform allies. In particular, abundant avian REs of the chicken repeat 1 (CR1) type have provided evidence for virtually homoplasy-free phylogenetic trees. While intra-ordinal phylogenetic studies have shown tremendous promise, a different pattern is emerging at deeper levels. Attempts to trace the origin of insertion of CR1s active during the initial diversification of Neoaves have revealed several cases of homoplasy, likely due to incomplete lineage sorting. Furthermore, multiple independent insertions can occur in close genetic proximity, and, though less frequent, ancient insertions may even be lost. Thus, phylogenetic inference from ancient REs appears constrained in much the same way as morphological or DNA sequence-based data by assessment of homology and homoplasy. It is anticipated that emerging avian genome sequencing efforts will ease these constraints, particularly once efforts will broadly encompass waterbirds and (lower and higher) landbirds.

NEW MATERIALS WITH EMENDED INFORMATION OF THE ENIGMATIC, RAIL-LIKE AVIAN TAXON *SONGZIA* HOU, 1990 (*SONGZIIDAE*) FROM THE EARLY EOCENE OF CHINA

MIN WANG¹, GERALD MAYR², JIANGYONG ZHANG¹ AND ZHONGHE ZHOU¹

¹*Key Laboratory of Evolutionary Systematics of Vertebrates, Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, Beijing 100044, China;*

²*Forschungsinstitut Senckenberg, Sektion Ornithologie, Senckenberganlage 25, 60325 Frankfurt am Main, Germany;*

E-mails: wangmin_nju@163.com, Gerald.Mayr@senckenberg.de, zhangjiangyong@ivpp.ac.cn, zhonghe@yeah.net

We describe two nearly complete articulated skeletons of a new species of *Songziidae* Hou, 1990 from the early Eocene of Central China. In the original description, *Songziids* were considered most closely related to *Rallidae*, but no convincing evidence has been put forth concerning their affinities. However, these recently discovered specimens provide important anatomical information on this poorly known avian taxon, especially about the skull, thoracic girdle, humerus and pelvic girdle, which makes a comprehensive description and refined assessment of its phylogenetic position available, now. Phylogenetic analyses based on two independent previously published matrixes combining data from the new fossils are performed, but the affinities of *songziids* have not been conclusive solved. One analysis supported *rallid* affinities, and the other resulted in a clade including *Songziidae*, *Messelornithidae*, *Rallidae*, and *Heliornithidae*. Apart from the proportionally much longer legs, the osteology of *Songzia* is, however, more similar to that of the contemporary *Messelornithidae* than to *Rallidae*. The living habit of *Songzia*, inferred from the peculiar combined characters in the sternum and limbs, has also been discussed.

PALAEORNITHOLOGY IN AUSTRALASIA IN THE 21ST CENTURY

TREVOR H. WORTHY

School of Earth and Environmental Sciences, University of Adelaide, Adelaide, South Australia 5005, Australia; E-mail: trevor.worthy@adelaide.edu.au

In this presentation, I will summarize the current state of avian palaeontology in Australia and New Zealand. The Mesozoic record is meagre and contributes nothing to global knowledge. The Neogene record exhibits a fundamental dichotomy of Marine and Terrestrial environments, each with inherent biases and temporal limitations. Two observations deriving from a survey of the record are the paucity of knowledge of basic taxonomic diversity, with not more than half of known taxa described, even in the 'well known' Eyre Basin faunas, and the presence of very large temporal gaps in the record. However, some evidence for the origin of crown clades is forthcoming and a major faunal turnover inferred for the Late Miocene. The Pliocene-Quaternary record will be briefly examined, and some conclusions drawn re the evolutionary origin of the modern avian biota. A brief mention of the scope and scale of advances in knowledge and understanding of the Recent fauna deriving from use of molecular techniques will be made. I conclude with a personal perspective on the current and future direction of research on avian palaeontology in Australasia, why our research is relevant to wider issues in biogeography and evolutionary biology in particular, and from this identify a number of fundamental research questions that await visitation.

THE FOSSIL CORMORANTS AND DARTERS OF THE AUSTRALIAN TERTIARY

TREVOR H. WORTHY

School of Earth and Environmental Sciences, University of Adelaide, Adelaide, South Australia 5005, Australia; E-mail: trevor.worthy@adelaide.edu.au

Cormorants, or shags (Aves: Phalacrocoracidae) as they are locally known, present a conundrum, as their centre of diversity is in the Southern Hemisphere, specifically in the Australasian region, yet a Cenozoic fossil record has been exclusively confined to the Northern Hemisphere, with the oldest taxa from the Oligocene of Europe. Similarly, the darters (Anhingidae), sister taxon of cormorants, have a Middle-Late Miocene Old World fossil record of perhaps a single species and several Early Miocene-Pleistocene New World species, but no Australian pre-Pliocene taxa. Here, a fossil record for both of these families is reported from the Late Oligocene of Australia. Two species of cormorants from the late Oligocene-Early Miocene (26-24 Ma) Etadunna and Namba Formations in the Lake Eyre and Lake Frome Basins of South Australia are described in a new genus. Phylogenetic analyses based on 113 morphological and two integumentary characters indicate that this new genus is the sister taxon to the Early Miocene *Nectornis miocaenus* of Europe and all extant phalacrocoracids. A new fossil anhingid is from the Etadunna Formation in the Lake Eyre Basin, and is the oldest globally. The late Oligocene age of both anhingids and phalacrocoracids requires that the origin of the combined clade (Phalacrocoracoidea) originated minimally during the early Oligocene but more likely in the Eocene. The widespread distribution globally of both clades in the late Oligocene – Early Miocene precludes predicting the biogeographical origin of these birds.

A FOSSIL KIWI (APTERYGIFORMES) FROM THE EARLY MIOCENE ST BATHANS FAUNA, NEW ZEALAND

TREVOR H. WORTHY,^{*}¹ ALAN J. D. TENNYSON,² Steven Salisbury,³ Suzanne J. hand,⁴ and R. PAUL SCOFIELD⁵

¹*School of Earth and Environmental Sciences, University of Adelaide, Adelaide, South Australia 5005, Australia; E-mail: trevor.worthy@adelaide.edu.au*

²*Museum of New Zealand Te Papa Tongarewa, P.O. Box 467, Wellington, New Zealand; E-mail: alant@tepapa.govt.nz*

³*School of Biological Sciences, University of Queensland, Brisbane, Queensland 4072, Australia; E-mail: s.salisbury@uq.edu.au*

⁴*School of Biological, Earth and Environmental Sciences, University of New South Wales, New South Wales 2052, Australia; E-mail: s.hand@unsw.edu.au*

⁵*Canterbury Museum, Rolleston Ave., Christchurch 8001, New Zealand; E-mail: pscofield@canterburymuseum.com*

The St Bathans Fauna from the Early Miocene, Bannockburn Formation, Manuherikia Group, Central Otago, South Island, New Zealand has revealed a diverse vertebrate fauna over the last decade of investigation. It was deposited in a lacustrine setting so unsurprisingly is dominated by fish (eleotrids, galaxiids and retropinnids). However, a diverse non-fish vertebrate fauna revealed in about 5000 specimens, includes frogs, turtles, sphenodontids, squamates, crocodilians, terrestrial and aerial mammals, and birds. Bird fossils dominate the assemblage in both frequency and diversity with about 40 taxa now represented. Waterfowl dominate with nine species in five genera, but other waterbirds (ardeids, palaelodids, charadriiforms and rallids) are diverse. Strictly terrestrial birds, such as accipitrids, psittaciforms, columbids, and passerines are diverse but rare. The fauna has so far revealed representatives of all the quintessential terrestrial vertebrates of New Zealand (sphenodontids, leiopelmatid frogs, moa, strigopid parrots, an aptornithid gruiform, and an acanthisittid wren) but notably has hitherto not revealed kiwi ancestors. Here we report two fossils from the fauna that represent a new species and genus of kiwi (Apterygidae) and which for the first time give insight into the evolution of the clade.

A NEW, REMARKABLY WELL PRESERVED ENANTIORNITHINE BIRD FROM THE LATE CRETACEOUS OF HENAN, CENTRAL CHINA

LI XU¹, ERIC BUFFETAUT² and HAIYAN TONG³

¹*Henan Geological Museum, Zhengzhou, Henan 450016, China; E-mail: xuli.312@163.com*

²*Centre National de la Recherche Scientifique, UMR 8538, Laboratoire de Géologie de l'Ecole Normale Supérieure, 24 rue Lhomond, 75231 Paris Cedex 05, France; E-mail: eric.buffetaut@sfr.fr*

³*Palaeontological Research and Education Centre, Mahasarakham University, Khamrieng Sub-district, Kantharawichai District, Maha Sarakham Province, 44150 Thailand; E-mail: htong09@yahoo.fr*

Excavations undertaken by the Henan Geological Museum in the Qiupa Formation (Late Cretaceous) of Luanchuan County, in the western part of Henan Province, central China, have yielded a remarkably well preserved partial articulated skeleton of a bird, comprising the complete skull and lower jaw as well as many elements of the postcranial skeleton. The structure of the pectoral girdle

and femoral morphology clearly show that the specimen belongs to an enantiornithine. The skull, which has undergone very little crushing, is exquisitely preserved and shows many anatomical details hitherto poorly known in enantiornithines. Both the upper and lower jaws are completely toothless. An unusual character of the new bird, by comparison with Early Cretaceous enantiornithines, is the complete confluence of the antorbital fenestra with the orbit, with no intervening osseous bar. Although it shows some similarities with the roughly coeval *Gobipteryx*, from the Late Cretaceous of Mongolia, the bird from Luanchan differs from it in several respects and will be described as a new taxon. Thanks to its exceptional preservation and completeness, it will provide important new information about the evolution of cranial characters in enantiornithines during the Late Cretaceous.

DYNAMICS OF THE AVIFAUNA DURING THE NEOGENE OF CENTRAL ASIA

NIKITA V. ZELENKOV

Borissiak Paleontological institute of RAS, Profsoyuznaya 123, Moscow 117997, Russia

E-mail: nzelen@paleo.ru

Asia plays an important role in the paleobiogeography, and is assumed to be the territory where many extant groups of birds might have been originated. Unfortunately, these views remain mainly speculative since very little has been known until now about the Paleogene and Neogene Asian avifaunas. In particular, not so many localities have yielded remains of Neogene fossil birds in Asia, and there are only a small number of closely located sites in Western Mongolia from where a representative Pliocene avian fauna has been described (Kurochkin, 1985). Recent stratigraphic studies however show that most of the avian localities in Western Mongolia are older than previously thought. The most important avian locality in the Central Asia, Sharga (also known as "point 1080") in the Gobi-Altai Aimak of Mongolia, was thought to be of the early Pliocene age, while new data on fishes and rodents allows it to be dated to the late Middle Miocene (MN7-8). Just a few species have been described from Sharga previously, but now the assemblage of birds from this locality comprises 17 families and shows a high rate of endemism: only a few genera (*Miopelecanus*, *Palaelodus*, *Ergilornis*) are found outside Mongolia. The fauna of Sharga displays a rather unusual diversity of ducks (3 genera of diving ducks; 4 genera of Anatinae and a tadornine) which indicates the presence of a food-rich water body near the locality in the Miocene. Notably, fossil genera absolutely dominate in the fauna. Given the abundance of bones of aquatic birds in the Sharga locality, the absence of Phoenicopteridae, Phalacrocoracidae, Podicipedidae and Threskiornithidae seems strange and may indicate that these birds were absent from the Central Asia in the late Middle Miocene.

The late Miocene-Early Pliocene stage of the Central Asian avifauna dynamics is known from assemblages of fossil birds from the several localities in the Western Mongolia and Kazakhstan. Notably, the diversity of diving ducks decreases by the late Miocene, reflecting apparently the impoverishment of the lakes due to the changes in the hydrological regime under the increasing aridification. The taxonomic composition of the Mio-Pliocene faunas also differs radically from that of the late Middle Miocene. The majority of the bird genera known from the late Miocene and early Pliocene of the Central Asia are extant and have been also documented from the contemporary faunas of North America and Europe. The role of open-land dwellers increases.

The late Pliocene stage remains poorly studied since only two localities from the Northern Mongolia and Transbaikalia have yielded a representative avifauna. It is nevertheless evident that the fauna of Villafranchian (MN 16) of the Central Asia was dominated by the open-land dwellers and contains numerous arid elements. A number of passerines closely related to extant species are known from this stratigraphic interval.

ANATOMY OF THE BASAL ORNITHURINE BIRD *ARCHAEORHYNCHUS SPATHULA* FROM THE EARLY CRETACEOUS OF LIAONING, CHINA

SHUANG ZHOU^{1,2}

¹ Key Laboratory of Evolutionary Systematics of Vertebrates, Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, Beijing 100044, China;

Email: zhoushuang_ivpp@163.com

² Graduate University of Chinese Academy of Sciences Beijing 100049

As one of the earliest known beaked ornithurine birds, *Archaeorhynchus spathula* is important for understanding the early evolution of this derived avian clade. Recently, two new complete and articulated referred specimens of *Archaeorhynchus spathula* were collected from Lower Cretaceous deposits in Jianchang, Liaoning, northeastern China. These specimens preserve new anatomical information, particularly in regards to the morphology of the skull, including the inner structure of the occiput, fore limbs, hind limbs and sternum. The sternum is similar to that of an unnamed ornithurine from the Xiagou Formation, Gansu Province. These new specimens are inferred to be subadult; together with the holotype of *Archaeorhynchus*; they comprise the entire Early Cretaceous record of subadult ornithurines and reveal important information regarding the ontogeny of this group. The caudal vertebrae are complete in the two referred specimens and provide information about the development of the pygostyle in basal ornithurines. At least four vertebrae form the pygostyle of *Archaeorhynchus* and fusion progresses disto-proximally. The preservation of gastroliths in all known specimens of *Archaeorhynchus* signifies it was likely herbivorous. This detailed account of the skeletal anatomy of *Archaeorhynchus* increases our understanding of the early evolution of ornithurines in the Lower Cretaceous.

NOTES ON PELVIC AND HINDLIMB MYOLOGY AND SYNDESMOLOGY OF *EMEUS CRASSUS* AND *DINORNIS ROBUSTUS* (AVES: DINORNITHIFORMES)

ANDREI V. ZINOVIEV

Zoology Dept., Tver State University, Tver, 170002, Russia; Email: nyroca2002@gmail.com

Dinornis robustus and *Emeus crassus* represent two variants of moa locomotor adaptations, *Dinornis* being more mobile. Nevertheless, the number and the position of their hindlimb muscles are almost identical. The only difference, related to the locomotor specializations is the development of muscles, related to the length of the leg elements. An overall hindlimb anatomy of these two species follows archetype, which is close to the proposed for the avian ancestor. In this way the hindlimb anatomy and syndesmology of moa resemble that of ancestral Tinamiformes, as well as geographically close Apterygiformes and Casuariiformes. Other members of Ratitae, such as Rheiformes and especially Struthioniformes show significant deviations from the archetype due to the distinct locomotor adaptations. Certain traits of hindlimb morphology are peculiar only for Dinornithiformes. First of all, it is the enormous development of *m. iliofemoralis externus*, by far surpassing in bulk mentioned muscle in other birds. Generally reduced, this muscle abducts the femur, thus preventing the passive adduction of this bone during one leg supported locomotor phase. As the massive ratites with wide pelves, moa must have exerted the maximal power of femoral abductors (*m. iliofemoralis externus*, *m. iliotibialis lateralis pars acetabularis*) to keep the body balanced. Changes in the center of gravity, proposed for moa in comparison to other birds and

that of *Dinornis* in relation to other moa, does not have anatomical support. Proceeding from the position of antitrochanter, femora of moa were in the same position as in other cursorial birds. The other difference, unique for moa (although additional observations on mummies are desirable), is an unusual insertion of *m. iliofemoralis internus*. Inserting just distally to the femoral neck on the anterior surface of femoral shaft, it thus must have changed its function of weak outward rotator of femur. The significance of this shift is unclear. Of other pelvic muscles *m. iliofemoralis* have unusually long attachment on the posterior surface of the femoral shaft, feature, observed outside of Dinornithiformes only in *Apteryx* (McGowan, 1979). Terminal tendons of the long digital flexors to the second toe were, at least in *Dinornis robustus*, were strongly separated from those to the other foretoes. This feature might indicate that the second toe have played a major role in scratching and digging, reported as one of the activities of moa in obtaining the food (fern roots).

Poster presentations in alphabetical order

USE OF MORPHOMETRIC DATA IN TAXONOMIC ASSESSMENTS: A CASE STUDY OF THE HESPERORNITHIFORMES.

ALYSSA BELL¹ and LUIS M. CHIAPPE¹

¹ *Dinosaur Institute, Natural History Museum of Los Angeles Co., Los Angeles, CA;*
Email: Alyssa_wjc@yahoo.com

The identification of taxonomic groups in the fossil record can be highly subjective and variable, particularly among species as well as highly incomplete specimens. The practice of relying solely on morphological characters, which may or may not be preserved, as well as the use of general size ranges, can result in contradictory taxonomic assessments often subject to repeated revisions. An excellent example of this sort of taxonomic back-and-forth come from the extinct Hesperornithiformes, a group of globally-distributed Cretaceous aquatic birds. Over 20 species in up to 7 genera have been described since the discovery of the first specimens in the 1870's. A number of these species have been described from highly fragmentary specimens and have been subsequently re-assigned as different species. In order to explore alternative methods of assessing taxonomic identity, this study presents a morphometric analysis of multiple skeletal elements, including the tarsometatarsus, tibiotarsus, and femur. A database of 30-50 measurements per element was developed for specimens from 3 hesperornithiform genera which have been variously assigned to as many as 10 or as few as 6 different species. Representatives of modern loons (*Gavia immer* and *Gavia pacifica*) and grebes (*Aechmophorus occidentalis* and *Aechmophorus clarkii*) were included as well. Measurements were first analyzed using a one-way analysis of variance as well as pair wise t-tests to identify variation in the measurements collected. Following these univariate tests, the complete dataset was analyzed with a principle components analysis in order to explore variance within the database and a canonical discriminant function analysis to summarize between-cluster differences and test classification of specimens to assigned species. Missing data in the fossil dataset was dealt with in two different ways, through database pruning and missing data imputations. This study allows for the quantitative analysis of morphometric variation within fossil species with a convoluted taxonomic history. Results highlight the potential benefits of combining morphometric and traditional descriptive work in paleotaxonomy, such as in the case of *Baptornis varneri*, which our study suggests should not be classified within the genus *Baptornis*. Use of this sort of analysis, in conjunction with detailed morphological work, may provide a less subjective means of determining the taxonomic identity of incomplete fossil specimens.

THE FOSSIL BIRD COLLECTION OF THE NATURAL HISTORY MUSEUM BASEL

VANESA L. DE PIETRI and LOÏC COSTEUR

Naturhistorisches Museum Basel, Augustinergasse 2, 4001 Basel, Switzerland

E-mail: vanesa.depietri@bs.ch, loic.costeur@bs.ch.

The vertebrate collection of the Natural History Museum Basel (NMB) includes a scientifically significant Cenozoic fossil bird collection. For 160 years, the successive curators for vertebrate palaeontology have collected tens to hundreds of thousands of fossils of mostly mammals, with the purpose of addressing all aspects of Cenozoic mammalian evolution. As a result of their collecting efforts, they discovered or acquired fossil birds. These fossils were often less studied than their mammal counterparts but several specimens benefited from large reviews (e.g., Quercy – Gaillard, 1908; Saint-Gérand-le-Puy – De Pietri et al., 2011a, De Pietri & Mayr, in press; European Pleistocene including Senèze – Mourer-Chauviré, 1980; Saint-Vallier – Mourer-Chauviré, 2004), specific descriptions (e.g., Egerkingen – Schaub, 1940; Quercy – Mayr & Mourer-Chauviré, 2008; Saint-Gérand-le-Puy – De Pietri et al., 2011b) and were used as comparative material (e.g.; Saint-Gérand-le-Puy – Cheneval, 1984).

After a carefully scrutiny of the collection, more than 50 localities with fossil birds spanning the Eocene to the Holocene can be counted. Several of these localities have published and figured specimens and some include type material. Examples of holotypes are the Late Eocene duck-like *Romainvillia stehlini* Lebedinski, 1927 and the Early Miocene woodpecker *Piculoides saulcetensis* De Pietri, Manegold, Costeur, and Mayr, 2011. Material-rich localities featured in the collection include Quercy (Eocene to Oligocene, South-Western France), the Saint-Gérand-le-Puy area (Late Oligocene-Early Miocene, Central France) and the locality of Senèze (Early Pleistocene, Central France); all with several tens to hundreds of exquisitely preserved specimens. The fossil collection is well supported by a comparative collection of extant birds with about a thousand skeletons of species distributed within over 23 avian orders.

The poster describes the fossil bird collection in space and time and gives an overview of the diversity of specimens and taxa that are housed in NMB.

ON THE AQUATIC ORIGINS OF BIRDS

EUGEN KESSLER

Eötvös Lóránt University, Department of Paleontology, Budapest 1117, Pázmány Péter sétány 1/C, Hungary. E-mail: kesler_jeno@yahoo.com

According to my hypothesis, a small-sized biped among Archosauria developed into a homoeotherm bird ancestor by developing feathers, and turning from the seaside-shore way of life to the aquatic environment during the end of Triassic–beginning of Jurassic period. Due to wing-propelled diving, the carpometacarpus evolved, the number of digits and phalanges has reduced, and the claws disappeared. Meanwhile the long tail atrophied. Henceforward nesting on land, the beak took the previous functions of the forearm such as in catching, feeding, nest-building, nursing, protection and attack, developing into various forms. The powerful movements of wings resulted in the growth of respective musculature, the rigidity of thoracic vertebrae, the development of synsacrum, the widening of sternum and the development of the *crista sterni* on it. The characteristic structure of tibiotarsus and tarsometatarsus developed due to walking on land.

The four recently known Ornithurinae birds (Neornithes) derived from this Middle-Late Jurassic bird ancestor are as follows: (1) Penguins that live in the water, and have primitive feathers and paleopulmo; (2) Hesperonithids whose wings atrophied due to foot-propelled diving; (3) Ratitae that adopted a terrestrial life style; and (4) Birds that developed remiges, and emerged from the water by wing-beats similar to paddling. Their common origin is evidenced by homogeneous morphological characters such as the form of beak, heterocoel vertebrae, rigid back, synsacrum, pygostyle, saurian ribs and chest, wide sternum, the structure of wing and leg. These all especially differ from the feathered, bird-like group of Sauriurae (Archaeornithes and Enantiornithes) that belong to the dinosaurs. They developed parallel, and only their Archosauria ancestry is common.

EARLY PLEISTOCENE FOSSIL BIRDS FROM CAVA SUD, SOAVE (VERONA, NORTH-EASTERN ITALY)

MARCO PAVIA and CLAUDIA BEDETTI

Museo di Geologia e Paleontologia, Dipartimento di Scienze della Terra, Via Valperga Caluso 35, I-10125 Torino ITALY. E-mail: marco.pavia@unito.it

The fossil bird remains here presented have been collected in different karst cavities opened in the Mesozoic limestone of the Cava Sud quarry at Soave, Verona, North-eastern Italy. The vertebrate assemblage has been analysed, particularly the mammals, and the association contains elements of the Early Pleistocene, particularly referable to the Pirro Faunal Unit of Italian biochronological scale, corresponding to the MNQ 19 of the European Mammal Zone. Some bird remains have been found. They were preliminary determined during the organisation of the Verona museum collections; afterwards a partial analysis of the material was carried out, with the indication of the presence of *Palaeocryptonyx* sp., Alaudidae and *Corvus pliocaenus*.

In the present work the analysis of the fossil bird remains from Cava Sud is presented; the study revealed the presence of 15 bird taxa: *Branta* sp., *Circaetus gallicus*, *Aquila* sp., *Perdix* n. sp., *Palaeocryptonyx donnezani*, Galliformes indet., Charadriiformes indet., *Bubo bubo*, *Strix nebulosa*, Strigidae indet., *Alauda arvensis* vel *Galerida cristata*, Alaudidae indet., *Corvus pliocaenus*, *Carduelis chloris*, Fringillidae indet., *Emberiza* sp.

Palaeocryptonyx donnezani and *Corvus pliocaenus* are extinct taxa of Pliocene origin, rarely reported in the Pleistocene. Cava Sud also has the oldest occurrence of *Circaetus gallicus* and *Strix nebulosa*.

The fossil bird assemblage allows us to make a palaeoenvironmental reconstruction of the area in the Early Pleistocene; the whole association suggests open environment with low vegetation and humid areas, with some species also indicative of woods.

INCREASING KNOWLEDGE ON THE FLIGHT SKILLS OF THE EARLY CRETACEOUS ENANTIORNITHINE *EOALULAVIS HOYASI*

F.J. SERRANO^{*1}, A. MARTÍN¹, P. PALMQVIST¹, and J.L. SANZ²

^{*} E-mail: fjsa@uma.es

¹ Área de Paleontología, Departamento de Ecología y Geología, Facultad de Ciencias, Universidad de Málaga. Campus Universitario de Teatinos s/n, 29071 - Málaga (Spain)

² Área de Paleontología, Departamento de Biología, Facultad de Ciencias, Universidad Autónoma de Madrid. C/ Darwin nº 2, 28049 – Cantoblanco, Madrid (Spain)

The flight skills of a Mesozoic bird, *Eoalulavis hoyasi*, were addressed using estimates of body mass, wing area and wingspan derived from least-squares regression analyses adjusted on measurements of skeletal elements taken in a large data base of extant birds. Subsequently, two key parameters for aerial locomotion were estimated: aspect ratio (AR) and wing loading (WL). These estimates and the dimensions of the alular digit of *E. hoyasi* were compared and plotted with values of modern birds. Multivariate analyses (principal components and canonical discriminant analysis) between the linear measurements of wing bone elements were also performed.

Flight mode is highly influenced in birds by the environment where they live (e.g., degree of tree coverage) and a number of studies have shown that flight type correlates with AR and WL values in modern flying animals, which in turn depends on the morphology of wing bones. For this reason, we have obtained some paleobiological inferences on the flight capabilities of *E. hoyasi*. However, these results should be interpreted with caution, because Enantiornithes is a basal clade of Ornithothoraces while Neornithes represent the avian crown group. This means that some differences in wing design could represent key adaptive innovations in the evolutionary history of the groups compared. As a result, the inferences on the flight skills of *E. hoyasi* could be biased by the effects of phylogenetic legacy.

A PLEISTOCENE AVIFAUNA FROM AUSTRALIA'S NULLARBOR PLAIN: AN UNPRECEDENTED HALF-MILLION-YEAR RECORD

ELEN SHUTE¹, GAVIN PRIDEAUX¹, TREVOR WORTHY²

¹School of Biology, Flinders University, Bedford Park, Adelaide, South Australia, 5042;

E-mail: elen.shute@flinders.edu.au, gavin.prideaux@flinders.edu.au.

²School of Earth and Environmental Sciences, University of Adelaide, North Terrace, Adelaide, South Australia, 5005; E-mail: trevor.worthy@adelaide.edu.au

Thylacoleo Caves (Nullarbor Plain, south-central Australia) is a site of crucial importance for understanding how southern Australia's arid environment evolved during the Pleistocene. It is Australia's only known fossil deposit that spans the half-million-year window from >780,000 yr BP to ~300,000 yr BP. The vertebrate fossil fauna from the site is exceptionally rich and well-preserved, and includes 23 species of kangaroo, and the first complete skeleton of the extinct marsupial lion *Thylacoleo carnifex* (Prideaux *et al.*, 2007, *Nature*, vol.445). Today the Nullarbor Plain is virtually treeless, but fossils of previously-unknown tree-kangaroo species from Thylacoleo Caves indicate that the region had dramatically different vegetation in the relatively recent past (Prideaux & Warburton, 2009, *J Vert Palaeo*, vol.25). Today, the Nullarbor's arid chenopod scrubland is a major biogeographic barrier between eastern and western Australia, and prevents the dispersal of many bird taxa. Abundant bird fossils from Thylacoleo Caves will allow the first direct investigation of

when and how the regional avifauna changed in response to regional climatic and vegetation change during the Pleistocene.

THE EVOLUTION OF FLAMINGOS AS INFORMED BY GENETIC AND DIGITAL MORPHOLOGICAL DATA

CHRIS TORRES and MARCEL VAN TUINEN

Department of Biology and Marine Biology, University of North Carolina at Wilmington, Wilmington, NC 28403, USA. E-mail: crt5524@uncw.edu

The filter-feeding apparatus of flamingos (Phoenicopteridae) is unique among birds and represents significant evolutionary disparity from its presumed closest relatives, the grebes, as well as all other suggested sister taxa (e.g., shorebirds and wading birds). It may also differ from basal flamingos (Palaelodidae). Furthermore, while sister status with the grebes is well supported based on both molecular and morphological evidence, higher-order relationships remain controversial. Phylogenetic resolution may inform the evolution of the unique flamingo feeding style. To assess the evolution of the filter-feeding apparatus, skulls of most of the six extant species of flamingos, as well as two grebes representing the basal split within Podicipediformes, were scanned using computed tomography (CT) analysis. Further work will complete the flamingo dataset as well as add data for extinct basal flamingos. Three-dimensional models of the skulls were studied to elucidate morphological signal for the attachment of the filter-feeding mechanism. Furthermore, the semi-circular canals, which can be used as a proxy for head orientation, were reconstructed in an attempt to detect any morphology signaling filter-feeding behavior. The higher-order phylogenetic context was investigated by sequencing eighteen genes from all six extant flamingos, as well as a number of grebes and taxa representing all previously suggested sister clades. Preliminary CT and phylogenetic data are presented.

THE FOSSIL CALIBRATION DATABASE: A NEW BIOINFORMATIC TOOL FOR DATING DIVERGENCES OF EXTANT LINEAGES BY SYNTHESIZING PALEONTOLOGICAL AND MOLECULAR SEQUENCE DATA

MARCEL VAN TUINEN¹, ADAM SMITH² and DANIEL T. KSEPKA³

¹ *Department of Biology and Marine Biology, UNC at Wilmington, Wilmington NC 28403;
Email: vantuinenm@unwc.edu*

² *The National Evolutionary Synthesis Center, 2024 W. Main Street, Suite A200
Durham, NC 27705-4667; E-mail: adam.smith@nescent.org*

³ *North Carolina State University, Raleigh, NC, USA*

Our ability to correlate biological evolution with climate change, geological evolution, and other historical patterns is essential to understanding the processes that shape biodiversity. The use of fossil to calibrate molecular phylogenies represents a rapidly expanding approach to dating the divergence of extant lineages. Developing fossil calibrations represents a significant challenge because they combine temporal and anatomical data from the fossil record with molecular systematics. These classes of data are traditionally used by researchers in separate fields and published in discrete specialist journals. Not surprisingly, many fossils used to calibrate divergence

times are not phylogenetically constrained and/or have incorrect ages assigned to them. The development of rigorous methods for using paleontological data for divergence dating has lagged behind the development of statistical methods for analyzing genetic sequences. A working group consisting of paleontologists, molecular systematists and bioinformaticians, has developed protocols, platforms, and incentives that will facilitate broader community involvement to meet this challenge. The recently published “best practices” for justifying and reporting calibrations serves as the foundation for a searchable online database of vetted fossil calibrations that are explicitly tied to museum specimens. Incentivising community contribution is key to keeping the database active and up to date and so the Fossil Calibration Database is paired with a rapid publication outlet for fossil calibration data through partnership with an open access online journal (*Palaeontologia Electronica*).

A NEW SPECIMEN SHOWS THAT *JEHOLORNIS* AND *JIXIANGORNIS* ARE THE SAME SPECIES

XIA WANG¹, PASCAL GODEFROIT², GARETH DYKE³, JESSIE ATTERHOLT⁴, HU DONGYU⁵, FRANÇOIS ESCUILLIE⁶

¹*School of Biology and Environmental Science, University College Dublin, Dublin, Ireland.*

E-mail: xia.wang@ucdconnect.ie;

²*Institut royal des sciences naturelles de Belgique, 29, rue Vautier, 1000 Bruxelles, Belgium;*

³*Ocean and Earth Science, National Oceanography Centre, SouthamptonSouthampton University of Southampton, Southampton SO14 3ZH UK;*

⁴*University of California Museum of Paleontology, 1101 Valley Life Sciences Bldg., Berkeley, CA 92720, USA;*

⁵*Paleontological Institute, Shenyang Normal University, 253 North Huanghe Street, Shenyang 110034, China;*

⁶*Eldonia, 9 avenue des Portes Occitanes, 3 800 Gannat, France.*

Until recently, *Archaeopteryx*, known exclusively from the 150 million year old (Ma) Solnhofen limestones of central Bavaria (Germany), was the only known definitive bird with a long bony tail (composed of 21–23 elongate free vertebrae). However, discoveries from China and Madagascar have documented a diversity of similarly long-tailed birds from much younger deposits (Forster et al., 1998; Ji et al., 2002, 2005; Zhou and Zhang, 2002, 2007; Turner et al., 2007; O'Connor et al., 2011). Among them, *Jeholornis* was widely accepted as valid and now at least two species have been reported (Zhou and Zhang, 2002; O'Connor et al., 2011). For other long-tailed bird specimens, only preliminary descriptions of these fossils are available and such taxonomic assessments will remain inconclusive until detailed studies of all these birds have been completed.

Here, we describe a new long-tailed basal bird from Yizhou Fossil and Geology Park, Lower Cretaceous Yixian Formation of western Liaoning, China, with intermediate morphology between *Jeholornis* (e.g., edentulous in upper jaw and possess 2-3 small teeth in lower jaws, subequal manus and humerus lengths, similar ratio between the radius and ulna shaft widths and the absence of an intermetcarpal tubercle on metatarsal II) and *Jixiangornis* (e.g., large size of ungual and a farther distal extent of metatarsal II), which further show that the two taxa are likely the same bird but quite variable in their morphologies. The evolution of long-tailed birds is also discussed in the paper.

COMPARISONS OF SKELETAL MEASUREMENTS BETWEEN VOLANCY AND FLIGHTLESSNESS IN ANATIDAE

JUNYA WATANABE

Department of Geology and Mineralogy, Graduate School of Science, Kyoto University, Kitashirakawa Oiwakecho, Sakyo, Kyoto 606-8502, Japan.

E-mail: watanabe-j@kueps.kyoto-u.ac.jp

The Family Anatidae (ducks, geese and swans) have yielded numerous flightless taxa through its evolutionary history. To find out the distinction between volancy and flightlessness, comparisons of skeletal measurements were made for recent species of Anatidae. Although distinction between the two is not always clear, it was confirmed that flightless species have: 1) a shorter wing skeleton relative to body weight, 2) a lower carina sterni relative to body weight, and 3) different proportions of limb bones, than volant species. Based on the result of the last comparison, the flight abilities of selected fossil species were assessed. The Californian *Chendytes lawi* and the New Zealand *Cnemiornis calcitrans* were clearly flightless, and the Bermudian *Anas pachyscelus* was (possibly weakly) volant, and so on. Although the characters found in flightless species can be interpreted as paedomorphic, the threshold of volancy in skeletal measurements does not always coincide with the equivalent point in ontogeny, possibly because maturation of soft parts in pectoral girdle lags behind that of the skeleton.

ONTOGENETIC CHANGE OF LONG BONE MORPHOLOGY AND SURFACE TEXTURE IN THE EXTANT GRAY HERON *ARDEA CINEREA*

JUNYA WATANABE and HIROSHIGE MATSUOKA

Department of Geology and Mineralogy, Graduate School of Science, Kyoto University, Kitashirakawa Oiwakecho, Sakyo, Kyoto 606-8502, Japan.

E-mail: watanabe-j@kueps.kyoto-u.ac.jp

Recently, surface texture of avian long bones have gained attention as a means of ontogenetic ageing. The skeletal ontogeny of the extant Gray Heron *Ardea cinerea* was studied by preparing an ontogenetic series, including about 20 individuals of chicks, several juveniles (birds younger than 1-year old, distinguished based on plumage) and adults. The general morphology and surface texture of long bones are described. In chick bones, the epiphysial area is cartilaginous and may contain ossification centers, and the surface texture is characterized by numerous longitudinal grooves and small pits. In juvenile bones, the epiphysial area is ossified but sometimes porous, and the surface texture is characterized by rather faint grooves and pits. In adult bones, the epiphysial area is completely ossified, and the surface is overall smooth. Timing of cessation of growth, as represented by smooth surface texture, varies among elements and taxa. This point deserves future comparative studies.

Maps



Fig. 2 Facilities around the Naturhistorisches Museum Wien



Fig. 3 Underground access close to the Naturhistorisches Museum Wien

Thursday, 14th June – early morning bird watching tour

6:30 – 9:00 a.m., in the **Park of the Imperial Schönbrunn Palace.**

Guide: Dr. Peter SZIEMER

Meeting point: 6:30 a.m.

Underground (**U4**) station “Schönbrunn”, on the station platform



Fig. 1 Imperial Schönbrunn Palace.



Fig. 2 Map of the park of Schönbrunn Palace.



Fig. 3 Map of the park of Schönbrunn Palace.

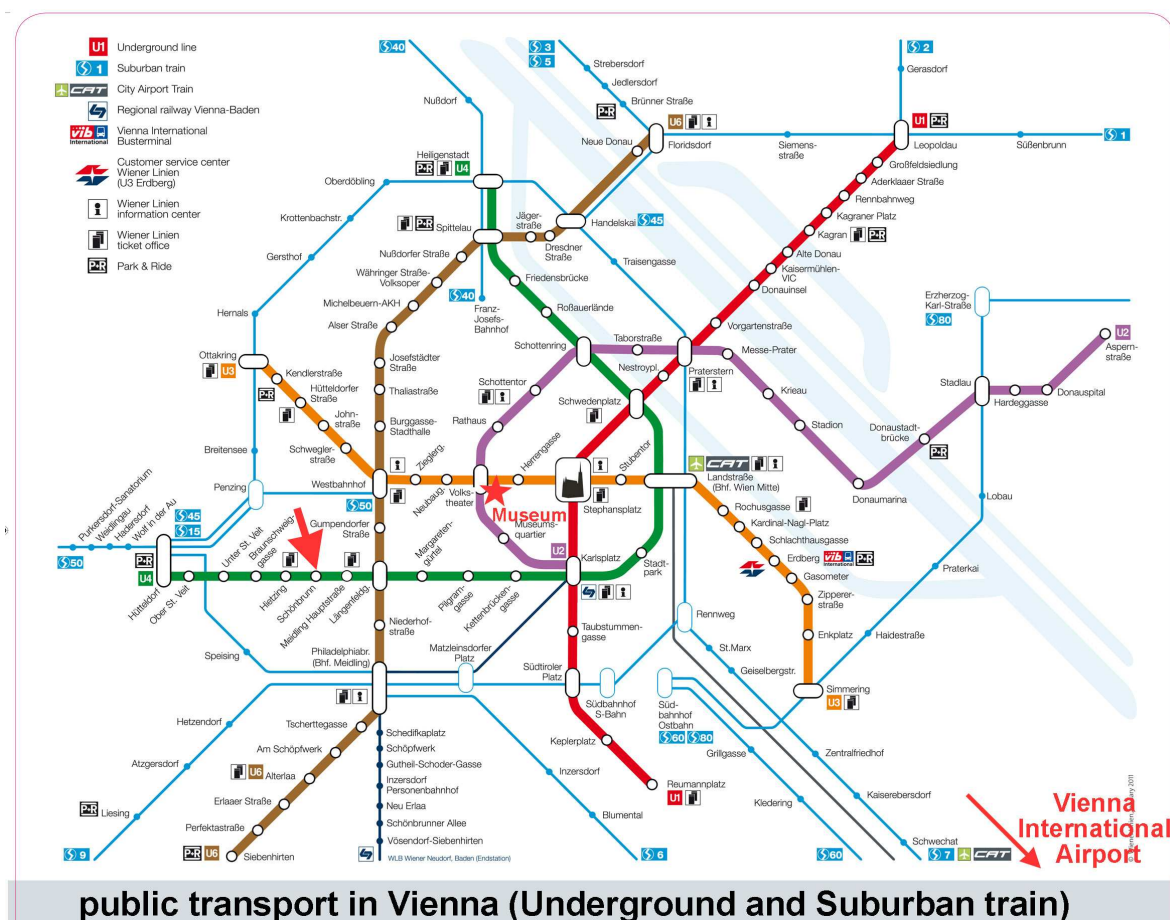


Fig. 4 Meeting point, Underground Station "Schönbrunn", Underground line U4, platform.

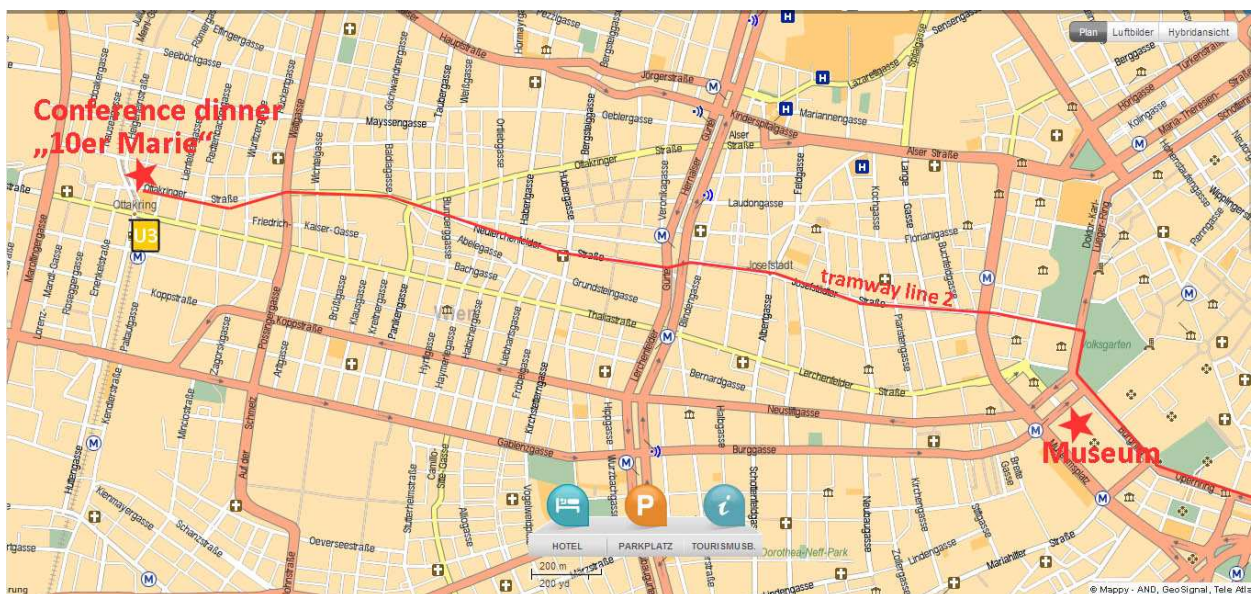
Friday, 15th June – Conference Dinner

Location: wine tavern “**10er Marie**”,
the oldest wine tavern of Vienna

Time: 19:30 – 24:00

Address: Ottakringer Str. 222-224, 1160 Vienna, Austria

Approach: take Tramway **line 2** (direction Ottakring)
(e.g. get on tramway 2 in front of the NHMW,
tramway station “Dr.-Karl-Renner-Ring”),
get off tramway stop “Johann-Krawanik Gasse”
(tramway stop is directly in front of the tavern)
or take underground line **U3** (direction Ottakring), until terminal station “Ottakring”, which is
in 3 min walking distance to the tavern.



The oldest wine tavern of Vienna dates back to 1740. In rustic atmosphere we will be served a buffet offering a variety of homemade dishes with Austrian specialities. The wines come from their own production.

The history of the wine tavern '10er Marie', 270 years ago...



When in 1740 the wine tavern in Alt-Ottakring number 10, which at the time was the suburb, belonged to the family Haimböck, it was already a well-known and well-frequented tavern. Guests came not only for the delicious wines and the atmosphere, but also to see the beautiful daughter Maria Haimböck. Since then the wine tavern has been known as the “10er Marie”.

Although Marie had moved away from Vienna and her brother Joseph ran the tavern, the good reputation remained and many famous celebrities frequented the wine tavern “10er Marie”: Prince Royal Rudolf and his carriage driver Bratfisch, Franz Schubert, Johann Strauss father, the Schrammel brothers, Franz Lehar, Josef Weinheber, Emmerich Kálmán, Robert Stolz and the Viennese composer Karl Föderl.

Since 1993 family Fuhrgassl-Huber have owned the wine tavern “10er Marie”.

Today the “10er Marie” is the oldest wine tavern of Vienna!

Saturday, 16th June – SAPE Ornithological Excursion

Visiting two national parks outside (east) of Vienna involves about 2½ hours travel by bus.

Departure: 7:30 a.m., side entrance of the NHMW (Burgring 7)

Arrival: ~19:00, at NHMW

Guides: Martin Riesing

Peter Sziemer

Ursula Göhlich

Excursion fee: 25€ per person for the bus drive. Optional lunch in a restaurant not included.

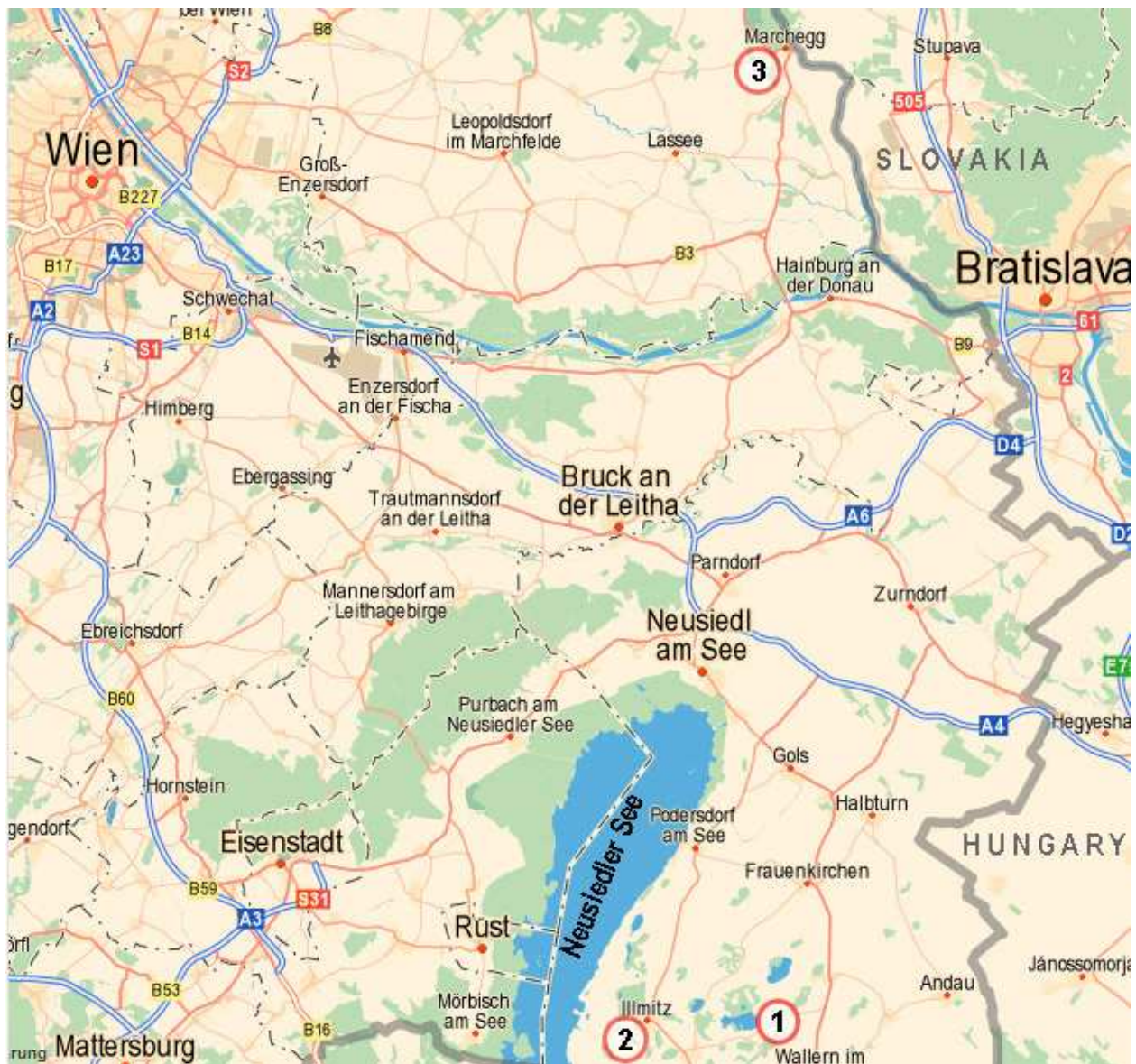


Fig. 1 Stop 1: saline lake “Lange Lacke” in National Park Lake Neusiedl-Seewinkel (UNESCO World Heritage), Stop 2: noon break in Illmitz, Stop 3: WWF reservation Marchegg.

1 Stop – saline lake “Lange Lacke” (in the National Park Lake Neusiedl-Seewinkel)

The National Park Lake Neusiedl-Seewinkel (UNESCO World Heritage), about one hour drive southeast of Vienna, comprises a large steppe lake (Lake Neusiedl) and east to it several small, saline lakes. This National Park is one of the most important conservation areas for birds in Europe. More than 300 avian species live safely in the extensive protected area, which contains reed, brackish pond and marshy meadow habitats.

The steppe lake “Neusiedler See” is the largest lake (320 km²) in Austria, but has a maximal depth of only 1.5 meter. It exists since the late Pleistocene, has no natural outlet and ever and anon fell dry temporarily. Its water is of low salinity reaching up to 2g/l (=0.2%) during summer.

East to Lake Neusiedl up to 40 small, saline lakes are situated. They also miss outlets, are recharged by precipitation, and fall dry periodically; their salinities reach up to 2% which is caused predominantly by Soda (Na₂CO₃) and somewhat by Glauber salt (Na₂SO₄), Salt (NaCl), and epsomite (MgSO₄). These saline lakes are imbedded in a unique halophyte flora.

Most popular for its **bird fauna** is the saline lake “Lange Lacke” (Stop 1). This shallow lake (max. depth 80cm) is a paradise for waterfowl. The “Lange Lacke” can be surrounded in a walking tour of about 3 hours, but there are also shorter walks.

Typical inhabitants of the area are the Avocet and the Kentish Plover that only nest in this part of Austria. Many species of birds search for food in the shallow waters and at the shores. Redshanks, Black-tailed Godwits and Lapwings nest here. Other birds, like the Ruff, the Dunlin, the Curlew sandpiper and the Great ringed Plover rest here during their migration. Seagulls, terns and herons rest here as well. Depending on the water level, the saline lakes attract different kinds of ducks and geese. When the water level is high, Black-necked and Little Grebes build their nests here.

Find more information on

<http://www.nationalpark-neusiedlersee-seewinkel.at/en/pflanzenwelt/vogelcheckliste.html>.

Stop 2 - noon break in Illmitz

We propose an optional lunch break at a restaurant (Pusztascheune), which has to be paid individually by participants.

(Pusztascheune, Apetloner Str 6, 7142 Illmitz)

Stop 3 – Marchegg (in the National Park March-Zaya-flood plains)

Another one hour drive away we will visit the WWF reservation Marchegg (close to the Slovak border), representing the largest tree brooding stork colony of Central Europe. There will be the possibility of a 1-2 hour walk through the National Park flood plain of the alluvial forest of the river March.

Find more information on:

<http://www.wwf.at/de/menu465/subartikel1432/?highlight=true&unique=1325254156>.