PRISCUM

The Newsletter of the *Paleontological Society* Volume 13, Number 2, Fall 2004

PRESIDENT'S COLUMN: WE NEED YOU!

by William I. Ausich

Why are you a member of *The Paleontological Society*? In the not too distance past, the only way to receive a copy of the *Journal of Paleontology* and *Paleobiology* was to pay your dues and belong to the *Society*. I suppose one could have borrowed a copy from a friend or wander over to the library. However, this was probably done with a heavy burden of guilt. Now, as we move into the digital age of scientific journal publishing, one can have copies of the *Journal of Paleontology* and *Paleobiology* transmitted right to your computer. It actually may arrive faster than the U.S. mail, you do not have to pay anything, and you do not even have to walk over to the library. No need for shelf space, no hassle, no dues, no guilt – isn't the Web great? The Web is great, but the *Society* needs dues-paying members in order to continue to publish in paper, digitally, or both. If in the future we switch completely to digital format, the cost of journal production will be reduced but not by as much as one might imagine.

Why are you a member of *The Paleontological Society*? In the digital age, this is an important question to be asked, and the answer will vary depending on the services and programs offered by the *Society*, whether or not one is a cheapskate, and whether one belongs to a generation in which data are expected to be free on the Web Paleontologists need to see a value in being a member of *The Paleontological Society*. To this end, the *PS* Council has authorized an ad hoc committee composed of Thomas W. Kammer, Patricia H. Kelley, and Steven M. Stanley to survey *Society* members in order to determine what you value in your *PS* membership, and what is the worth of current and potential *Society* services and products. Please return this survey so that the Council can better meet the needs of members.

In order to provide more for the society, a new *Paleontological Society* initiative will be on the ballot during the Autumn 2004 for consideration by the membership. The *Paleontological Society* Council is proposing to members that a *Paleontological Society* Fellows program be established. A vote by the membership is required because *Fellows* would be a new member category, and this requires a change in the Constitution and Bylaws. An ad hoc committee composed of Richard K. Bambach,

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.

Stephen M. Holland, and Mark E. Patzkowsky drafted a proposal for consideration. The *Paleontological Society Fellows* is an award to recognize a larger number of excellent paleontologists than is presently possible with only the Schuchert Award and the *Paleontological Society* Medal. Fellow is a membership category in many societies, and in order for this to be the honor that is intended, the number of fellows does have to be limited. For example, AGU has 2.5% of its members as fellows, AAAS has 8%, and GSA has 17%. For *The Paleontological Society*, 5 to 10% of members is considered appropriate. Recipients of the Schuchert Award and *The Paleontological Society* Medal would automatically become Fellows (although in many cases they may already be Fellows). Once established, it is anticipated that no more than four candidates be proposed for election each year. However, initially, several Fellows would be elected to begin the program, including award winners mentioned above and more than an additional four new fellows annually for the first five years.

Council is excited about this new initiative because we believe that it will add value to membership in *The Paleontological Society*, and we hope that the membership at large will agree. The Fellows category of membership will be maintained as a prestigious designation so that a *PS* Fellow is as significant a distinction as an AGU Fellow and an AAAS Fellow.

Why are you a member of *The Paleontological Society*? Council hopes that you maintain your membership and encourage your students and colleagues to be members because you recognize that the health and future of our discipline requires that all paleontologists be members. However, we also hope that *The Paleontological Society* Fellows and other initiatives will make it such that your renewals are automatic. If so, then a future *PS* President will not have to write you a letter asking "Why aren't you a member of *The Paleontological Society*?"

Treasurer's Report for Fiscal 2003

by Mark E. Patzkowsky, Treasurer

Your Society remains in strong financial shape. Assets at the end of 2003 totaled $1,597,714, which was an increase of $2,842 from the end of 2002, and is the first increase in total assets since 1999. Cash in bank accounts was $76,341, which was down by $88,973. Investments were $1,521,373, which was up by $91,815, or 6.4%. Society operations required a withdrawal of $60,000 from investments during the year, so the total investment return for 2003 was $151,815, or 10.6%. Investment allocations were approximately 40% stock mutual funds, 40% bond mutual funds, and 20% cash.

Total income was $324,627. This included $209,500 from dues and subscriptions to our journals, $8,669 from donations, $9,921 from page charges, $4,325 from Special Studies publications, $26,282 from royalties, $2,400 from grants, and $60,000 from investment income.

Total expenses were $417,784. A detailed listing of expenses will be provided at the Annual Business Meeting and Luncheon at the Annual GSA Meeting in Denver. Some of the more notable expenses included: $251,216 to print our two journals plus the associated Memoirs; $43,600 for editorial costs of the two journals; $56,484 for Business Management of our journals and Society memberships by Allen Press; $7,264 for Special Studies publications; $15,000 for student research grants; $16,125 for PalSIRP grants; and $23,010 for overhead to operate the Society (meeting expenses, travel by Council members, insurance). This overhead cost was only 5.5% of total expenses.

Once again, I want to remind all Society members to please renew your journal subscriptions early, certainly by December 31 each year. Early renewals could save the Society thousands of dollars in business management fees by Allen Press if we don't have to send out so many renewal notices plus stop and then restart journal subscriptions to late-paying members.

Paleontological Society Program Coordinator's Report

by Mark A. Wilson, Paleontological Society Program Coordinator

1. Paleontological Society Short Courses:

2004 (Denver GSA): Biological Revolutions in the Neoproterozoic and Cambrian • (Ben Waggoner and Jere Lipps)

2005 (Salt Lake City GSA): Paleobiogeography: Generating New Insights into the Coevolution of the Earth and its Biota • (Bruce Lieberman)

2006 (Philadelphia GSA): No proposal yet. Possibility: "Recent Developments in Geochronology"

2. Paleontological Society-Sponsored Pardee Sessions at Denver GSA (2004):

Adversity, Advantages, Opportunities: Phanerozoic Stromatolites as "Survivor" vs. "Disaster" Taxa (**P5**) (Connie Soja and Robert Riding; co-sponsored with GSA Geobiology and Geomicrobiology Division)

Pre-Mesozoic Impacts: Their Effect on Ocean Geochemistry, Magnetic Polarity, Climate Change, and Organic Evolution (**P6**) • (Charles Sandberg, Jared Morrow, and Christian Koeberl; co-sponsored with the GSA Planetary Geology Division)

3. Paleontological Society-Sponsored Topical Sessions at Denver GSA (2004):

Marine Hard Substrates: Colonization and Evolu-

tion (**T50**) • (Stephen K. Donovan and Paul D. Taylor; co-sponsored with the GSA Sedimentary Geology Division)

The Hunters and the Hunted: Predation On and By Gastropods (**T52**) • (Patricia H. Kelley, Thor A. Hansen and Gregory P. Dietl)

Critical Events in the Evolution of Terrestrial Arthropods (**T53**) • (Robert Nelson, Dena Smith and Bruce Archibald; co-sponsored with GSA Geobiology and Geomicrobiology Division)

Anatomy of an Anachronistic Period: The Early Triassic Environment and its Effect on the History of Life (**T55**) • (Adam D. Woods, California State University, Fullerton, Calif.; Frank Corsetti; co-sponsored with the GSA Sedimentary Geology Division)

Paleontology and Stratigraphy of the Late Eocene Florissant Formation, Colorado (**T56**) • (Herbert W. Meyer, Florissant Fossil Beds National Monument, Florissant, Colo.; Dena Smith; co-sponsored with the GSA Limnogeology and Sedimentary Geology Divisions)

Geologic Time and CHRONOS: Databases, Tools, Outreach, Education, and the Geoinformatics Revolution (**T112**) • (Cinzia Cervato and Walter Snyder; co-sponsored with the Geoscience Information Society and CHRONOS)

Pre-Mesozoic Impacts: Their Effect on Ocean Geochemistry, Magnetic Polarity, Climate Change, and Organic Evolution (**T143**) • **(**Charles Sandberg, Jared Morrow, and Christian Koeberl; co-sponsored with the GSA Planetary Geology Division – A poster session associated with the Pardee Session**)**

4. Paleontological Society-Sponsored Topical Sessions at GSA Section Meetings (2004):

The Paleontology of Marginal Marine Environments **(**Northeastern and Southeastern Sections, March 2004; Neil Tibert and Al Curran**)**

Fossil Reef Systems • **(**North-Central Section, April 2004; Ann Budd and Christopher Crow**)**

Upper Paleozoic Biostratigraphy of the Western North America • **(**Rocky Mountain and Cordilleran Sections, April 2004; Tamra A. Schiappa and Peter E. Isaacson**)**

5. Other Paleontological Society-Sponsored Events (2004):

Upper Paleozoic Continental Margin Tectonics of the Western U.S.: Tectonostratigraphic Framework of Nevada: Elko Area • (Field trip for the Rocky Mountain and Cordilleran Section meeting, April and May 2004; James Trexler, Patricia Cashman, and Walter Snyder**)**

Paleontology and Volcanic Setting of the Florissant Fossil Beds • (Field trip for the GSA Annual Meeting in Denver, November 2004; Herb Meyer and Amanda Cook**)**

What did *T. rex* taste like? – or – The science behind the stories • (Workshop at GSA Annual Meeting in Denver, November 2004; Judy Scotchmoor and Dale Springer; co-sponsored with the Society of Vertebrate Paleontology)

6. Future Paleontological Society-Sponsored Events (2005):

Terminal addition, segmentation, and the evolution of body plan regionalization • (The Society for Integrative and Comparative Biology, January 2005; Nigel Hughes and David Jacobs)

7. Acknowledgments:

Thank you to the Paleontological Society's representatives on the 2004 GSA Joint Technical Program Committee: Lisa Park (senior member) and Tom Olszewski (junior member). Thank you also to those members who served as chairs of volunteered sessions at this up-coming GSA meeting.

8. Program ideas?

We always encourage short course and topical session proposals, and now funds are available to defray travel expenses for speakers who do not normally attend annual GSA meetings. If you are considering a short course or topical session proposal, please contact the Paleontological Society Program Coordinator, Mark Wilson (mwilson@wooster.edu). The next opening for a short course is November 2006. Topical session proposals for the 2005 GSA meeting (October 16-19 in Salt Lake City) must be submitted by the session organizers to GSA by January 14, 2005. Paleontological Society sponsorship should be obtained prior to submitting a proposal to GSA. To facilitate consideration of sponsorship, please submit ideas to Mark Wilson as soon as possible (especially if you wish to request funding for the session).

Reviews of PS-Sponsored Sessions at the GSA Annual Meeting in Seattle, 2003

PS Short Course: Bridging the Gap: Trends in the Ostracode Biological and Geological Sciences

by L. Park and A. Smith (Co-organizers)

We convened an all day Short Course on November 1, 2003 in Seattle, Washington that focused on ostracodes, one of the most common calcareous metazon micro-organisms on Earth. In our short course, thirteen scientists from all over the globe, including Austria, Belgium and the United Kingdom, and from both the biological as well as the geological sciences, presented different approaches and new techniques used in ostracode studies. The major objectives of this short course were: 1) to bring together ostracode specialists and scientists working with ostracodes, who do not usually interact on a regular

basis; 2) to focus on establishing or strengthening methodological and conceptual links between studies of living ostracodes and studies of fossil ostracodes of Cenozoic age; and 3) to provide an avenue for further collaborative efforts and interdisciplinary research and education to graduate students and established scientists. In addition to the presentations by the speakers on November 1, we also sponsored a half day Topical Session at the GSA meeting on current research on Ostracoda. This topical session featured students, as well as recent Ph.D.'s, with the goals of: 1) allowing new ostracode workers to establish links with the wider community of ostracode specialists and scientists working with ostracodes; 2) creating interest in other students in the topic; and 3) promoting new scientists early in their careers.

The need for this short course was pressing. Ostracode studies have increasingly found applications in wid- ranging areas within the disciplines of geological and biological sciences, yet the community of ostracode workers, although diverse, is a fragmented one. In addition, the ironic juxtaposition of the dwindling number of ostracode specialists with the new cutting-edge use of ostracodes in geological, paleontological, paleoclimatological, hydrological, and environmental research, has made the need for training people in these new utilities a necessity. We felt and continue to feel that ostracode studies have a tremendous amount to offer scientists working in environmental, genetic, paleoclimate, and geochemical research. Thus, it is important to establish networks among ostracode specialists and other scientists that will lead to collaborative research and problem solving in the above mentioned areas. We feel that our short course and its resultant publication has helped to inspire a new generation of ostracode workers as well as train those currently using them as proxy indicators.

List of Short Course Presentation Topics:
Thomas Cronin, Stephen Schellenberg and Dan Danielopol • Remembering Richard Benson

Lisa Park and Douglas Ricketts • Evolutionary History of the Ostracoda and the Origin of Nonmarine Faunas

Anne Cohen and James Morin • Sexual Morphology, Reproduction and the Evolution of Bioluminescence in Ostracoda

Isa Schön and Koen Martens • Molecular Approaches to Phylogeny Reconstruction in Ostracodes

Richard Benson, deceased (presented by Stephen Schellenberg) • A Biomechanical Theory of Ostracode CarapaceMorphology

Angel Baltanás, Wolfgang Brauneis, Dan L. Danielopol, and Johann Linhart • Morphometric Methods for Applied Ostracodology: Tools for Outline Analysis of Non-Marine Ostracodes

Emi Ito, Patrick DeDeckker and S.M. Eggins • Ostracodes and their shell chemistry : Implications for Paleohydrologic and Paleoclimatologic Applications

Ian Boomer and David Horne • The Use of Ostracodes in Palaeoenvironmental Studies, or What Can You Dowith an Ostracod Shell?

David Horne • Key Events in the Ecological Radiation of the Ostracoda

Jesse W. Davis, Alison J. Smith, Donald F. Palmer, Donald F., Richard M. Forester, and Brandon B. Curry • Hydrochemical Constraints on Ostracode Habitats in Springs, Wetlands and Streams in the U.S.

B. Brandon Curry and Richard M. Forester • Ostracodes, Hydrology, and Climate

Thomas M. Cronin and Gary S. Dwyer • Deep-sea Ostracodes and Climate Change

Roger L. Kaesler and Michael S. Cormack • Ostracoda on the Internet

Jonathan Holmes • The Future Directions of Ostracod Research

Thus, our Short Course contributed to the enhancement and improvement of scientific and educational activities in the paleontological and geoscience communities in a number of ways. It provided a much needed introduction and update for the paleontological community on present ostracode research. It demonstrated the utility of ostracodes in answering geological questions, while also providing much needed resource references for potential workers. And, it demonstrated the need for new workers, energizing a new generation of ostracode workers in the earth sciences. In sum, it "bridged the gap" between the biological, geological, climatological sciences.

T90. Terrestrial Paleobiology of South America, Cretaceous through Neogene

Peter Wilf, Robyn J. Burnham, Maria A. Gandolfo and Kirk R. Johnson (Conveners)

The session was a very successful and diverse mix of excellent talks about South American paleobiology, a topic not typically covered at GSA, with data arising from at least eight South American countries, organisms including plants, mammals, clams, fish, and insects, and topics including paleodiversity, geochronology, stratigraphy, tectonics, paleoecology, paleoclimate, and conservation. Three speakers traveled from South America for the session, and half of the speakers were native South Americans. Funding from the Petroleum Research Fund supported the international travel costs for the international keynote speakers, Rubén Cúneo, Egidio Feruglio Paleontological Museum, Trelew, Argentina, and Carlos Jaramillo of the Colombian Petroleum Institute. Dr. Cúneo presented detailed information on the stratigraphy and floras of the Early Cretaceous Baqueró Group in Argentina, which hold an outstanding record of this critical time period for the evolution of angiosperms. Dr. Jaramillo presented the first quantitative analysis of palynofloral diversity in northern South America for the Maastrichtian through early Miocene, highlighting the diversity crisis at the K-T boundary, massive diversification during the early

Eocene, and an increase in extinction rates at the end of the Eocene. The Paleontological Society provided support for domestic keynote speakers John Flynn, Field Museum, who provided a detailed synthesis of unusual Cenozoic mammalian faunas in a geochronologic, tectonic, and paleoclimatic context, and John Lundberg, Academy of Natural Sciences, who reported fossil evidence for great antiquity of crown groups of the Amazonian fish fauna, the richest freshwater fish fauna in the world. Other new developments were reported regarding Mesozoic mammals of South America (Guillermo Rougier et al.), petrified Eocene forests in Peru (Herbert Meyer and Deborah Woodcock), Maastrichtian to Eocene climates and highly diverse floras from Patagonia (Maria Gandolfo, Felipe Hinojosa, Peter Wilf, and their co-authors), dispersal ecology in Neogene floras of Bolivia and Ecuador (Robyn Burnham), comparative Neogene radiations of freshwater bivalves in Amazonia and North Dakota (Laurie Anderson and Joseph Hartman), comparative mammalian community dynamics for the Neogene of South America and Africa (Rene Bobe et al.), and karst caves containing diverse and well-preserved Pleistocene mammals in northeastern Brazil (Walter Hartwig et al.).

T92. Advances in the Fossil Record of Insects and Other Terrestrial Arthropods

Cary Easterday and Conrad Labandeira (Conveners)

Since 2001, GSA has hosted a technical session at the annual meeting dedicated to the insect fossil record and other terrestrial arthropods. In 2003, twelve speakers presented original research, including eight volunteer talks and (for the first time) four invited talks. The 2003 session included a broad range of topics, such as insect taphonomy, taxonomy, plant-insect associations and evolution (4 talks), amber ecology, preservation, and preparation methods (4), arachnid taphonomy, taxonomy, and evolution (2), and myriapod biomechanics, ecology, and evolution (2).

The 2003 GSA "fossil bug" session was divided into three major themes. Amy Moe, April Kinchloe, and S. Bruce Archibald discussed Cenozoic compression fossil assemblages. Scott Anderson, Sara Lubkin, George Poinar, and Megan Adcock reviewed Mesozoic and Cenozoic-age amber deposits. Cary Easterday, Heather Wilson, and Joseph Hannibal reported on Paleozoic terrestrial arthropods.

Moe applied the Wilson model of paleolacustrine depositional enviroments to the insect-dominated Stewart Valley (Miocene), Nevada fossil assemblage. Kinchloe reanalyzed 72 type spiders from Florissant (Eocene), Colorado. Archibald reanalyzed Mecopteran (Scorpionfly) diversity through time. Anderson described a rare and unusual vertebrate in amber, including evidence of its last insect meal. Lubkin described the first known occurrence of the beetle family Lymexylidae. Poinar reviewed probable Agathis-derived ambers of the Mesozoic and Cenozoic and discussed its implications. Adcock introduced a new method of amber preparation. Amanda Cook discussed experiments with beetle cuticle and its broader implications for insect taphonomy. Conrad Labandeira provided evidence that seed-plant nectivory and pollinivory were established on gymnosperms prior to the earliest angiosperms. Easterday presented new evidence for silk-spinning structures in trigonotarbid arachnids and reviewed his latest discoveries from the insect-rich Cemetery Hill (Pennsylvanian), Ohio fossil assemblage. Wilson analyzed the biomechnics of tracemaking in the extant millipede *Polyxenus* in order to better understand the probable functional morphology of locomotion in extinct *Arthropleura*. Hannibal reviewed defensive armament, organs, and behaviors of fossil millipedes with an emphasis on Paleozoic forms.

T91. Understanding Late Devonian and Permian-Triassic Biotic and Climatic Events: Towards an Integrated Approach

Jared Morrow, Paul Wignall, and Jeff Over (Conveners)

The Late Devonian and Permo-Triassic were among the most dynamic intervals of Earth history, marked by major changes in terrestrial forests and continental ecosystems coinciding with dramatic fluctuations in ocean oxygenation, major phases of biotic turnover (including the Frasnian-Famennian and end-Permian mass extinctions), and rapid fluctuations in several stable isotope systems. Multiple bolide impacts and major eustatic changes are further factors implicated in these changes. Understanding how potentially contemporaneous events are linked constitutes a major challenge in understanding these pivotal Phanerozoic intervals. Presentations during this full-day topical session focused on new, high-resolution, global-scale data sets covering a broad spectrum of research, including results from the sub-disciplines of micro- and macropaleontology, evolutionary geobiology, geochemistry, biostratigraphy, sequence and event stratigraphy, petrography, and GIS. This session highlighted the necessity of both traditional and cutting-edge approaches to understanding the timing and possible causes of environmental and biotic changes during these intervals. The results from this session will be published by Elsevier in a compilation of papers as part of the "Developments in Palaeontology and Stratigraphy" Series.

Introducing the Paleontology Portal

http://www.paleoportal.org

The Paleontology Portal site will create a central, interactive entry point to paleontology resources on the Internet for many audiences, and it is now open for contributions of images, links ,and information from the paleontological community. The centerpiece of the portal is the USGS color-coded geologic map of the United States draped over a shaded-relief digital elevation model. This map and associated stratigraphic column are interactive, allowing the user to access

information about particular geographic regions, geologic time periods, depositional environments, and representative taxa. Throughout the site, the user will also find images and links to information specific to each state, including current research projects and publications, on-line exhibits and educational materials, information on collecting fossils in that state, and availability of other resources. Other features include highlights of famous fossil sites and assemblages, and a Fossil Gallery.

Thanks to the efforts of many volunteers from the paleontological community, this site now includes basic information on nearly half of the states, with many more soon coming on line. From now through September, the emphasis of the project is on gathering links and images to fill out basic information categories for as many of the remaining states as possible.

This is where you can help! We are encouraging contributions of images to the Fossil Gallery and links to paleontological resources from paleontologists, educators, and the general public throughout the United States. Links and images can be submitted on-line through the "add to site" button at the top of each screen. Links will be reviewed by an editorial panel before inclusion.

This new web resource is a joint project with the Society of Vertebrate Paleontology, the Paleontological Society, and the U.S. Geologic Survey, with funding from the National Science Foundation. We look forward to celebrating the "official" public launch of the site in September!

Student and Teacher Training Opportunity: The 2005 Nyanza Project

The Nyanza Project is an interdisciplinary research training program for outstanding undergraduates, graduate students, and secondary school teachers interested in tropical lakes in the areas of paleoclimatology, biology, limnology, and geology. The Nyanza Project is supported by the Paleoclimate Program-Atmospheric Sciences Division of NSF, the Research Experience for Undergraduates Program-Division of Biological Infrastructure, and the Office of International Science and Engineering. The project is run jointly by The University of Arizona and Vassar College. Participants in the Nyanza Project will join a team of U.S. and African students in a seven-week program of training and independent research. The program will be based in Kigoma, Tanzania, a small town on the eastern shore of Lake Tanganyika and will run from June 29th-August 15th, 2005. Any undergraduate and graduate student attending a U.S. college or university, and secondary school teacher, may apply, regardless of nationality. Students from under-represented minority groups are particularly encouraged to apply. Students enrolled in the Nyanza Project will have all of their expenses paid (air fare, room/board and research costs) by the project and will receive a summer salary. Applications will be accepted on-line at www.geo.arizona.edu/nyanza. Application deadline is Dec. 24, 2004. The University of Arizona and Vassar College are EEO/AA Employers-M/W/D/V.

Announcement: University of Kansas Invertebrate Collections

The Division of Invertebrate Paleontology of the University of Kansas Natural History Museum and Biodiversity Research Center is embarking on a major renovation that will entail installation of a high-density storage system to expand our capacity. For much of the coming year, most of the collections will be unavailable for study. The collection of type and figured specimens will be available, and space will allow us to retain some other parts of the collection for study. Paleontologists who anticipate needing to study parts of the collection should contact us as soon as possible in the hope that we can arrange to make available the specimens they need for study. We shall continue to receive material now on loan that investigators wish to return.

The Paleontological Society Distinguished Lecturer Program

by Robert Gastaldo, Councilor At Large

Each year the Paleontological Society selects outstanding scientists whose works encompass a wide variety of paleontological topics as Paleontological Society Distinguished Lecturers. Each Distinguished Lecturer has national and international stature in paleontology, has traveled widely, and has published extensively. Each is also known as an excellent speaker who can communicate the interest and importance of their research topics. This program is intended to make available lecturers for inclusion in departmental speaker series or other college and university forums.

The Paleontological Society Distinguished Lecturers, topics, and short abstracts of presentations for the 2003-2004 academic years are listed below. Additional information is available on The Paleontological Society homepage at: http://www.paleosoc.org/speakerseries.html. If your department is interested in inviting one or more Distinguished Lecturer to your institution, please contact the speaker directly. Although financial arrangements must be made directly with each speaker, all Paleontological Society Distinguished Lecturers have agreed to be available on an expenses-only basis.

The Paleontological Society hopes that you take advantage of this opportunity. Paleontology is a dy-

namic discipline, and these speakers will certainly convey the excitement and timeliness of our science. If you have any questions regarding the Paleontological Society Distinguished Lecturer program, please feel free to contact me at: ragastal@colby.edu.

ACADEMIC YEARS 2003–2004 DISTINGUISHED LECTURERS

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The Ecology of Pennsylvanian-age Tropical Coal Swamps

Tropical peat-forming environments, or mires, were among the most prominent features of Late Carboniferous terrestrial landscapes. These habitats were home to a unique wetland flora that specialized in low nutrient conditions and high water tables. The dominant plants comprise five major groups. The bizarre tree lycopsids were spore-producers, dominant during the Early and Middle Pennsylvanian; they are bark supported and similar to colonial organisms in construction. The spore producing marattialean tree ferns dominated Late Pennsylvanian mires; they are root supported. Other locally important groups were the seed-producing medullosans and cordaites, and the spore producing sphenopids. Major extinctions at the Middle-Late Pennsylvanian boundary entirely restructured these mires and led to a major decline in wetland landscape heterogeneity. The ecology of this transition reveals lottery-like dynamics, the ascendancy of opportunists, and shortening of resource gradients.

Decline and Fall of the Primeval Forest: Rain-forest Replacement During the Permo-Carboniferous Transition

The transition from the Carboniferous to the Permian brought about major vegetational changes in the tropics, reflective of long term trends in warming and drying. These changes correspond, in part, to the termination of southern hemisphere glaciation. During this transition, a tropical wetland biome is replaced by a biome characteristic of seasonally dry conditions. The two biomes share few species in common, and the transition begins episodically during the Late Pennsylvanian. By the later Early Permian, a third biome can be detected, yet more adapted to xeric conditions, that replaces the seasonally dry biome, and that contains a number of precocious "Mesozoic" taxa. The plants of each subsequent biome are progressively more derived evolutionarily, suggesting a strong relationship between landscape position and evolutionary innovation in the terrestrial biosphere.

Evolutionary Assembly and Dynamics of Tropical Forests During the Paleozoic

The major classes of vascular plants appear during the Middle to Late Devonian. These classes represent distinct body plans. They also occupy different parts of the lowland resource gradient. Lycopsids occupy wetlands. Seed plants occupy terra firma settings. Sphenopsids are most abundant in aggradational environments. Ferns are opportunistic weeds. This pattern develops as the groups begin to appear and is set by the early part of the Carboniferous, probably contributing to the termination of evolutionary innovation at the class-level scale of architectural distinctiveness. The overlap of high-level phylogenetic lineages with ecological centroids is unique to the late Paleozoic and confers a distinct constraint on ecosystem dynamics that lasts through the Carboniferous and into the Permian. Incumbent groups retain their ecological dominance within their respective spheres until environmentally induced extinctions eliminate or significantly reduce their "hegemony," opening up resources for colonization by members of other groups. The ultimate rise of seed plants to dominance in many kinds of environments was made possible by these extinctions rather than inherently superior biology.

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The Eocene-Oligocene Transition – Insights to Climate Change and Causes of Mass Extinction from Stable Isotope Analyses of Biogenic Materials

From both a biological and climatological perspective, the Eocene-Oligocene transition is one of the fundamental turning points in Cenozoic earth history. Global cooling brought on by tectonic and oceanographic changes took place on both gradual and episodic time scales, and affected the global biota in a variety of ways, culminating in mass extinctions at both the middle-late Eocene and Eocene-Oligocene boundaries. Stable oxygen isotopic analyses of molluscan shell and fish otolith carbonate reveal the pattern of climate change throughout this transition, in terms of both mean annual temperature and seasonality. Ongoing research in the US Gulf Coastal Plain, the Antarctic Peninsula, and the Belgian Basin highlight differences in the pattern of climate change from low to high latitudes. High-resolution data from the Gulf Coast in particular suggest a causal link between increasing seasonality, cooler winters, and the ongoing faunal extinctions.

Tales from the Clam: What You Can Learn about Climate, Growth, and Ancient Seawater from Multi-Annual Records Archived in Molluscan Shells

Improvements in our ability to incrementally sample accretionary carbonates at very high resolution have opened the door to many fruitful avenues of research. Biogenic carbonates from long-lived macrofauna are ideal for this approach, for they record in their shell chemistry the changing conditions experienced throughout the lifetime of the animal. Stable isotopic profiles across multi-year growth trajectories go beyond the single analyses typical of microfossil research and can

therefore yield estimates not only of mean temperature but also of seasonality, a crucial variable controlling the biogeographic distributions of organisms today. In addition, these records provide a clock by which to measure the changing growth rates of organisms, and hence can provide the information often needed for ecological and evolutionary studies. A smorgasbord of recent research on clam chemistry illustrates the applications of this approach to studies of past climate, ontogeny (life history), and the composition of ancient oceans.

Perspectives on the Current Status of Long-Term Faunal Stability... Is Coordinated Stasis Still Coordinated?

Coordinated stasis is a pattern of taxonomic and ecologic stability of faunal assemblages over geologic time proposed to typify the record of many shallow shelf sequences. The suggestion that patterns of punctuated equilibria may characterize not only the morphological evolution of species but also the sorting of taxa into relatively stable long-term associations was met with initial skepticism, some of it rather acerbic. If such a pattern can be substantiated, however, the implications are significant and far-reaching for paleobiology and ecology. Since its introduction, workers in various areas of paleontology have conducted studies that have bearing on the issue. Data from the Paleogene of the US Gulf Coast and the Devonian of New York illustrate the complexity of the problem.

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The Latitudinal Diversity Gradient – The Past is the Key to the Present

Understanding the factors that influence biodiversity remains the central issue of the life-sciences. This is true more than ever, given the alarming rate of extinction in the Recent. As such, paleontology needs to attack the relevant problems of biodiversity at all scales of space and time. The latitudinal diversity gradient, in which the number of species decreases away from the Tropics, is arguably the most widely-recognized and well-studied pattern of biodiversity. The diversity gradient is recognized among both plants and animals, and both on land and in the ocean. Understanding the gradient would be a major step forward in understanding diversity. But, despite over a century of research, there still are a dozen or more competing hypotheses to explain the pattern. Although several studies have demonstrated that the latitudinal diversity gradient exists at different points in time during the Phanerozoic, few studies have examined how the gradient changes *through* time. Such a deep-time approach provides an opportunity to test some of the competing hypotheses in a manner unavailable to the ecologist. An example using Carboniferous brachiopods suggests that (a) the latitudinal diversity gradient probably is not simply a function of diversification and expansion away from the Tropics, and (b) that the study of diversity gradients may be a useful, new tool for inferring paleoclimate.

Escalation in the Paleozoic: A 400 Million Year Old Murder Mystery

Escalation, the hypothesis that a species' enemies get progressively more dangerous through time and so become the primary agents of natural selection, may be a fundamental explanation for observed evolutionary and ecological patterns. However, virtually all of the hard evidence supporting escalation has come from the Cretaceous to Recent. Study of Paleozoic predator-prey systems, which involve taxa related only distantly to modern predators and prey, provides a second, independent, test of whether escalation can be generalized as an evolutionary "law". During the mid-Paleotaxa seem to adapt to this increase. But is this general pattern rigorous proof of escalation? The present work illustrates some of the problems inherent in analyzing predation in the fossil record, as well as techniques to solve those problems. The current results provide insight into escalation in the mid-Paleozoic at multiple scales, from detailed bed by bed analysis of prey morphology and traces of predation to global trends in diversity, morphology, evolution, and extinction.

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The Stratigraphy of Vertebrate Skeletal Concentrations: Insights Gained from the Upper Cretaceous of Madagascar and Montana

An astounding variety of vertebrate skeletal concentrations punctuate the fossil record, and these concentrations provide an exceptional opportunity to explore an array of paleobiological and geological questions. For example, to what extent do bonebeds in their many expressions accurately record biological signals - exactly how does vertebrate paleoecology and behavior translate into bone-rich deposits? What are the genetic links between bonebed formation and sedimentary dynamics - can sedimentologic processes alone generate relative concentrations of vertebrate hardparts? And to what degree are bonebeds associated with significant stratigraphic intervals and surfaces, such as well-developed paleosols, marine flooding surfaces, and sequence boundaries? In this presentation I explore the ancient record of vertebrate skeletal concentrations. Genetic scenarios are considered both from a conceptual standpoint and from empirical observations, and characteristic taphonomic signatures are reviewed. Exceptionally rich vertebrate localities in the Late Cretaceous of Madagascar and Montana serve as case studies, and are examined in detail.

Expedition to the Late Cretaceous of Madagascar: Exploring the Geology and Taphonomy of a Stressed Terrestrial Ecosystem

Recent expeditions in Upper Cretaceous deposits of the Maevarano Formation (Mahajanga Basin, northwestern Madagascar) have yielded an amazing assem-

blage of vertebrate fossils that includes mammals, dinosaurs, birds, crocodiles, snakes, turtles, and fish. Fluvial sediments that entomb these fossils indicate a variable and flood-prone discharge regime, and associated paleosols indicate that the paleoclimate was semiarid. These same sediments yield taphonomic clues suggestive of localized and perhaps seasonal pulses of mortality. These discoveries shed light on the nature of an exotic Mesozoic terrestrial ecosystem, and also provide a wonderful opportunity to explore the paleobiogeography of Madagascar's modern fauna. In this presentation I delve into the stratigraphy and sedimentology of the Maevarano Formation and associated units, and explore the taphonomy and paleoecology of the formation's spectacular vertebrate assemblage.

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.

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.

Hou, X.-G., Aldridge, R., Bergstrom, J., Siveter, D., Siveter, D., and Feng,, X.-H., 2004, THE CAMBRIAN FOSSILS OF CHENGJIANG, CHINA: THE FLOWERING OF EARLY ANIMAL LIFE, Blackwell, Oxford, 185 p., hardcover $99.50.

King-Hele, D., (ed.). 2002, CHARLES DARWIN'S "THE LIFE OF ERASMUS DARWIN". Cambridge University Press, Cambridge, 172 p, hardcover $25.00.

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. Hardcover $28.00

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

SKELETAL FUNCTION AND FORM: MECHANOBIOLOGY OF SKELETAL DEVELOPMENT, AGING AND REGENERATION, by Dennis R. Carter and Gary S. Beaupré, Cambridge University Press, Cambridge, 2001, 330 p. ISBN 052179000X, hardback $80.00.

Bones have been the stock in trade of vertebrate paleontologists since the days of Cuvier. But only recently has the study of bone itself become important to the field, mainly because of new insights that studies of bone tissue have brought to general paleontological questions. Pathologies in fossil bones, the result of injuries or disease, have been described for years by Bruce Rothschild and his colleagues. Armand de Ricqlès brought the classic tradition of descriptive bone histology into a new era by putting myriad observations of a host of living and fossil taxa into evolutionary perspective. Today, many younger workers are asking questions about the growth, chronology, and metabolics of fossil bone tissues, using the contexts of phylogeny, ontogeny, environment, and mechanics.

Dennis Carter has long been a pioneer in mechanical engineering approaches to bone, and has been unusual in his preoccupation with evolutionary themes in bone mechanics. He and his colleagues have begun with the assumption that bone tissues reflect a combination of external and internal forces. Among the former set of influences, environmental conditions, nutrition, and mechanical stresses are important; among the latter, genetic and phylogenetic features, including metabolic rates, are critical. Carter and his longtime associate Gary Beaupré bring this perspective to this concise and well-written text, and it is especially useful in explaining to evolutionary biologists the mechanical and ontogenetic determinants of bone form.

A main strength of *Skeletal Form and Function* is its historical emphasis. Carter and Beaupré begin with the ontogeny of our understanding about form, from Galileo to *Naturphilosophie* to Hox genes; they go on to describe, with clinical examples, how the form of the mammalian skeleton is generated ontogenetically, and how its sensitivity to mechanical stimuli also develops. This sensitivity is also paralleled evolutionarily to milestones in the evolution of the vertebrate skeleton. Although the historical emphasis is most evident in the first and final chapters, there are currents of ontogeny and phylogeny even in the chapters on skeletal histology and mechanical modeling.

No text on skeletal mechanics would be complete without the requisite chapter on skeletal tissue histology, development, and mechanics. Cartilage, bone, tendons, and ligaments are all discussed, but bone receives the most attention. The rest of the chapter explains assumptions, components of stress (i.e., hydrostatic versus octahedral/shear), and finite element stress analysis, which the modeling chapters use heavily. (The mechanics of materials and structures are relegated to three well-written appendices.)

The following six chapters discuss models and clinical studies of internal stress patterns during the processes of growth, repair, and destruction in bone and other skeletal tissues. Carter and Beaupré return to a broad comparative approach to skeletal mechanics in the final chapters. The authors make "mouse-to-elephant" comparisons to explain how size influences bone dimensions and the forces across joints. They also describe and test how the presence or absence of secondary centers of ossification in different lineages is a function of the interaction between mechanical and phylogenetic influences.

Paleontologists with a phylogenetic emphasis may

find some limits to the approach of the book. Bone is treated fairly uniformly, as if all vertebrates shared the same skeletal features. This is reasonable in that by far most of the experimental and clinical work on bone has been done on humans, and the material properties of the same tissues of bone are consistent among animals. (Humans are slow-growing mammals, even for primates; as model organisms, we fail once again.) However, there is no discussion of (for example) the different kinds of tissues that vary among bones, such as typical lamellar bone versus the fibro-lamellar complex, or of how circumstances and rates of growth and degeneration vary phylogenetically. These factors are acknowledged but not treated in detail; however, no other comparable text does it either, so it is not really a criticism to bring it up. The book's purview is bone mechanics, not skeletal evolution. As an introduction to bone growth and mechanics in evolutionary and developmental contexts, this text is a fine starting point for paleobiologists and vertebrate zoologists.

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HEYDAY OF THE GYMNOSPERMS: SYSTEMATICS AND BIODIVERSITY OF THE LATE TRIASSIC MOLTENO FRUCTIFICATIONS, by J.M. Anderson and H.M. Anderson, *Strelitzia* 15, National Botanical Institute, Pretoria, 2003, 298 p. ISBN 1919795987 hardback $68.00.

If we have a guiding principle in botany and paleobotany it is "go for the gonads". So many leaves of Australian gum (*Eucalyptus*) look alike, but more than 600 species can be recognized using nuts and flowers. Among plant fossils, flowers and fruits are uncommon, but necessary to determine what kind of plant they were. This splendid new monograph describes 2378 new fossils of ovulate structures and 1287 fossils of pollen structures among 27,000 catalogued slabs of Late Triassic fossil plants from the Molteno Formation of South Africa. The result is a profound revision of our botanical concept of this flora with important implications for plant evolution and biodiversity.

The Molteno flora is dominated by the seed ferns *Dicroidium* and *Lepidopteris*, which have been placed in the families Corystospermaceae and Peltaspermaceae respectively, since Hamshaw Thomas' pioneering 1933 monograph of the upper Umkomaas locality of Natal. New Molteno collections support such affinities of these plants, despite contrary recent claims based on supposedly "attached organs" from Antarctica and South Africa, which the Andersons dispute. There also is variation on the old themes, such as the new genus *Matatiella* and the megasporophylls associated with *Switzianthus*, which are similar to peltasperm ovulate structures.

A notable discovery of this volume is that Triassic leaves that look like *Ginkgo* may not have been *Ginkgo*, but are better referred to at least three different groups. The most *Ginkgo*-like leaves have fanlike seed-bearing structures (*Avatia*) placed in the family Avatiaceae, distinct from the paired large seeds of living *Ginkgo*. The narrow-segmented *Ginkgo*-like leaves (*Sphenobaiera*) are attached to bilaterally symmetrical small-seeded fruits (*Hamshawvia*) in yet another family (Hamshawviaceae). Yet another group of *Ginkgo*-like leaves, distinguished by anastomosing venation (variously attributed to *Chiropteris*, *Rochipterus* and *Kannaskoppifolia*) has very distinct ovulate cupules (*Kannaskoppia*) in yet another family (Kannaskoppiaceae).

Triassic gnetalean fructifications (*Nataligma*, *Fraxinopsis*) are especially significant because this group, represented today by relict taxa (*Gnetum, Ephedra* and *Waelwittschia*), has been thought important to angiosperm ancestry. The Triassic gnetaleans have leaves with anastomosing venation (*Gontriglossa, Yabeiella*), some of them formerly confused with the Permian genus *Glossopteris*. Other surprises are Late Triassic evidence of groups better known in the Jurassic: cycadeoids (*Weltrichia, Fredlindia*), cycads (*Androstrobus*), and pentoxylans (*Lindtheca*). The great adaptive radiation that spawned angiosperms, gnetaleans, ginkgos and cycadlike plants was clearly underway by Late Triassic. Understanding the sex lives of Triassic plants changes everything.

Yet another surprise is the shear diversity of the Molteno flora: for gymnosperms alone it is 206 species of leaves, 51 species of ovulate fructifications, 35 species of pollen organs, and 143 species of whole plants. Together with at least 26 species of mosses, bryophytes, horsetails, and ferns described in earlier volumes, the Molteno flora rivals some modern floras of South Africa, the Rhaeto-Liassic flora of Greenland and Middle Jurassic flora of Yorkshire.

The culmination of 35 years of indefatigable collecting, this monograph is unparalleled. With its graphic-arts format and copious illustrations it is a treat to browse. There are so many intriguing puzzles and surprising connections, I found it simply amazing. Classification of fossil leaves has been somewhat arbitrary, but fructifications now get us to the heart of plant evolution. It is an indispensable reference to the real meaning of Triassic plants, which any paleobotanist will need to have nearby. I could not find it online at Amazon or Barnes and Noble, but googling for the National Botanical Research Institute in Pretoria quickly turned up *Strelitzia* and order forms. Tell your librarian or get online yourself.

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BIOLOGY OF MARINE FOULING BRYOZOANS IN THE COASTAL WATERS OF CHINA, by Liu Xixing, Yin Xueming, and Mia Jianghou, Science Press, Beijing, 2001, 860 p., hardback $95.00 [In Chinese].

Bryozoans are carefully documented in this handsome volume which explores the ecology and taxonomy of these marine-fouling organisms. One hundred and ninety species of marine-fouling bryozoans have been identified from from the coastal waters of China; one hundred and seventy-four are Cheilostomida, ten Tubuliporida , and six are Ctenostomida. This delightful monograph is well illustrated and filled with a vast amount of information and ideas on marine bryozoans which foul submerged objects. The report identifies bryozoans from the north

Bohai China Sea, south to the Yellow Sea, East China Sea, northern South China Sea, Daya Bay, Boan, Sanya, and Xincun.

Every conceivable object that can be fouled is categorized and a record of the species that are present is discussed. Here, you will find information on marine bryozoans as well as entoprocts and compound ascidians that commonly co-occur. The distribution on fixed ocean platforms, artificial panels, cultured shells and their floating cages, culture cages for fish, shrimp and molluscs, fixed fishery nets, buoys and boat hulls and bottom cables identifies the many objects that can be fouled and are studied in this compendium.

A careful documentation of the life history and attachment seasons of marine bryozoan foulers from the coastal waters provides new data on many bryozoan species. A section on the general depth distribution of marine fouling organisms is followed by a comprehensive discussion of 52 common or abundant bryozoan species. This discussion includes details on colony growth of *Membranipora grandicella*, *Electra tenella*, *Bugula neritina*, *Tricellaris occidentalis*, *Schizoporella unicornis*, *Cryptosula pallasiana* and *Watersipora subtorquata* and provides extensive ecological data on these cosmopoitan species. The long concluding chapter describes the systematics of 190 species and outlines the morphological characteristics of all these species. The 37 new species are described in English by Liu. An extensive English summary of the volume provides a ready understanding of these fouling bryozoans. The volume is well illustrated with 82 photographic plates and provides considerable help in identifying the many different species.

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WHEN BUGS WERE BIG, PLANTS WERE STRANGE, AND TETRAPODS STALKED THE EARTH: A CARTOON PREHISTORY OF LIFE BEFORE DINOSAURS, by H. Bonner, National Geographic, Washington, 2003, 45 p. ISBN 079226326X, hardcover $16.95.

Dinosaurs get all the attention in children's books, so it is refreshing to see a colorful and whimsical book on life on land before the dinosaurs. The text is large and suited to kids in prime dinosaur sensibility (ages 6-10), but does not skimp on big names and advanced concepts. The drawings are watercolor-enhanced pen drawings with a sketchiness suitable to the intended whimsy.

"Winners of the Big Bug Competition" include 1.8 m eurypterids (*Hibbertopterus*), 1.8 m myriapods (*Arthropleura*), 72 cm wingspan dragonfly-like insects (*Meganeuropsis*), 70 cm long scorpions (*Pulmonoscorpus*), and 36 cm long spiders (*Megarachne*), all arrayed on a Carboniferous beach around a young girl on a beach towel. It was all about high oxygen levels, allowing unusual insect physiology. The strange plants were the tree lycopsids (*Synchysidendron*) which grew like "hairy telephone poles" until their first branch some 30 m off the ground. Again climate played a role with the reptilian television weatherman announcing "Today will be hot and muggy, just like every other day for the next several million years!" The tetrapods include sabretooth gorgons (*Arctognathus*) and cow-turtles (*Dicynodon*) of South African dry rangelands before the great extinction of the terminal Permian, visualized by a great cemetery of tombstones for the various extinct clades. I was pleased to see that in each of these three topics there was attention to details of recently published science: Robert Dudley's theory of Carboniferous insect physiology, Bill DiMichele's names and ontogeny of tree lycopsids, and my work on Karoo reptiles and extinction. This book could have promulgated the old saws of giant dragonflies, *Lepidodendron*, and a swampy Karoo, but thankfully it has rolled with the times.

Meanwhile, kids have rolled with the times too. Nowadays, they are more likely to be entranced by computer games than dinosaurs, and would rather visit an expensive theme park than nag their parents to take them to fossil sites, which are becoming dangerous or illegal to collect. With its hip TV and newspaper-oriented humor, this slim book will perhaps redress the balance, and woo new young minds to the concept that scientific fact can be stranger than fiction. I doubt that your university library will want a copy, but surely you have a son, daughter, nephew or niece who might profit from this delightful and funny little book. Pairing it with Gary Larson's "There's a hair in my dirt" would make a great Christmas or birthday present. And don't forget your local elementary school library, they all need help such as this.

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LATE CRETACEOUS AND CENOZOIC MAMMALS OF NORTH AMERICA: BIOSTRATIGRAPHY AND GEOCHRONOLOGY, by M.O. Woodburne (ed.), Columbia University Press, New York, 2004, 391 p. ISBN 0231130406, hardback $95.00.

North American Land Mammal Ages were formalized by a committee in 1941 with a disregard for biostratigraphic and geochronological practice that still rankles, as is apparent from this update of a comparable volume edited by Mike Woodburn in 1987. His editorial introduction and many subsequent chapters outline the sorry story of how formations were conflated with faunal zones, and the stratigraphic levels of fossils were unrecorded. He chides vertebrate paleontologists for not measuring sections or not attempting graphic correlation in the same way as micropaleontologists (yet I did this in 2000, in Geological Society of America Special Paper 344, not cited in this volume!). Subsequent chapters dispel the gloom by nominating type sections and first appearances, though the absence of illustrated measured sections is striking. The Paleocene-Eocene mammal collections of Phil Gingerich, Eocene-Oligocene Frick collections reworked by Don Prothero, and Neogene rodent collections of Robert Martin include levels and sections that conform to current chronostratigraphic practice. Most of the mammal "ages" now qualify as stages, the usual precursor to ages, and are here to stay.

This volume clarifies a number of persistent

problems with the time scale. The profusion of late Cretaceous to early Eocene ages and biozones is admirably laid out. The Bridgerian and its dating remains a problem, but most likely ranged from 51-46 Ma. The brontotheres now are known to have become extinct at the end of the Chadronian and Eocene, rather then persisting into the Orellan and Oligocene. The base of the Blancan at 4.8 Ma is taken at the first appearance arvicoline rodents (such as *Mimomys*), the Irvingtonian at the earliest *Mammuthus* ca. 1.35 Ma, and the Rancholabrean at the first *Bison* ca 200 ka, all appearances at latitudes less than 55°N.

The scope of the volume extends from Alaska to Panama, so includes Mexico and Central America. Having just returned from studying the Cucaracha Formation of the Gaillard Cut of the Panama Canal with Michael Kirby, I was pleased to find its Barstovian fauna discussed. The chapter on Paleocene faunas also briefly discussed correlations with South American, European, Asian and African faunas, and I missed this international perspective in subsequent chapters.

I wonder about the completeness and timeliness of this volume. Other topics of this volume for which my papers were uncited include the Cretaceous Tertiary boundary (3 papers), completeness of the non-marine rock and fossil record of North America (3 papers), biostratigraphy and paleoecology of Eocene-Oligocene of central Oregon (4 papers), and stratigraphy and paleosols of Badlands National Park in South Dakota (2 papers). Alroy's proposal of Geringian, Monroecreekian and Harrisonian subdivisions of the Arikareean also are not mentioned. Nor is the ecomorph reiteration and age duration of North American land mammal ages by Terry Meehan and Larry Martin. Nor are several papers on Cenozoic mammalian diversity and adaptation by Chris Janis. So it's not just me.

In a concluding chapter the mammalian record is compared with the marine oxygen isotopic record, and said to fit the classical pattern of a stepwise decline in temperature, each cooling event corresponding in magnitude with the magnitude of faunal modernization. This was not the conclusion of John Alroy, and may be why his work is not discussed. My own work on paleosols and paleoclimate and Chris Janis's work on mammalian diversity (also uncited) do not support the idea of stepwise decline either, but rather long ramps of cooling (Paleocene, late Eocene, Oligocene, Neogene) with abrupt perturbations of warming (end-Cretaceous, end-Paleocene, end Eocene, middle Miocene). This is just a question of record, not the currently contentious interpretation of climate drivers, which range from mountain uplift, to deep-ocean currents and grassland ecosystem coevolution. It is sobering to think that after 200 years of Cenozoic vertebrate paleontology in North America, the basic patterns are not yet universally agreed.

This summary of the North American mammalian time scale should nevertheless be an indispensable reference to any serious science library. It lays out the basis for mammal ages in a clearer fashion that any prior work, and makes it clear that mammal fossils are indeed serviceable chronometers for the last 85 million years of North American geological history.

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LA FIN DES DINOSAURES, by E. Buffetaut, Fayard, Paris, 2003, 250 p., ISBN221361489X, paperback $34.88.

Eric Buffetaut's latest book is a popular exposition about extinction, and it has two quite different parts. The first is a history of thought about extinction, and the second is an exploration of why the dinosaurs and their colleagues became extinct at the end of the Cretaceous Period (the K/T boundary). The book has a split personality: its parts are not only different in their contents, but in their levels of discourse. Buffetaut, an excellent writer and meticulous scholar, goes into great detail in the first part about the savants of the Enlightenment, contrasting their thoughts and quoting their works at length as he lays out the developing history of ideas. But in the second part, although he explains or touches on nearly every conceivable idea related to the K/T extinction, the treatment of the evidence is surprisingly superficial. The tone, too, changes from expository to evangelical. He has a mission, and it is to convince the reader that the meteoritic impact that formed the Chicxulub crater off the Yucatan Peninsula is the one and only cause of the K/T extinctions. (He might be surprised by recent revelations from Gerta Keller and her colleagues [*J. Geol. Soc. London*, 2003; *PNAS*, 2004] that the Chicxulub impact seems to have occurred some 350,000 years before the K/T boundary, but the faithful will always find another refuge.) As far as he is concerned, all extinctions (save a few normal background casualties) occurred at that boundary from that cause, and nothing else even contributed faintly to the disappearances. Nor do we need to entertain the possibility that some taxa were extinct well before the bolide impact; the fossil record is too poor to tell us that this hypothesis is nonsense, but other evidence assures its rejection anyway.

Buffetaut's history of extinction is vivid and a pleasure to read. He begins with the questions that investigators raised in the 1600s. What are fossils? Why aren't the organisms they represent the same as living ones? How did they come to be entombed as they are, and where they are? Buffetaut brings a deep perspective to this history, introducing some players poorly known or overlooked, ranging from Jean-Étienne Guettard to J.F. Blumenbach. Cuvier is usually credited with demonstrating the reality of extinction, and he is due the credit of establishing it firmly as scientific precept; but Buffetaut shows that Robert Hooke expounded on the idea 130 years earlier (though it fell on deaf ears at the Royal Society). Moreover, Hooke asked, if we must be open to the possibility that some kinds of organisms have become extinct, shouldn't we also consider the possibility that some have newly arisen?

Even in the early period of discourse on extinction, the threads of gradualism and catastrophism polarized themselves. Much of this, initially, was related less to explaining the progression of fossil life than to that of the rocks themselves, usually in the context of finding evidence for the Noachian deluge. Buffon, who accepted in the mid-1700s that fossils represented extinct forms that could help reconstruct the history of the Earth, had little patience for catastrophist ideas and no inclination to mix science with theology. But Cuvier, along with Brongniart, influentially showed that the fossil faunas in the Paris Basin did not succeed each other logically or gradually, but disjunctly and

abruptly. Buffetaut, who recently wrote a book on Cuvier, does not make the frequent mistake of attributing to him ideas of worldwide catastrophes, complete replacement of all life by new creations, and a literalist Biblical view. He notes instead how Cuvier's strong ideas, pushed to the extreme of multiple creations by his disciple d'Orbigny after Cuvier's death, tripped a reaction in French science against the great master's brand of catastrophism and ushered in a new tolerance for gradual change.

The idea of gradual change, Buffetaut shows, was epitomized in Charles Lyell's influential exposition of uniformitarianism (or actualism, as it is often called on the Continent). Lyell thought that the condition of the world was effectively steady-state; and although changes might perturb it, it would always return (even cyclically) to its normal condition. For Buffetaut, this kind of actualism, in which only processes observable today are admissible as possible causes of past events, persists today as an old-fashioned reaction to more adventurous causes such as bolide impacts. His view echoes the mantra of many geophysicists and asteroiders two decades ago ("Uniformitarianism is dead!"), during the heady days when impacts were beginning to be recognized as frequent, unpredictable, and possibly influential in the course of Earth history (mostly thanks to the pioneering work of Gene Shoemaker). However, like them, Buffetaut conflates several kinds of uniformitarianism. One can see the Earth as steady-state and never changing, or subject to perturbations but always returning to its normal form. Since the middle 1800s, though, neither view has been admissible. The descendant of both ideas is partly embodied in substantive uniformitarianism (that rates and processes are essentially constant through time), a generalization with too many exceptions to be of much use. A more respected, and standard, version of uniformitarianism is methodological: the laws of the Universe have not changed through time (though modern cosmologists may have something to say about that, too). At any rate, uniformitarianism is not dead; it is just widely misunderstood.

For Buffetaut, however, the problem boils down to whether the causes of change in the history of Earth and its life are actualistic or aleatory, and he is firmly on the side of the latter. This brings him to the second part of his book: explaining the K/T extinctions. The Chicxulub crater, he says, provides indisputable evidence (along with many other things) of a great impact. Only "*refractaires*," a word that means "insubordinates" but might better be translated as "heretics," try to deny or minimize the effect of this event on life at the time. With this initial volley, Buffetaut launches his impassioned defense of the killer asteroid. He trots out all the usual lines of evidence and arguments advanced by the pro-asteroiders in the past 25 years, but with as many surprising twists as self-contradictions. The scenarios of months of darkness, raging superfires, sharp drops in temperature, and acid rain with pH <1 are stock in trade, but Buffetaut rightly rejects them as being too much and too severe. Nothing could have survived such an onslaught on land. Instead, Buffetaut champions Sheehan and Fastovsky's idea that freshwater vertebrates survived because their food chains did not depend on terrestrial plants, which were hard hit by the K/T impact. However, as even Buffetaut admits, there were few plant extinctions at the boundary, and plant life returned to normal shortly after the time represented by the iridium layer. What, then, are we to make of the "fern spike" of spore abundance just above the boundary? To Buffetaut, this shows the recolonization of devastated habitats by pioneer opportunists like the ferns. But there is little evidence that ferns are *a priori* better colonizers than angiosperms; it depends on the soil, climate, and other factors, including the types of ferns in question.

Buffetaut notes that the "freshwater" theory does not apply to all land vertebrates that survived the impact; lizards, snakes and mammals were small and mostly ate insects, which like worms and other invertebrates depended on a "decomposer" food chain, not a plant-based one. But this idea also breaks down, he admits, when considering small dinosaurs, which would have fed on such smaller vertebrates and insects. As for the bird fossil record, Buffetaut gives a wary nod to Feduccia's much-criticized idea that birds suffered a mass extinction at the K/T boundary, when the "archaic" lineages supposedly met their ends and only a few lineages survived to give rise to the crown group bird radiation. Unfortunately, both fossil and molecular evidence are against this scenario. Representatives of lineages of several crown group bird groups are known now from the Late Cretaceous (the more archaic lineages are not found anywhere near the K/T boundary), and current views of bird phylogeny imply that others were present. Moreover, molecular estimates (for what they are worth) place the divergence of these lineages deep into the Late Cretaceous. The bird record certainly provides no comfort to catastrophists, although archaic bird groups persisted (though rarely represented) until very close to the K/T boundary.

Perhaps the most astonishing aspect of Buffetaut's book is how little attention he gives to the many studies of the pace of vertebrate change across the K/T boundary in North America (except that of Fastovsky and Sheehan, which counters all the others and with which he obviously agrees). The extensive and eminently fair explanations of all the evidence by David Archibald in his 1993 book *Dinosaur Extinction and the End of an Era* are not even considered, just dismissed as attributing everything to sea-level regressions. None of the actual work by Archibald, W.A. Clemens, L. Bryant, J.H. Hutchison, L. Dingus, D. Lofgren, and others, which meticulously showed the pace of change of all vertebrates down to the genus level across the K/T boundary in Montana, is even mentioned. Buffetaut seems to think that such chauvinistic US-based studies are myopic and can be disregarded as not representative of worldwide change (as if anyone ever said they were). On the other hand, the other parts of the globe that he mentions, from France to India, that do preserve Late Cretaceous sediments do not have them in such abundance; nor do they have anywhere near the stratigraphic control as the North American sections; nor have they been anywhere near as extensively studied. And it is curious that although Buffetaut is quick to dismiss the importance of these American studies, he is happy to accept the recent findings by Paul Olsen and his colleagues of an iridium level at the end of the Triassic in eastern North America, when more archaic vertebrates gave way to the rise of the dinosaurs. This signature has so far not been found in rocks worldwide.

What are we to make of this cognitive dissonance? Clearly there must be some larger theory that the author endorses that will cut through the conflicting lines of

evidence that confuse the issue. Buffetaut's explanation of the K/T extinctions is that they must depend on blocking sunlight for a long enough time to disrupt the photosynthetic processes of oceanic plankton and terrestrial plants. He is convinced that all the marine groups that perished depended on this photosynthetic chain, and so did the dinosaurs. To a large extent, he is probably right that such a unified cause could well account for most of the groups affected … if. The big "if" here depends on the simultaneity of extinctions at the K/T boundary. All studies but one of dinosaur diversity in North America establish a decline over hundreds of thousands to millions of years (and contrary to what he portrays, do not depend at all on the once-legendary "3-meter-gap" at the end of the Cretaceous in Montana). Unfortunately, no other place on Earth currently provides enough material to establish the pace of vertebrate change across the K/T boundary, despite Buffetaut's representations in his other publications.

In both parts of his book, Buffetaut invokes William of Ockham to remind us of the principle of parsimony, that explanations must not be unduly multiplied. For Buffetaut, this means that if you have one explanation that can fit all observed phenomena, there is no need to bring in others. But historical sciences are not so simple, and the end of the Cretaceous, as Officer and Drake once observed, was a very noisy time. Curiously, the very mechanism that Buffetaut endorses to account for the end of the dinosaurs also must have paved the way for their radiation 135 million years earlier. Not to see the irony in this, or to think that great events in Earth history must always have simple explanations, seems more medieval than Ockham's views.

Buffetaut's book should be read and appreciated for its wonderful distillation of the history of the very important idea of extinction and how it came to be understood. The treatment of extinctions themselves, particularly that of the dinosaurs, should be read with cognizance of the author's strong bias, to which he is of course entitled, and it is one shared by many scientists. The bibliography comprises little more than historical and popular books, so readers will have to look elsewhere for original sources. Archibald's 1993 book, though now a decade old, presents fuller and fairer coverage of the actual evidence.

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PERMIAN BRYOZOA OF TASMANIA AND NEW SOUTH WALES: SYSTEMATICS AND THEIR USE IN TASMANIAN BIOSTRATIGRAPHY, by Catherine M. Reid, Association of Australasian Paleontologists, Memoir 28, Canberra, 2003, 133 p., paperback $56.00.

This monograph on Australian Bryozoa brings to mind the initial discovery by Charles Darwin of Permian Bryozoa in southern Tasmania, Australia, collected during the long world voyage as a naturalist on the H.M.S. Beagle in 1844. Lonsdale (1844) described some of these bryozoans. In Reid's monograph on Permian bryozoans, the bryozoans from Darwin's locality on Maria Island are one of thirteen localities in the eastern half of the island in the Tasmanian basin. Reid's localities are placed in six stratigraphic sections and she correlates the sections as Sakmarian through Kazanian. Across Bass Strait, she also reports on Bryozoa in the southern part of the Sydney Basin of New South Wales, Australia, and places her ten localities in four stratigraphic sections ranging through the Sakmarian toKazanian. Four bryozoan orders are present in the Permian sequences. The fenestellids are dominant with 12 genera and 28 species. Trepostomes are represented by four genera and 16 species; cryptostomes have only one genus, and cystoporates are noted but no species are identified.

Utilizing the taxonomy approach of Morozova (1974) and Morozova and Lisitsyn (1996), Reid assigns the bryozoans in Tasmania to 34 species which are primarily endemic and assigned to five faunizones in the Lower and Middle Permian. Sakmarian bryozoan faunizone (Faunizone A) has an abundance of fenestellids and trepostomes. The trepostome *Stenopora tasmaniensis* is abundant and occurs throughout the Tasmanian Basin. Bryozoan Faunizone B (assigned to the late Sakmarian into the early Artinskian) has numerous species of fenestellids and trepostomes and, according to Reid's figure 6, displays an introduction of seven new species along with five hold-over species from below; a distinct change in composition from the species association in Faunizone A. Four new species mark the beginning of Faunizone C and only about six species range into Faunizone C from below. *Stenopora criniita, Rectifenestella counselensis, Polypora virga, Stenopora ovata*, and *S. grantonensis* are said to characterize this faunizone. However, on Reid's figure 6, the first three of these species are shown ranging into Faunizone D (or even higher). Faunizone D (late Artinskian into Kungurian) and Faunizone E (Ufimian) have more sparse and sometimes poorly preserved bryozoans. Five species are restricted to Faunizone D, including species of *Stenopora, Shulgapora, Polyporella, Pseudopolypora*, and *Rectifenestella*. Faunizone E includes four species that range up from lower faunizones and only two new species, *Polyporella westarmensis* and *Stenopora* sp. A. As noted, there is some confusion between the ranges of species given in the text and shown on the figures.

The study is particularly interesting as it documents Permian bryozoans from the edge of Gondwana in what must have been a cool- to cold-water marine shelf environment, perhaps almost periglacial conditions. The editor, John Laurie, has carefully prepared this volume and attractively interspersed plates and tables of measurements throughout the text. This informative study of Permian Bryozoa, extensely documents fenestellids and some trepostomes, and is attractively presented.

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Meeting Announcements

NAPC 2005

NAPC 2005 will run from June 19 - 25 hosted by Dalhousie Univeristy, Halifax Nova Scotia, Canada. The

Conference will consist of five days of talks and posters, with a choice of day trips mid-week, as well as major field trips pre- or post-conference examining such areas as the Gaspe Bay, Quebec, as well as the Mistaken Point biota. The day trips will be to some excellent sites within a two-hour drive of Halifax. Accommodations are available at Dalhousie University Residences (59$ Canadian/night), plus many local hotels. More details on the meeting, field trips, on-line registration, lodging, and other elements of the conference are available at: http://meguma.earthsciences.dal.ca/napc/napc.htm or contact the local organizer Dr. David B. Scott (David.Scott@Dal.Ca)Centre for Environmental and Marine Geology, Department of Earth Sciences, Dalhousie University, Halifax, Nova Scotia B3H3J5 Canada.

The Seventh International Congress on Rudists

We are calling together Cretaceous sedimentologists, paleontologists, stratigraphers, and explorationists to pursue research goals set forth in 1988 by the Cretaceous Resources, Events and Rhythms project of the Global Sedimentary Geology Program. The meeting is co-sponsored by the University of Texas and the University of Tulsa and will take place from June 5-11, 2005 in Austin, Texas.

The 2005 Congress theme is "Cretaceous Rudists and Carbonate Platforms: Environmental Feedback". This theme will be developed in three sessions, "Depositional Environments of Cretaceous Carbonates", "Origins, Events, and Demise of Rudist Paleocommunities", and "Towards Rudist Taxonomy, Biogeography, and Phylogeny". Oral and poster sessions are planned.

A pre-meeting one-day field trip will explore the Texas Hill Country geology. The post-meeting three-day excursion will give participants the opportunity to examine rudist-bearing outcrops and collect from classic middle Cretaceous carbonate buildups. The Texas Memorial Museum has developed a new exhibit of Cretaceous life, and the museum will give access to its extensive and important collections of Cretaceous fossils for qualified specialists.

To register and submit abstracts see the website: http://www.tmm.utexas.edu/npl/rudist2005/, or contact Debra Sue Trinque, Treasurer, 7th International Congress on Rudists, PO Box B, Austin TX 78713-8901, USA. Schedule: 1 June 2004 – early registration and visa requests; 1 January 2005 - final circular; 15 February 2005 – abstracts due and late registration fee applies after this date. For a formal invitation letter to accompany your visa application contact Robert Scott, rwscott@ix.netcom.com, RR3 Box 103-3, Cleveland OK 74020, 918-243-7871; or Ann Molineux, annm@mail.utexas.edu, Texas Memorial Museum, University of Texas, Austin, TX 78712, 512-232-5384, Fax: 512-471-6090.