PRISCUM

The Newsletter of the *Paleontological Society* Volume 14, Number 1, Fall 2005

PRESIDENT'S COLUMN: YOUR SOCIETY AT WORK FOR YOU - GENERATING A NEW BUZZ FOR PALEONTOLOGICAL RESEARCH

by David J. Bottjer

Who among us has not dreamt at some point of tackling some big research question in paleontology that would need many investigators and, of course, substantial funds? And, I suspect that most of us have then deflated our own balloon with the realization that the research dollars typically allocated to paleontology cannot usually accommodate such requests.

With the goal of broadly improving funding for paleontology the Paleontological Society, with support from NSF, is organizing a workshop and a series of research forums that will focus on formalizing Future Research Directions in Paleontology. This effort is not to outline specific research programs, but, rather, to focus on developing a broad theme or themes that can be used to sell federal agencies on investing significantly greater levels of funding in our science.

This effort was initiated with a two-hour evening research forum at the very successful NAPC that we had last June in Halifax. This meeting was attended by ~100 paleontologists and featured an address on funding problems by Rich Lane of NSF. The subsequent discussions led to the conclusion that paleontology does not have much of a profile at the federal funding agencies, and this is largely why our science is typically ignored when significant new sources of funds become available. We also recognized that paleontology is largely fragmented into small interest groups and that paleontologists need to come together more as a whole and express a unified message to funding agencies on our research needs. As a consequence, it was endorsed by those present that development of a simple theme or themes which can act as a "big tent" covering much of paleontology would be effective in persuading funding agencies to increase the re-

Inside...

Priscum is published twice yearly by the Paleontological Society. Submissions are welcome. Please forward articles, book reviews, announcements, and notes to: Peter Harries, Priscum Editor, Department of Geology, University of South Florida, 4202 E. Fowler Ave., SCA 528, Tampa, FL 33620-5201 or via email at harries@chuma.cas.usf.edu.

sources allocated to paleontological research.

This October, at the Salt Lake City GSA, there were additional opportunities to further discuss these issues with PS and GSA Annual Meeting attendees. At the PS luncheon on Monday, October 17, everyone was asked to fill out a questionnaire on these important issues while observing the awards and business meeting. Then, later, from 5-6:30 PM after the PS Beer Social, we had another public research forum such as we had at NAPC, for open discussion on how to increase the profile of paleontology with funding agencies.

We will then have a workshop at the Smithsonian in Washington, D.C., in March/April of 2006. At this workshop approximately 25 paleontologists representing the breadth of our science will formalize plans on which broad theme or themes are the best to move forward on, and commission individuals to write short drafts for a preliminary document espousing our goals. Following the workshop a final document will then be prepared outlining the committee's recommendations.

I hope that you, as a member of the Paleontological Society, are willing to join in this effort, which I am chairing. If you accept in large part this means that you will be willing to dream big for paleontology, and also to help formalize your ideas as well as the ideas of others for potential broad themes that we can use to generate increased excitement in us as a dynamic research community poised to solve important problems. Send your ideas to me (dbottjer@usc.edu). The success of this effort depends upon your ideas and creativity to outline big, ambitious projects that can capture the imagination of the broad earth and biological sciences communities, and the funding agencies which serve them. Please join us as we build towards the future!

Paleontological Society Program Coordinator's Report

by Mark A. Wilson

We encourage short course and topical session proposals, and funds are available to defray travel expenses for speakers who do not normally attend annual GSA meetings. If you are considering a proposal, please contact the Paleontological Society Program Coordinator, Mark Wilson (mwilson@wooster.edu). The next opening for a short course is in 2009. Topical session and Pardee proposals for the 2006 GSA meeting (October 22-25 in Philadelphia) must be submitted by the session organizers to GSA by January 10, 2006. Paleontological Society sponsorship should be obtained prior to sending a proposal to GSA. For sponsorship consideration, please submit ideas to Mark Wilson as soon as possible (especially if you wish to request funding for the session).

1. Up-Coming Paleontological Society Short Courses:

2006 (Philadelphia GSA): Recent Developments in Geochronology • Tom Olszewski & Warren Huff

2007 (Denver GSA): Pond Scum to Carbon Sink: Geological and Environmental Applications of the Diatoms • Scott W. Starratt

2008 (Chicago GSA): Paleontological Society Centennial Celebration

2. Future Paleontological Society-Sponsored Events (2006):

Current Applications of Geochemistry to Marine Paleoecology • Northeastern Section, March 2006 • Lisa Amati

Paleontological Perspectives: A Symposium in Honor of Frank K. McKinney • Southeastern Section, March 2006 • Steven J. Hageman

Paleontology, Paleoecology, and Paleoenvironments of the Gray Fossil Site, Gray, Tennessee • Southeastern Section, March 2006 • Steve Wallace and Blaine Schubert

Hands-on Ichnology and the Union Chapel Track Site • Southeastern Section, March 2006 • Andrew K. Rindsberg

Fossils of Ohio: A Century After Newberry • North-Central Section, April 2006 • Lisa Park

3. Acknowledgments:

Thank you to the Paleontological Society's representatives on the 2005 GSA Joint Technical Program Committee: Tom Olszewski (senior member) and Dave Goodwin (junior member). There were 294 paleontological abstracts to organize this year.

Thank you also to those members who served as chairs of volunteered sessions at this GSA meeting:

Chad Allen Ferguson and Philip M. Novack-Gottshall
Gregory P. Dietl and Jeffrey G. Agnew
David L. Jeffery and Daniel J. Peppe
Carl Simpson and Peter Wagner
Leigh M. Fall and Paul C. Fitzgerald
Steven M. Holland and Karen M. Layou
Margaret L. Fraiser and Anne Raymond

Pro Paleontology

by Leif Tapanila, Student Representative

Do you consider yourself a paleontologist? If you're reading this, then you're most likely a member of *The Paleontological Society*. But do you refer to yourself as a "paleontologist"?

I've been giving some thought to this question of labels lately. As a "younger" member of *The Paleontological Society* and just completing my dissertation, I'm at a defining point in my research career. Being a paleontologist—by my definition, one who studies the dynamic

history of life—is easy to explain to my friends and family. It's easy to express my wonder and passion for studying how life works and changes through time. But at the professional level, finding my title—my *label*—has subtleties all on its own.

Academic labels are important. They not only define what we do, but often identify who we are in our professional lives. By trade, paleontologists are accomplished wordsmiths. Within my broad definition of a paleontologist, myriad synonymies exist under the titles geobiologist, biogeoscientist, biogeochemist, evolutionary biologist, functional morphologist, taphonomist, ichnologist, vertebrate paleontologist, invertebrate paleontologist, micropaleontologist, palynologist, paleobotanist, paleoecologist, paleoclimatologist, paleo… you get my point. Although many of these labels have loose and overlapping definitions, they reflect the truly interdisciplinary approach to scientific discovery that paleontologists employ—a fact that we ought to be proud of. But these subdisciplinary words are increasingly replacing the P-word, "paleontologist."

We can observe this change taking place in a variety of professional venues. For example, this past year the NSF Division of Earth Sciences, which used to have the Geology and Paleontology Program, now has rearranged (and renamed) its programs to include the Sedimentary Geology & Paleobiology Program and the Geobiology & Environmental Geochemistry Program. Most journals that publish paleontologic data have a subdisciplinary title (*Journal of Paleontology* and *Palaeontology* are noteworthy exceptions). And the employment sector more and more is shifting its want-ad vocabulary towards hiring a subdisciplinary title rather than seeking a "Paleontologist".

In each of these examples, it can be argued that the use of a subdisciplinary title will be more selective and better focused for categorizing a grant proposal, research article, or job applicant. The clear benefit is that by more narrowly defining our titles, we can better reach our target audiences for financial grants, publishing, and employment needs. However, these semantic shifts (e.g., reducing the use of the more general P-word) often can be linked to a sea change in the scientific zeitgeist.

Is there a stigma about the P-word? Is it simply that this word is considered too general to be useful, or does the P-word connote a bygone science once equated to stamp collecting? Certainly anyone who actively researches and keeps up with current paleontological literature knows that it is a vibrant science that is constantly pushing the envelope. The consistent rise in abstracts submitted for *Paleontological Society*-sponsored symposia at the annual GSA meetings clearly attests to the enthusiasm for studying and applying the fossil record in geology.

The focus of paleontologic research needs to shift with the times. The big questions in science today are very different from the ones posed back in the 1800's. Our approaches to these questions are constantly diversifying through new combinations of disciplines and the development of new scientific tools. But an emerging challenge for paleontology is how to advance the various subdisciplines in a competitive and resource-limited society without jeopardizing the very diversity of research we hold dear. Do we run the risk of outcompeting ourselves?

Ultimately what holds us, the members of *The Paleontological Society*, together in the vast soup of scientific specialties is that *we are paleontologists*. The *Society* provides a variety of services to foster a vibrant paleontological community, from publishing its two premier journals to providing financial support for students and supporting public outreach programs. It's this sense of community which convinced me to join *The Paleontological Society* as a graduate student, and it's the same that will keep me in the *Society* as a professional. And that's why I'm pro paleontology.
"Paleontologist" is an inclusive label that focuses on our similarities rather than our differences and forces us to think collectively rather than competitively. So next time you are asked, don't mince your words. Be a paleontologist!

Leif Tapanila, a proud paleontologist, is a PhD student at the University of Utah. His research examines the paleoecology, taphonomy and ichnology of ancient marine ecosystems. His current projects include investigations on the benthic recovery of the Late Devonian Alamo Bolide Impact, the Paleozoic evolution of the endolithic guild, the fossil record of symbiosis, and the paleontology of the K–T Transaharan Seaway in West Africa.

Paleontological Society International Research Program

Sepkoski Grants

Ronald L.Parsley, PalSIRPChair

The Paleontological Society has continued its small grants program for paleontologists living in Eastern Europe and republics of the former Soviet Union. These grants are made directly to individuals and not to institutions. Grantees are selected by a committee of the Paleontological Society based on the quality and feasibility of the proposed research. Consideration is given to paleontologists of all ages beginning with graduate student research. *PalSIRP Sepkoski Grants* are named in honor of Dr. J. John Sepkoski, Jr., founder of the program. The deadline for the next round of grants is **April 1, 2005**; details and application forms available at: www.paleosoc.org/palsirp.html.

2004 Recipients

Olga Anistratenko • National Academy of Sciences, Kiev, Ukraine • Miocene • Archaeogastropods of Eastern Paratethyes.

Vitaliy Anistratenko • National Academy of Sciences, Kiev, Ukraine • Miocene rissoid gastropods of Eastern Paratethyes.

Doren-Soren Baciu • Muzeul de Stilinte ale Naturii, Piatra Neamt, Romania • Oligocene fishes of the East Carpathians, Romania.

Alexandre Bannikov • Paleontological Institute, RAS, Moscow • Oligocene fishes in Romania

Jiri Bek • Institute of Geology, Czech Academy of Sciences, Prague, Czech Republic • Pennsylvanian in situ

spores.

Tatiana Dmitreiva • All-Russian Petroleum Scientific Research Geological Exploration Institute, St. Petersburg, Russia • Miocene foraminifera from SW Kamchatka.

Margarita Erbajeva • Geological Institute, Siberian Branch, RAS, Ulan-Ude • Paleogene lagomorphs of Central Asia.

Elzbieta Gedl • Institute of Geological Sciences, Jagiellonian University, Kraków, Poland • Early Cretaceous dinoflagellate cysts of the Outer Carpathians.

Andrey Gladenkov • Institute of Lithosphere of Marginal Seas, RAS, Moscow, Russia • Paleogene diatoms from Northeast Kamchatka.

Alexander Ivanov • Department of Paleontology, University of St. Petersburg, Russia • Permian chondrichthyans of the Urals.

Tatiana Krakhmalnaya • National Museum of Natural History, Academy of Science, Kiev, Ukraine • Late Miocene Perissodactyla of the Ukraine.

Alexey Lopatin • Paleontogical Institute, RAS, Moscow, Russia • Late Paleocene insectivores from Mongolia.

Evgeny Maschenko • Paleontogical Institute, RAS, Moscow, Russia • Pleistocene mammoths in Northern Western Siberia.

Serge Molchanoff • Geological Institute, Academy of Science, Kiev, Ukraine • Eocene and Oligocene coniferous cones of Ukraine.

Tamera Nemyrovska • Geological Institute, Academy of Science, Kiev, Ukraine • Lower Carboniferous conodonts of the Donbas.

Tamara Ryabokon • Geological Institute, Academy of Science, Kiev, Ukraine • Middle Eocene Foraninifera of Northern Ukraine.

Andrey Sennnikov • Paleontological Institute, RAS, Moscow, Russia • Dinosaur precursors in the Permian and Triassic of Russia and Poland.

Tatyana Shevchenko • Geological Institute, Academy of Science, Kiev, Ukraine • Eocene and Oligocene dinoflagellate cysts of Northern Ukraine.

Milos Siblik • Institute of Geology, Academy of Science, Prague, Czech Republic • Alpine brachiopods at the Triassic/ Jurassic boundary.

Svetlana Syabryaj • Geological Institute, Academy of Science, Kiev, Ukraine • Tertiary amber from the Ukrainian Shield and the Dnieper River valley.

Mikhail Surkov • Geological Institute, Saratov University, Saratov, Russia • Late Permian dicynodonts from Eastern Europe.

Maria Tekleva • Paleontological Institute, RAS, Moscow, Russia • Palynomorphology and phylogeny of gnetophytes.

Vojtech Turek • Paleontological Department, National Museum of Natural History, Prague, Czech Republic • Color patterns in Lower Paleozoic nautiloids.

Olev Vinn • Geological Institute, Univ of Tartu, Tartu, Estonia • Shell ultrastructure of Silurian *Conchicolites* and tubicolous annelids.

Radek Vodrázka • Czech Geological Survey and Institute of Geology and Paleontology, Charles Univ., Prague, Czech Republic • Hexactinellids from the Lower Turonian of the Bohemian Cretaceous Basin.

Michal Zato_ • Faculty of Earth Sciences, Sosnowiec, Poland • Prosopid crab fauna from the uppermost Bajocian, South Central Poland.

Andrey Zhuravlev • All Russian Geological Research Institute, St. Petersburg, Russia • Late Paleozoic conodont phylogeny.

Natalia Zavialova • Paleontological Institute, RAS, Moscow, Russia; Electron microscopy for morphological evolution of fossil pollen.

Tatjana Zonova • All Russian Geological Research Institute, St. Petersburg, Russia • High resolution stratigraphy, Albian-Cenomanian of Northeast Russia, based on inoceramids.

Mikhail Zuykov Department of Paleontology, St Petersburg University, St. Petersburg, Russia • Ordovician *Platystrophia*-like brachiopods of North America.

Stephen J. Gould Grants

John Groves, Chair of Grant Committee

Each year the Paleontological Society gives grants to the aid the research of student members. The list below outlines those students granted awards for 2005 in order of how they were ranked by the committee. The submission for the coming year is February 1, 2006; details about the process can be accessed at www.paleosoc.org/grantin.html.

2005 Recipients

Ellen Currano • Ph.D. • Response of insect herbivores to Paleocene and Eocene climate change in the Bighorn Basin • Pennsylvania State University

Sandra Jasinoiski • Ph.D. • Cranial mechanics of Dicynodontia using finite element analysis • University of Bristol

Devin Buick • Biogeography, morphology and lifespan: Shedding light on the evolutionary pathways of *Cucullaea* (Bivalvia) • University of Cincinnati

Thomas Hegna • Cambrian trilobites of the St. Charles Formation (Idaho and Utah): Paleoecology and phylogenetic systematics • University of Iowa

James Schiffbauer • Probable eukaryote fossils preserved in Archaen-Paleoproterozoic shales: A new window onto the early biosphere • Virginia Polytechnic Institute

Jocelyn Sessa • Ecosystem response to gradual and abrupt climate change in the Paleogene, Gulf Coastal Plain • Pennsylvania State University

Troy Dexter • The effect of ontogeny on hydrospire respiratory capacity in Blastoidea • University of Tennessee-Knoxville

Sarah Werning • Comparative osteohistology of *Tenontosaurus tilletti* (Cretaceous, North America), with comments on ontogeny • University of Oklahoma

James Bonelli • The ecologic response of brachiopod genera to cooling during the late Paleozoic ice age • Pennsylvania State University

Patrick Getty • Cruising with *Climatichnites:* A Late Cambrian beach pioneer • University of Massachusetts

Paul Harnik • Evolutionary macroecology of Paleogene bivalves • University of Chicago

Lin Dong • High-resolution biostratigraphy of an Early Cambrian succession: Ecological and evolutionary implications • Virginia Polytechnic Institute

Amy Smith • *Pteranodon* foot morphology and its implications in aquatic locomotion • Michigan State Unviersity

John Vanden Brooks • The effects of varying pO_2 on *Poecilia reticulata* • Yale University

Karen Waggoner • The utility of *Placenticeras:* A study of ammonite biostratigraphy and phylogenic sutural analysis • Texas Tech University

Richard Barclay • The rise of angiosperms and the role of CO_2: A test of the CO_2-decline hypothesis • Northwestern University

Heather Baugh • The paleoecology of extinction: Molluscan turnover of the middle Late Eocene • Syracuse University

Jennifer Eoff • Sequence-stratigraphic context of Cambrian extinctions: trilobite faunas, stratigraphy and sedimentary facies of the Eau Claire Formation and the Tunnel City Group, Upper Mississippi Valley • University of Oklahoma

Brian Kraatz • Revising the geochronology of Eocene and Oligocene faunal turnover in Asia _ University of California • Berkeley

Andrew Krug • Extinction and recovery of strophomenid lineages in Laurentia during the Late Ordovician mass extinction and Early Silurian recovery • Pennsylvania State University

Joshua Miller • Taphonomic biases of temperate mammalian death assemblages • University of Chicago

Eric Wysong • Hurricane effects on molluscan death assemblages and their facies: San Salvador, Bahamas • University of Georgia

Tovah DiPrinzio • Morphology and paleoecology of *Aspidocrinus scutelliformis* from the Becraft Formation (Lower Devonian) of eastern and central New York • SUNY – Oneonta

Chad Ferguson • Anatomy of a present-day shell bed: An assessment of structural and temporal properties • University of Cincinnati

Kristin Hepper • Mesozoic Great Valley Group hydrocarbon seeps through space and time • University of California – Riverside

Katherine Johnson • Deep-water foraminifera and stable isotopes: Deciphering relative contributions of late Cenozoic ice sheets to SW Pacific oceanography and climate • Ohio State University

Jennifer Scott • Ichnology and trace taphonomy of saline, alkaline and freshwater lakes • University of Saskatchewan

Cynthia Peñaflor • Understanding short-term environmental changes in Lake Titicaca, Peru, through diatom analysis and study of changes in *Cyclostephanos andinus* • Brigham Young University

New National Research Council Report Identifies Research Priorities at the Interface of Ecology and Paleontology

by Karl Flessa

Because of recent advances in earth scientists' ability to analyze biological and environmental information from geological data, the National Science Foundation and the U.S. Geological Survey asked a National Research Council (NRC) committee to assess the scientific opportunities provided by the geologic record and recommend how scientists can take advantage of these opportunities for the nation s benefit.

The "Geological Record of Ecological Dynamics: Understanding the Biotic Effects of Future Environmental Change", released in June, 2005, identifies three initiatives for future research to be developed over the next decade: (1) use the geological record as a natural laboratory to explore changes in living things under a range of past conditions, (2) use the record to better predict the response of biological systems to climate change, and (3) use geologic information to evaluate the effects of human and non-human factors on ecosystems. The committee also offers suggestions for improving the field through better training, improved databases, and additional funding

Produced by a committee consisting of both ecologists and paleontologists, the report provides ecologists

with background on techniques for obtaining and evaluating geohistorical information, and provides paleontologists with background on the nature of ecological phenomena amenable to analysis in the geological record. The report can be read online for free. View, download and/or order a hard copy at http://books.nap.edu/catalog/11209.html.

From the Executive Summary:

"Longer-term historical perspectives are essential for answering a host of questions about the ecological dynamics of present day environmental systems and about feedbacks between biotic systems and environmental change, including climate change. The geologic record—the organic remains, biogeochemical signals, and associated sediments of the geological record—provides unique access to environmental and ecological history in regions lacking monitoring data and for periods predating human impacts. It also provides information about a broader range of global environmental conditions than exist today, as well as insights into biological processes and consequences that are expressed only over longer time intervals and the opportunity to discover general principles of ecological organization. Understanding how ecological processes scale up from short-term to evolutionary time frames is critical to a full understanding of the biotic response to environmental change, and thus to developing sound policies to guide future management. Advances during the past 10-20 years have transformed the ability of earth scientists to extract critical biological and environmental information from the geologic record. These advances at the interface of earth and biological sciences—combined with a greatly improved capacity for accurate dating of past events, the development of high-resolution timescales, and new techniques for correlation—set the stage for this assessment of research priorities in geohistorical analysis of biotic systems."

Meeting Announcement: Bivalvia 2006

July 22 - 27, 2006
Universitat Autònoma de Barcelona, Bellaterra, Catalunya, Spain

The *Departament de Geologia-Area Palaeontologia* of the Universitat Autònoma de Barcelona (UAB), the *Sociedad Española de Malacología* (SEM), and *CosmoCaixa Barcelona*, Museu de la Ciència de l'Obra Social "la Caixa", invite professionals and students with a special interest in bivalves to participate in **Bivalvia 2006**, an international congress with venue on the campus of the UAB in Bellaterra and at the Museu de la Ciència in Barcelona.

After nearly an eight-year absence, we think it is time for a new specific congress on this second largest group of Mollusca and to undertake a new synthesis. Neontologists and paleontologists are invited to present their most recent research results on bivalve ontogeny, evolution, palaeontology, systematics, freshwater mussels, conservational biology, and stratigraphy. Contributions on other molluscan taxa are acceptable as long as they shed light on the origin and phylogeny of the Bivalvia. **Syntheses are especially welcome**. Detailed works on single organisms or containing extensive taxonomic lists should be presented as a poster.

The Congress venue is the Facultat de Filosofia i Lletres de la UAB which is about a 10 minute walk from the accommodation facilities on the University campus. Plenary sessions will be celebrated in the Auditori and parallel sessions in smaller conference rooms close to it. Posters will be displayed around the Auditori. One afternoon session will take place in the Museu de Ciència (CosmoCaixa).

Accommodation

Accommodations will be on the campus, either in the Hotel Serhs or the students' residence "Vila Universitaria" next to the hotel.

Registration

Informal registrations through N. Malchus:
a) fax +34-93 581 12 63 "Bivalvia 2006-register" or
b) via email: nikolaus.malchus@uab.es (subject line: "Bivalvia2006-register").

Please specify name, institution, whether you wish to present a talk or poster, and preliminary title. Do not send abstracts.

Formal registration requires the use of the registration forms provided on the congress webpage: http://bivalvia2006.uab.es. Only in case of technical problems contact a) or b) (above) for your formal registration.

Conference Review: 5th Regional Symposium of the International Fossil Algae Association

30th-31st August 2005, Ferrara, Italy

by David Bassi (bsd@unife.it)

The 5th Regional Symposium of the International Fossil Algae Association was principally organised by Davide Bassi and Anna Fugagnoli of theDipartimento delle Risorse Naturali of the University of Ferrara. This symposium follows the tradition of successful regional meetings previously held in Granada (1989), Munich-Vienna (1993), Cracow (1997) and Cluj-Napoca (2001) (http://www.ku.edu/~ifaa/). Presentations were offered in threesessions: general themes, calcareous red algae and calcareous green algae. A total of 31 presentations were made over two days. Delegates from several countries (Italy, France, Germany, Spain, Sweden, Slovenia,Croatia, Israel, China, U.S.) attended the symposium. Two workshops were held, one focusing on the classification criteria of Dasycladales and Bryopsidales (Halimedaceae) green algae (chairman Ioan I. Bucur) and the second dealing with the palaeobiogeography of calcareous algae(chairman Juan C. Braga). Titles of the presentations can be found at http://www.uni-tuebingen.de/IFAA-regional-symposium/. The abstractbook has been published in

the Annali dell'Università di Ferrara, section Museologia Scientifica e Naturalistica, volume 1.

A post-meeting field excursion focused on shallow water carbonates including Middle-Upper Eocene calcareous algae and larger foraminifera (Colli Berici, Monti Lessini, north-eastern Italy), Lower Jurassic microbial structures, dasycladaleans, larger foraminifera, and dinosaur footprints (Rovereto and Altopiano di Lavarone, Trento area), and dasycladaleans at the K/T boundary (Friuli and western Slovenia areas).The field excursions were organised by the University of Ferrara, the Museo Tridentino di Scienze Naturali, the University of Naples FedericoII, the University of Trieste, the University of Tübingen, the Slovenian Geological Survey, and the Slovenia Academy of Sciences. The field trip guide-book is published in the Studi Trentini di Scienze Naturali, Acta Geologica, supplement 80 (2003).

NEW BOOKS FOR REVIEW

This section of the newsletter includes a list of books and reviews received by the Books Review Editor for the Paleontological Society. Volunteered reviews will be accepted if concisely written and of general interest. Books listed may be requested for review with the understanding that the resultant review will be ready for publication of the next issue of *Priscum.* Contact the Book Review Editor: Greg Retallack, Department of Geological Sciences, University of Oregon, Eugene, OR 97403-1272: gregr@darkwing.uoregon.edu.

Barbieri, M., 2002, THE ORGANIC CODE: AN INTRODUCTION TO SEMANTIC BIOLOGY. Cambridge University Press, Cambridge, 301 p.; hardback $75.00; paperback $25.00.

Hess, H., Ausich, W.I., Brett, C.E., and Simms, M.J. (eds.) 2002, FOSSIL CRINOIDS. Cambridge University Press, Cambridge, 275 p., paperback $40.00.

Palmer, T., 2003, PERILOUS PLANET EARTH: CATASTROPHES AND CATASTROPHISM THROUGH THE AGES. Cambridge University Press, Cambridge, 522 p. hardcover $75.00.

Pollack, H.N., 2003, UNCERTAIN SCIENCE...UNCERTAIN WORLD. Cambridge University Press, Cambridge, 243 p. Hardcover $28.00

Rigby, J.K., and Collins, D., 2004, SPONGES OF THE MIDDLE CAMBRIAN BURGESS SHALE AND STEPHEN FORMATION, BRITISH COLUMBIA. Royal Ontario Contributions in Science, v. 1, 155 p.

Taylor, F.W., 2001, THE CAMBRIDGE PHOTOGRAPHIC GUIDE TO THE PLANETS. Cambridge University Press, Cambridge, 305 p. Hardback $50.00

Turcotte, D.L., and Schubert, G., 2002, GEODYNAMICS, Second edition. Cambridge University Press, Cambridge, 456 p. Hardback $110.00, Paperback $45.00.

Weedon, G., 2003, TIME-SERIES ANALYSIS AND CYCLOSTRATIGRAPHY: EXAMINING STRATIGRAPHIC RECORDS OF ENVIRONMENTAL CYCLES. Cambridge University Press, Cambridge, hardcover, $70.00

Webby, B.D., Paris, F., Droser, M.L., and Percival, I.G., 2004, THE GREAT ORDOVICIAN BIODIVERSIFICATION EVENT. Columbia University Press, New York, 484 p. hardcover $99.50.

BRIEF BOOK REVIEWS

PRIMATE DENTITION: AN INTRODUCTION TO THE TEETH OF NON-HUMAN PRIMATES, by Daris R. Swindler, Cambridge University Press, New York, 2002, 296 p.: hardcover $80.00.

This welcome work by a longtime leader in the study of primate anatomy is a valuable summary of dental information for 85 living primate species. It represents a substantial revision and augmentation of his 1976 work, *Dentition of Living Primates*, and the approach is strongly interdisciplinary, reflecting Swindler's long experience, wide contacts, and diligence in searching the literature. The included species have been selected to demonstrate as wide a variety of dental patterns as possible to optimize comparative studies. Wherever possible the representation is from a wide geographic range within a given species. Species are organized in traditional Linnaean fashion, although reference is made to findings from recent cladistic analyses. No fossil species are illustrated, though the fossil record is discussed in general terms for some groups.

The book includes a review of primate odontometry, detailed discussion of dental terminology, and valuable reviews of dental anatomy, development, and age estimation. The dental anatomy chapter also includes discussion of ultrastructural enamel prism patterns. One chapter is specifically devoted to the deciduous dentition for a more limited sample of species, with six illustrated. The main body of text is devoted to the species descriptions for adult dentition, with extremely detailed and carefully worded discussions of key features and characteristics. More than half of them are illustrated by adequate stipple-shaded drawings of upper and lower occlusal views; and the descriptive summaries are capped by a 103-page appendix of odontometric data with ranges, means, and standard deviations for teeth of both sexes. These data were obtained from high-quality plaster casts, made by Swindler and assistants, of permanent and deciduous dentitions in six research collections. Most of the specimens had been collected from the wild for the respective museums; however, some *Macaca* specimens were from primate research centers and could reflect morphological consequences of captivity as, for example, from dietary influences. Additional appendices include a summary of dental eruption sequences and a glossary of technical terms. The 17-page bibliography will assist researchers in further literature review. Overall, the emphasis is more on description than interpretation, so that the latter tends to pop up in the form of asides. For example, discussion of deciduous dentitions closes by mentioning Swartz's finding that orangutans and humans "share the greatest number of apomorphies among hominoids," and marks this as "interesting" without discussing the significance of such a finding (p. 59).

The first discussion of dental defects is disappointing, almost dismissive in tone. Studies of enamel hypoplasias in non-human primates are said to have had "a rather checkered history" and the reader is referred to other literature. The Federation Dentaire

Internationale coding system for developmental defects in enamel is not mentioned or illustrated, although Swindler acknowledges the continuum from pits to grooves and furrows (pp. 17-18). Discussion of defects continues, however, in the species accounts with a decidedly more positive tone and detailed reference to their potential in revealing seasonal environmental (and other) stresses. This is important for paleontologists because of the potential of such information as a proxy paleoenvironmental indicator and as a possible measure of selective pressures and even birthing synchrony. The only index to the book is taxonomic; therefore, it is impossible to track topics such as hypoplasias through the book without skimming the pages. For such a comprehensive book not to have a subject index is surprising and frustrating, though skimming is assisted by bold-face headings. Skimming also reveals information that is not in "summary" tables; for example, Table 1.2 (p. 9) is a list and synonymy of cusps and other dental features. The postentoconulid is given as a synonym of the tuberculum intermedium. We wait until p. 81 to be told that "metastylid" is another synonym. All of the synonymies are presented as unambiguous. The term "cervix" (neck) is obscurely introduced (p. 12) though the crown/cervix/root structure could easily have been added to an existing figure (Fig. 2.1). The term's meaning is not explicitly laid out and seemingly is "the region of the cementoenamel junction" and a zone smaller in diameter than the crown. But is it the tapering part of the crown or the exposed part of the root? "Fovea" is taken to be both singular and plural (p. 124) but the latter should be *foveae*. Tarsioids are presented as a superfamily within the Prosimii; yet reference is made to "strepsirhines" in discussion of Seligsohn's work (p. 65). This sets up the oddity of having "strepsirhine" but not "haplorhine" in the glossary.

These minor problems aside, the book belongs on the shelf of any primate anatomist or paleontologist. It is a very good summary of information and primary data and will doubtless facilitate studies by other researchers, particularly those who lack the travel support and time necessary to pull together data from widely dispersed collections. Graduate students will therefore be immediate beneficiaries and Swindler will influence and inspire yet another generation of primatologists to continue the quest for understanding through careful description and documentation.

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CHARLES DARWIN'S THE LIFE OF ERASMUS DARWIN, edited by Desmond King-Hele, Cambridge University Press, Cambridge, 2003, Hardback $25.00, ISBN 0-521-81526-6.

Charles Darwin's The Life of Erasmus Darwin is the first unabridged publication of this obscure work by Charles Darwin. In 1879, Darwin wrote a 129-page "Preliminary Notice" to a 86-page essay by Ernst Krause, both about the life of Erasmus Darwin, Charles' celebrated grandfather. The contributions were published together in 1879, and Krause given top billing on the title page. In 1887, Charles' son Francis added a synopsis when the book was brought out in a second edition, but this time making Darwin the primary author. Most interestingly, Darwin had allowed his daughter Henrietta to revise, rearrange, and abridge his contribution to the joint book. Most of her stylistic changes were definite improvements, but she removed so much significant and provocative content (16% of the text was excised) that charges of censorship were leveled against her. This was unfair—Darwin had, after all, asked her to undertake the revisions—but it seems he did not take the time to review her substantive excisions, and Charles' final tribute to his grandfather has remained unknown for over one hundred years.

Desmond King-Hele, the editor of this first unabridged edition, is the leading authority on Erasmus Darwin. He has written and edited numerous books, including the *Letters of Erasmus Darwin* and *Erasmus Darwin: A Life of Unequaled Achievement,* the standard biography. The present book contains only Darwin's text, but King-Hele summarizes Krause's essay—which is devoted solely to Erasmus Darwin's scientific work—and includes a chronology of Erasmus Darwin's life, a Darwin family tree, and a bibliography of books and papers by and about Erasmus Darwin.

This book is fascinating for several reasons. Erasmus Darwin was a major figure of the English Enlightenment: a leading intellectual, a respected physician, a keen mechanical inventor, and both a well-known poet and naturalist. His massive treatise on medicine and animal life, *Zoonomia,* made him the foremost medical author of the time. His poetry influenced Blake, Wordsworth, Coleridge, and Shelley, making him—according to Coleridge—"the first *literary* character of Europe."

Most notably, Erasmus Darwin adopted what we now call biological evolution—including a rudimentary natural selection—as his theory of life, 65 years prior to his grandson's *Origin of Species.* As described in Ernst Krause's summarized essay, "The Scientific Works of Erasmus Darwin," Erasmus was a pre-Lamarckian, i.e. he was really the first to establish a complete—if erroneous—theory of evolution. Krause stated that Charles Darwin "has succeeded to an intellectual inheritance, and carried out a programme sketched forth and left behind by his grandfather," and indeed, it was just a sketch. In *Zoonomia*, Erasmus claimed that evolutionary changes were controlled by "the three great objects of desire, which changed the forms of many animals by their exertions to gratify them, are lust, hunger and security." For lust, Erasmus described male combat for exclusive possession of females; the outcome is "that the strongest and most active animal should propagate the species, which should thence become improved," a preliminary theory of sexual selection. For hunger, he described the specialized adaptations of animals for acquiring food. For security, Erasmus was the first to describe the adaptations of mimicry and protective coloration in animals, as well as such obvious attributes as fleetness, hard shells, horns, great teeth and claws, etc. However, in this work Erasmus did not propose natural selection as the driving force for the improvements and adaptations he describes at length.

Krause then summarizes Erasmus Darwin's long poem *The Temple of Nature.* Life first arose by spontaneous generation from non-living matter, then:

First forms minute, unseen by spheric glass,
Move on the mud, or pierce the watery mass;
These, as successive generations bloom,
New powers acquire, and large limbs assume;
Whence countless groups of vegetation spring,
And breathing realms of fin, and feet, and wing.

Later in this poem, Krause notes that Erasmus describes a "pitiless struggle for existence." In verse, Erasmus describes plants competing for soil and moisture, vines strangling, caustic secretions, leaves shading other plants,

And insect hordes with restless tooth devour
The unfolded bud, and pierce the ravell'd flower.
Without such a struggle, living creatures would soon overun the world:
All these, increasing by successive birth,
Would each o'erpeople ocean, air, and earth.

Krause believes that Erasmus Darwin "directed the eyes of many of his readers to the struggle for existence, and in this we may perhaps find the explanation of the remarkable fact that so many English naturalists (Wells, Matthew, Charles Darwin, Wallace, among others) have one after the other set up the principle of natural selection." Krause claims that Erasmus Darwin was the "first who proposed and consistently carried out a well-rounded theory with regard to the development of the living world, a merit which shines forth most brilliantly when we compare with it the vacillating and confused attempts of Buffon, Linnaeus and Goethe." Finally, Erasmus Darwin's scheme was much better than the old "comparison of Nature with a great piece of clockwork," referring to the standard interpretation of his day, that of intelligent design by a Creator.

By presenting his speculative evolutionary "theory" largely in verse, Erasmus Darwin could not really expect to convince the scientific community of his day. But in fact he was ahead of his time, and even a more rigorous presentation of his biological worldview would certainly not have been persuasive. But there's more, and this is another reason this book is fascinating. I have always been curious about the status of Erasmus Darwin's scientific reputation and his grandson's appreciation of it. As is often the case, the complete story is far more interesting than usually presented. Erasmus Darwin was skeptical of religion and an unbeliever in the anti-clerical, anti-Christian sense, a philosophy he passed on to his son Robert, Charles's father. Not a Unitarian—Charles reports that Erasmus used to say that "unitarianism was a feather-bed to catch a falling Christian"—he is perhaps best described as a deist. In this book, Charles takes great pains to refute the charge that his grandfather was an atheist, saying that, "Although Dr. Darwin was certainly a theist in the ordinary acceptation of the term, he disbelieved in any revelation." Had not his grandfather written an ode on the folly of atheism? First verse:

Dull atheist, could a giddy dance
Of atoms lawless hurl'd
Construct so wonderful, so wise,
So harmonised a world?

I relate this story with amusement, for by the time that Charles wrote his defense of his grandfather's "theism," Charles himself had already completed his slow and lifelong religious evolution from orthodox Anglican to religious skeptic to Enlightenment deist to resolved agnostic to resigned atheist.

Erasmus' unorthodoxy and religious skepticism were not secrets among his contemporaries. The Darwin family coat-of-arms consisted of three scallop shells; Erasmus added the motto *E conchis omnia* ("everything from shells") to signify his appreciation of evolution. In 1770, he had the arms and motto painted on his carriage, and this was noticed by the canon of nearby Lichfield Cathedral. Canon Seward wrote a satirical poem, accusing Erasmus of "renouncing his Creator," and:

Great wizard he! by magic spells
Can all things raise from cockle shells,

After this, Erasmus had to paint over the motto to not risk offending his wealthy patients on whom his livelihood depended. But the final onslaught on his reputation came in 1798: the Napoleonic wars were going badly for Great Britain, and a new magazine called the *Anti-Jacobin* was begun to combat all ideas subversive of the established order—this included traditional Christianity. The magazine was controlled by George Canning, junior minister and later Prime Minister. Canning set out to destroy Erasmus with a poem titled *The Loves of Triangles,* a parody of Erasmus's poem *The Loves of Plants,* and backed up by long notes ridiculing his scientific ideas, particularly the absurd notion that human beings evolved from lower forms of life. This very public attack quickly ruined Erasmus's reputation: his status as the leading British poet crumbled and his evolutionary hypothesis ignored. His son, Robert, was horrified, and he never talked about his own religious skepticism and evolutionary beliefs, even to his own son, Charles. Thus Charles began his voyage on the *Beagle* in 1831 as a confirmed religious creationist, despite the fact that both his father and grandfather were deistic evolutionists. Charles was forced to discover his family's evolutionary agnosticism on his own.

The most fascinating aspect of the book is Charles Darwin's treatment of his grandfather's early evolutionary speculations, which uncannily predated his own. Today we understand that Charles's priority was never at risk, because he was the first to rigorously document the process and explain how it operated by a natural mechanism—natural selection—but while he lived priority for the discovery of natural selection was controversial, and his grandfather was something of a rival. As King-Hele remarks, if "Charles praised Erasmus's evolutionary writings, people would say that Erasmus had all the ideas first, and Charles merely filled in the detail." Indeed, some suggested exactly that, including Bishop "Soapy Sam" Wilberforce. So, early in the book, Charles suggested that his grandfather's scientific work was not very important, and he concentrated on family history, not scientific history. To his great credit, however, Charles changed his mind as the writing progressed: "the more I read of Dr. D. the higher he rises in my estimation." Charles ultimately praises Erasmus, describing his "vividness of imagination," "great originality of thought," and "uncommon powers of observation." His final tribute to Erasmus was excised by Henrietta, but contained the sentence, "With his prophetic spirit, he anticipated many new and now admitted scientific truths," which undoubtedly referred to

evolution and natural selection.

Charles Darwin briefly describes his family's early history, the personalities and accomplishments of his ancestors, and the events in their lives. He then turns his full attention to Erasmus, quotes his letters, describes his character and moral qualities, and relates many extraordinary events in his life, some of which were quite remarkable. He was considered the greatest physician in Britain during his lifetime, and was consulted by other prominent doctors. Erasmus made several significant medical and zoological discoveries, in some cases anticipating others who are credited with them. Through his researches, he also made many important botanical discoveries, most often in the areas of agriculture and horticulture. Charles describes these with anecdotal stories. He mentions that Erasmus had two illegitimate daughters that he raised as part of his family, giving them both good educations.

Charles devotes considerable attention to correcting false statements made about Erasmus during his lifetime. He takes considerable pains to refute several false, inaccurate, and indeed reprehensible claims made about Erasmus Darwin by Miss Anna Seward in her "Memoirs of the Life of Dr. Darwin," an essay published in 1804, two years after his death. The heading over these pages is "Anna Seward's Calumnies Refuted." One of these calumnies deals with the suicide of Erasmus's second son, also named Erasmus, in 1799 at the age of 40 (Erasmus's first son, Charles, died at age 20 from an infection; only his third son, the famous physician Robert—the father of Charles Darwin—lived a full life). When the son Erasmus died, Miss Seward falsely claimed that his father Erasmus immediately took possession of his property and lightly discussed improving it and making it his place of residence. She later was forced to retract this and other false statements.

In conclusion, I found this book very enjoyable to read: it is concise, entertaining, and illuminating, as it deals with a figure of historical merit and, most importantly, is written by one of our civilization's greatest scientists about his scientist ancestor. Anyone with an interest in the history of evolution or eighteenth-century British science, manners, and morals will enjoy this book.

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THE CAMBRIAN FOSSILS OF CHENGJIANG, CHINA: THE FLOWERING OF EARLY ANIMAL LIFE, by Hou, X.-G., Aldridge, R. J., Bergström, J., Siverterm D. J., Siveter, D.J., and Feng, X.-H., Blackwell, Oxford, 2004, Hardcover $104.95.

Canada's Burgess Shale has become a household word in part due to Steven Jay Gould's book *Wonderful Life*, but the Yu'anshan Shale near Chengjiang in China, surpasses the remarkable Canadian fauna in several ways. The Chengjiang fossils are geologically older (Early rather than Middle Cambrian), so right at the base of the invertebrate evolutionary radiation. Chengjiang fossils are also much more photogenic than those of Burgess (picked out by iron oxide stains of subsequent weathering, rather than black on black). Furthermore, Chengjiang fossils are found at numerous, easily accessible localities over a wide area of Yunnan, rather than a single quarry protected within a National Park high in the Canadian Rockies. The Chengjiang fauna is already known by more than 100 species, even though discovered as recently as 1984. Its diversity is likely to be at least comparable with the roughly 140 species collected from the Burgess Shale since 1909. In the two years since this book was published, another major monograph by Chen Jun-Yuang was published, and further descriptions continue to appear (*Nature* v. 430, p. 422, 2002). During my own visit in 1996, I was surprised to discover how much rock must be moved to obtain good specimens. We are not at the end of this fauna yet.

The Chengjiang fauna has many shared genera with the Burgess fauna some 30 million years younger, but little in common with Ediacaran fossils of the latest Precambrian, less than 15 million years older. The Chengjiang fauna does contain cnidarians, such as *Xianguangia* and ctenophores such as *Maotianascus* but they are tiny (less than 12 mm) compared with the Ediacaran medusoids. The suggestively named *Heliomedusa* of Chengjiang is also small, and turned out to be a brachiopod. *Eldonia* and *Rotadiscus* are also Chengjiang medusa-like fossils, but their U-shaped gut and sclerotized shagreen indicate echinoderm affinities. Nothing in this earliest Cambrian fauna resembles *Dickinsonia*, *Rangea* or other iconic Ediacaran forms, which were worlds, or kingdoms, apart.

After visiting several of these sites and the local museum, and following the literature with interest, I thought I knew this fauna well, but this book surprised me at many turns. Many of the worms regarded by others as annelids, are here assigned to Nematomorpha. The inarticulate brachiopods have amazingly long and slender pedicles (6-9 times shell length) compared with living *Lingula* that I have seen in burrows on the Queensland coast. There is surprising disparity and diversity (6 species) of velvet worms (Onychophora), including a local species of the Burgess genus *Hallucogenia*. Like Burgess, Chengjiang has a riot of arthropods, with a clade-defying array of segmentation patterns. In many cases appendages are preserved and are crustacean or trilobitomorph, but there are no clear uniramians. *Pseudoiulia* is a possibility, but the visible limbs appear somewhat leaf-like, and although endopodites are presumed hidden, it is odd that not one of so many would stick out. *Facivermis* is another possibility, especially a specimen with more appendages than usual, and reminiscent of the Wheeler Shale taxon *Cambropodus*. The giant anomalocarids may not belong in the phylum Arthopoda according to these authors. This view counters others that the Arthopoda should be enlarged to accommodate the diversity of Chengjiang and Burgess Onychophorans, and perhaps Pentastomids and Tardigrades as well. The best known Chengjiang chordate is *Myllokunmingia*, and most of the other plausible chordate taxa which I have successively touted in my paleontology class as the oldest chordate, are considered problematic or misidentified worms.

This beautifully produced volume should be in every university science library. Public libraries need copies too, as its color illustrations are a feast for the eyes, and its bizarre array of body plans an inspiration for science fiction artists and animators. The branching cephalic diverticulae of *Naraoia* and spiny proboscis of *Paraselkirkia* are visually stunning. I have a shelf for

books of superb fossil illustrations, to which I turn late in the day, when weary of analysis, and ready for aesthetic recreation. We are lucky that paleontology is rich in such books, and this one deserves pride of place.

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HUMAN PALEOBIOLOGY, by Robert B. Eckhardt, 2000. Cambridge University Press, Cambridge, UK, 2002, 350 p.: hardcover $80.00.

How well do human paleospecies reflect modern human diversity and how adaptable are humans? Robert Eckhardt addresses these issues in a fascinating and at times provocative book. He observes that new fossils seem to make the picture of human evolution more confused, though the opposite should happen. Is "a nomenclatural thicket pruned by recurrent extinctions" (p. x) unreasonably imposed upon the record? Chapters address paleobiology; taxonomy; histories of fossil finds and theoretical trends; human adaptability; primate and hominid phylogeny, diversity and adaptations; character state velocity; population dispersal and differentiation; and modern human origins. He engages readers despite few illustrations, only one of a bone, challenging us to move from specimen-bound narratives to the "meat" of theoretical arguments.

Some semantic nuances seem forced: "although paleontological evidence is itself static, comprising fossilized skeletal parts and associated remains for the most part, the paleobiological approach to this evidence is dynamic" (p. 1). Eckhardt sees paleobiology, phylogeny, and studies of character change velocity as "all but inseparable," which resembles George Gaylord Simpson's dynamic view of *paleontology*. Absence of "taphonomy" from the index may explain Eckhardt's view of paleontological evidence as "static." Citation of only one Simpson paper (on taxonomy) is troubling, because certain themes here were presaged in *Tempo and Mode in Evolution*.

Eckhardt seeks to bring fossils to life by documenting the extent, distribution, and causes of variation within and between past populations, using a biospecies template (p. 3). Most paleontologists share this dream, even as they name paleospecies. Accepted as provisional, paleospecies increasingly resemble biospecies as information accrues. Strategies differ, not goals: whereas Eckhardt imports a "top-down" view of modern variation to the past to clarify relationships, others seek clarification from "bottom-up" studies of the fossils themselves. One can appreciate his frustration in waiting for plodding paleontologists to reach understandings from fossils; yet there is danger in his approach, too: modern analogues can obscure past novelties. This fear is only partly allayed by his statement (p. 9) that cladistic analysis of modern taxa is not enough in phylogenetic studies, for fossils reveal combinations that did not survive to the present.

He scores points by showing how many hominid fossils are available (some 8000 as he wrote). He rightly asserts that the Linnaean system misleads by declaring discontinuity before it is tested, but for a *morphospecies* perspective that is acceptable. He is off the mark in complaining that paleontologists are not like chemists, who study populations and "normally do not attempt to describe or explain the attributes of individual molecules in terms of position, velocity, or past history." Paleoanthropologists allow a new find to revolutionize understandings, so he warns, "It is worth pondering the style of a field in which all of the previous theories might be overturned by one data point" (p. 11). Yet they allow this to happen because working from the bottom up, they accept that their hypotheses will be tested by new findings. The underlying difference is that paleontology is not a *physical science*, focusing upon processes, but an *historical science* focusing upon events, each uniquely expressing process. Physical scientists do indeed consider individual particles in specific events, such as a collision in a particle accelerator, where one data point *can* overturn previous views. Eckhardt's discussion of the East Turkana early *Homo* find, KNM-ER 1470, shows how inescapable such matters are in paleoanthropology.

Attempts at poetic imagery can obscure an issue. He asks (p. 18) if species "comprise closed categories of near-identical units, like cans of peas and dried carrots on a shelf of Jehovah's Grocery, or do they more closely resemble amorphous cheesecloth bags holding different species suspended in Gaia's long-simmering stewpot?" I heard the voice of Bob Dylan as I pondered the contrast between Jehovah and Gaia and wondered how the spices came to be different before the event (or process?) of the stew. And would not the peas in the cans exhibit population variation? Nor does a specious foray into Schrödinger's quantum mechanics (p. 23) advance the discussion: is it more useful to see the Taung specimen as an "indeterminate simultaneity" than as a juvenile of dubious taxonomic utility, as we already know?

The histories of taxonomic and evolutionary perspectives and of discoveries are reviewed, though key workers are often evaluated retrospectively out of historical context. To dismiss past discoveries as "stochastic events in the intellectual realm" and "accidents of circumstance" (p. 41) demeans researchers who recognized *novelty* while not readily understanding it. Major discoveries were made in reverse time sequence (Neanderthal - *Pithecanthropus* - *Australopithecus*), suggesting that each helped condition the discipline for discovery and acceptance of the next. Discussion of "the Dane, Neils Stensen, who held church offices in Italy" (p. 34) fails to identify him as Steno or credit his contributions to stratigraphy. It is stated that "early contributions to the foundation of historical geology largely bypassed England" until the second decade of the nineteenth century. William Smith is not mentioned, nor is his Principle of Fossil Succession. William Whewell is cited as an "important scholar from Cambridge," but his disparaging authorship of the word "uniformitarian" in a blunt dismissal of James Hutton's viewpoint is not mentioned. Charles Lyell is described as a student of William Buckland "before coming increasingly under the influence of his own Scots countryman, James Hutton" (p. 37), leaving the impression that Hutton came on the scene in the late 1830s, a decidedly spectral appearance given his death in 1797. More puzzling is the statement that "historical geology" was less ready than "its uniformitarian rival" to accept the enormity of geologic time (p. 37). Discussion of the

interpretation of finds in relation to Noah's Flood leaves out the famous *Homo diluvii testis*, a fine example of conception imposed upon perception.

There is much here about the implications of human variation for past populations. Arguing that fewer hominid species existed in the past than are now accepted, Eckhardt eschews "standard taxonomic conventions" and moves to a broader temporal and geographical perspective informed by modern human biology and sensitive to Hennig's call for multiple approaches to classification (pp. 292-293). Eckhardt's historical review of evolutionary biology is illuminating. I was delighted to read how Darwin understood the power of compounding from his experience in investing: a part of his logic neglected in textbooks. He shows that Darwin was *not* a gradualist and held for large-scale changes, but kept gradualism as a fall-back position given potential for compounding over long geologic time. It would have helped to mention that Darwin later wrestled with Lord Kelvin's faulty "disproof" of long earth time, which took away Hutton's "gift of time" and temporarily rendered gradualism implausible. The relationship between microevolution and macroevolution is well considered, showing multiple pathways from genotype to phenotype. Polymorphisms are discussed as important evolutionary phenomena (p. 95). The importance of timescale is discussed for both adaptation and skeletal evidence. Molecular measures of diversity and relatedness are well treated, as is the dialogue between molecular systematists and paleontologists about divergence times.

Papionine primate diversity and adaptation patterns provide parallels to those of humans, supporting application of such insights to the fossil record. Eckhardt rejects a dichotomy that has humans relying on behavioral mechanisms to adapt to environmental change, whereas non-human primates adapt through gene-based mechanisms: "Contrasts of this sort misrepresent reality on both sides" (p. 141). A difference of *degree* is sufficient in understanding human adaptive success, given the power of compounding. He attributes past diversity partly to population fragmentation, minimizing gene flow, and partly to fine-scale temporal separation. Whether one argues for or against constant rates of change, one must make assumptions about geological processes and particularly stratigraphic scaling and completeness (p. 230). As to modern human origins he considers phenotype *vs.* genotype, genetic adaptations, and molecular evidence and, at last, cautions that "A prodigious amount of work remains to be done" before we can assess the relative importance of genetic and non-genetic aspects of adaptation (p. 279). The evidence, he admits, despite the number of human fossils, is limited and most specimens incomplete.

Missing in this book is consideration of evolutionary trends in other Quaternary mammals. Molecular information has shortened the expected timespan for hominid-pongid divergence so much that those very taxonomic categories can be challenged, but was this really any more dramatic than the Quaternary rise of mammoths? Consideration of global change is also weak. Eckhardt states (p. 90) that organisms function "adequately, if not always optimally in a variety of particular environmental settings." To imply that *any* organisms function "optimally" is ideological: global change readily elicits a "Red Queen" view of adaptation, with species running faster and faster simply to stay in the same place. His statement that "as hominid populations increased in numbers and expanded their range, they would have come to occupy an increasing variety of environments," and that they "responded to the challenges" of these new settings (p. 5) is a Kiplingesque "just so" story. One could argue that environmental change made uniform environments more patchy, without population or range increases.

Acknowledging a continued need for phylogenetic studies, Eckhardt calls for equal attention to "studies of the velocity of character change and the paleobiological contexts that shaped adaptation and evolution" (p. 281). Velocity comparisons hold promise and the examples given are among the book's better contributions. Molecular studies of fossil and recent populations will lead to new definitions of taxonomic categories for fossil hominids, and his call for a change in focus in identification from species to lineages parallels the concerns of paleontologists working with other groups. Temporal resolution complicates studies of character change, but disjunct characters can flag incorrect dates if character change velocities are understood (p. 290). Finally, his own studies of high-altitude adaptation show that evolutionary rates within relatively recent Andean populations have exceeded rates calculated for differences between Neanderthals and anatomically modern humans (p. 292).

Analogy from present to past variation provides insights to be laid alongside those emerging from studies of the fossils. One hopes that the convergence of these approaches will be more like the handshake over the golden spike, when eastern and western rail lines were linked, than like the climactic car crash at the end of a movie. Wishful thinking, based also in the present, made Piltdown Man alluringly "logical" with its large brain yet simian mandible. The *fossil record* challenged its validity when the find could not be replicated and discoveries painted a different picture. Tests confirmed that there was indeed "something nasty in the woodshed." Might we risk new misconceptions, as Cold Comfort Farm receives another emissary from the big city?

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EVOLVING EDEN: AN ILLUSTRATED GUIDE TO THE EVOLUTION OF THE AFRICAN LARGE-MAMMAL FAUNA, by Alan Turner and Mauricio Antón, Columbia University Press, New York, 2004, hardcover $39.50

The recent discovery of a new Pleistocene species of human, *Homo florisensis*, in Indonesia, was announced in *Nature* with a cover story and spectacular photos of the skull, but it was not these images that captured the attention of the world. Instead the news wires buzzed with an independent reconstruction of this hobbit of the woods by Peter Trusler, which *Nature* (v. 432, p. 555, 2004) later self-righteously published as an example of the non-scientific power of imagery. The reconstruction was commissioned by the National Geographic Society, who know a thing or two about the power of images. Dinosaur artists such as Charles

Knight, Rudolf Zallinger, Greg Paul, Doug Henderson and Mark Hallett are better known that many dinosaur scientists. Their images not only lodge in the mind's eye, but stimulate testable hypotheses of the past.

This volume will further establish the reputation of Mauricio Antón, and continues the high standard of illustration set in his previous collaborative works *The big cats and their fossil relatives* and *Mammoths, sabertooths, and hominids.* Big cats, mammoths and hominids are well covered in reconstructions of the past, but this volume now provides definitive new images of many poorly known creatures from Africa's remote geological past. I wish it had been around in the 1990's when I was struggling to do my own reconstructions of fragmentary and little known fossils from the early Miocene of Kenya. Antón has provided a striking reconstruction of the early Miocene giant spring hare *Megapedetes pentadactylus*, an distant ancestor of modern animals of open dry country. His fossil aardvark *Myorycteropus africanus* makes plain differences in less gracile limb and snout compared with the larger modern aardvark illustrated beside it. The middle Miocene antelope *Kipsigiceras labidotus* and *Oiocerас tanyceras* are shown as similar to goats and impala, respectively. The early proboscidian *Prodeinotherium hobleyi* was the size of modern humans, only 1.6 m at the shoulder. Both Anton's early monkey, *Victoriapithecus macinnesi*, and early ape, *Proconsul africanus* are surprisingly prognathic. There are many reconstructions of hominids, but the most memorable image is a group of 11 smiling and laughing woman and children of *Homo erectus.* Their varied expression and appearance is quite captivating, as is the caption. "A new, characteristically human way of strengthening social bonds may have appeared at this stage – laughter."

Also included are habitat reconstructions of major fossil sites: Fayum, Gebel Zelten, Rusinga, Maboko, Fort Ternan, Arrisdrift, Lothagam, Laetoli, Omo River, West Turkana, Hadar, Olduvai, Taung, Sterkfontein, Kromdraai, Swartkrans, Drimolen and Makpansgat. The text vacillates, and sometimes is at odd with the illustration, which presents a very clear impression of past habitats. All convey an unmistakably African appearance of the vegetation. I was particularly pleased with the grassy and open Fort Ternan, as indicated by the fossil Mollisol soils, grasses, *Acacia*, and antelope. Carbon isotopic analysis of pedogenic carbonate and bone from this site stirred much controversy in 1994. Later the issue was settled by the surprising discovery that most Miocene tropical grasses were isotopically light for carbon, so that light carbon isotopic composition did not necessarily indicate rain forest at Fort Ternan.

The text by Alan Turner is pleasant and conventional, and includes outlines of modern African flora and fauna, different mammal groups, most of the major fossil sites, and an evolutionary history of African biota. There are minor errors of fact and interpretation. Fort Ternan fossil site is not a building quarry, though there are such quarries in underlying pink tuffs. *"Protragoceras" labidotus* labelling the first reconstruction, should be *Kipsigiceras labidotus* as given for a later assemblage reconstruction. The montane pollen at Aramis and Hadar do not necessarily indicate high elevation at the site, but rather nearby, as Raymonde Bonnefille has made plain. The hominoid from Maboko is definitely not *Afropithecus* and probably not *Equatorius* either, but *Kenyapithecus* according to Brenda Benefit and Monte McCrossin, who have the largest and most recent collections. The persistent idea that Africa was entirely forested during the early Tertiary is also promoted, despite evidence marshalled by Martin Pickford and others for deserts well back into the Eocene in different parts of Africa. The general theme of the text is of a relatively protracted modernization of the African fauna, from Oligocene forests to middle Miocene open country with abundant antelope, then the late Miocene advent of hypergrazers and humans.

I am very pleased to have this book because a picture really is worth a thousand words. There is plenty of material here to enliven your lectures in paleontology and historical geology. Your university, as well as local town library should also have a copy. This book really makes the past come alive.

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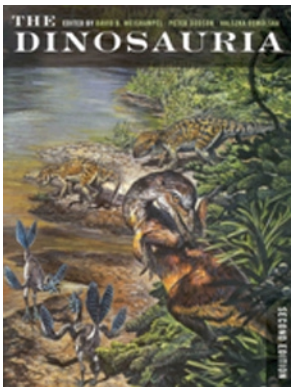

THE DINOSAURIA (2nd edition), edited by David B. Weishampel, Peter Dodson and Halska Osmólska, University of California Press, 2004, 861 p. ISBN 0-520-24209-2, hard back $95.00.

The long-awaited, and much anticipated, second edition of *The Dinosauria*, first published in 1990, is an expanded version (128 more pages), with some new authors, new sections and new dinosaurian taxa. The book has been slightly reorganized, but it retains much of the original flavor and format. Two main sections include: *Dinosaur Systematics* (section 1) and *Dinosaur Distribution and Biology* (section 2).

Within the *Dinosaur Systematics* section, major groups of dinosaurs are reviewed. Those familiar with the first edition will note the new sections (Basal Saurischia, Basal Tetanurae, Tyrannosauroidea, Therizinosauroidea, Basal Avialae, Basal Ornithischia, Basal Ornithopoda, Basal Iguandontia, and Basal Ceratopsia). Gone are chapters on *Staurikosaurus* and Herrerasauridae, carnosaur paleobiology, Elmisauridae, etc., as these have been largely subsumed in the new chapters that reflect the modern cladistic groupings recognized by most workers. The *Dinosaur Distribution and Biology* section contains seven chapters: Dinosaur distribution, dinosaur taphonomy, dinosaur paleoecology, Mesozoic biogeography of Dinosauria, physiology of nonavian dinosaurs, dinosaur physiology and dinosaur extinction.

Because this book is so extensive it would almost be impossible to review it, in any comprehensive way, within the limited space provided here. But a key question that comes to mind is: How reliable are all these new data in both the *Systematics* section and the *Distribution and Biology* sections? To evaluate this question, I will focus my attention on two subject areas I know best: the Pachycephalosauria and Dinosaur Distribution chapters.

In the first edition, the Pachycephalosauria chapter was written by Teresa Maryanska, whose pioneer work on the Asian pachycephalosaurids in the 1970's is well-known among dinosaur workers. In the second edition she is joined by co-authors Ralph E. Chapman, who is known for morphometric analyses, and by David Weishampel, who has no documented expertise in the realm of pachycephalosaurs. Collectively, they make taxonomic decisions that are *ad hoc* and unsupportable. They revert to the old taxonomy relegating *Stegoceras* to the status of a garbage taxon. *Colepiocephale* and *Hanssuesia* are well-defined and readily distinct genera, different from *Stegoceras* (*sensu stricto*) as well as *Prenocephale*, yet they are placed in synonymy with *Stegoceras* without comment. *Sphaerotholus* is a subjective junior synonym of *Prenocephale* and its recognition as a distinct genus is not supportable. The problematic *Yaverlandia bitholus* from the Lower Cretaceous of the Isle of Wight (UK) is retained in the Pachycephalosauria, despite the fact that it lacks any characters that would support its inclusion with this group. If this chapter is illustrative of the taxonomic rigor of the other chapters, then this volume is seriously flawed. But, it doesn't end here with the pachycephalosaurs. The synonymy of the ceratopsid *Torosaurus utahensis* with *Torosaurus latus*, which was suggested by Peter Dodson and Philip Currie in the first edition (also without justification), is another example of an unsupported taxonomic decision, that has been carried over to the second edition. Parenthetically, the two are arguably distinct ceratopsid species, and perhaps, even separate genera. The taxonomic status of the hadrosaurid *Kritosaurus* is yet another example. The holotype *Kritosaurus navajovius* has been relegated to the status of *nomen dubium* in this new edition despite the fact that many workers continue to recognize it as valid taxon, separate from hadrosaurid taxa such as *Gyrposaurus*, *Naashoibitosaurus* and *Anasazisaurus*. Again, no demonstrable case is made for this new taxonomic designation.

I have fewer complaints with the Dinosaur Distribution chapter, which summarizes the stratigraphic (and geographic) distribution of the dinosaurs. Although it should be noted that the taxonomic decisions in the first section adversely affect the stratigraphic distribution of taxa, and can mislead those who are trying to grapple with issues relating to temporal occurrence and geographic distribution (e.g., Asia – North America). In some instances, the stratigraphic nomenclature lacks clarity. Rather than using lithostratigraphic members, terms such as "upper" and "lower" are employed. This is a potential problem for such units as the Kirtland Formation in northwestern New Mexico, where historically there has been debate over the placement of the members within formations. The fauna (e.g., the Alamo Wash local fauna) of the "Upper Kirtland" (Naashoibito Member) is now considered to be part of the overlying, and unconformable, Ojo Alamo Formation; and the fauna of the Denazin Member (Willow Wash local fauna) is above the Hunter Wash local fauna of the upper Fruitland Formation (Fossil Forest Member) and lower Kirtland Formation (Hunter Wash Member). As a consequence, the faunal list of the Fruitland Formation (more properly "upper Fruitland") is replicated, in part, in the taxon list for the "Lower Kirtland." The head spins. As with this first edition, illustrations are few. There are some new ones, however, like those of the feathered theropods (Basal Avialae), psittacosaurids (Basal Ceratopsia), and others. Most are line drawings, whereas others are photographs (such as *Confuciusornis*). The new format and new taxa have necessitated the inclusion of new illustrations. However, in other chapters, notably the Pachycephalosauria, the illustrations of taxa are remarkably the same as in the first edition (no surprise here). However, for what is it worth, the pachycephalosaur cladogram has changed with no data to support it! As with the first edition, many of the line drawings provide minimal information. The new paleogeographic maps (pages 637-640), while a good idea, are of low quality and could have been better presented. Some illustrations have been improved over those of the first edition, but the volume is still deficient in the graphics department.

It is important to try to bring together current state-of-the-art thinking on dinosaurs, and all that they entail. However, this ambitious undertaking has only resulted in producing an uneven and somewhat biased product. I largely perceive this endeavor as an agenda-driven volume, one that lacks objectivity, and is heavily grounded in cronyism, as reflected in some of the authorships of various chapters. If I had to choose between spending my money on either the biased *The Dinosauria* or Donald Glut's more informative and objective *Dinosaurs: The Encyclopedia* (and supplements), it would be the latter, hands down. As the saying goes "buyer beware."

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