

JANUARY, 1988

THOMAS DEMOHUK
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AASP NEWSLETTER

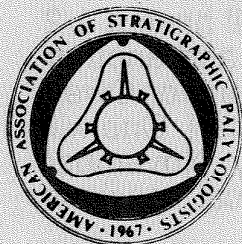
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A.A.S.P. - 1988

HOUSTON, TEXAS

The 21st. Annual Meeting of the American Association of Stratigraphic Palynologists will be held in Houston, Texas, Thursday, Friday, and Saturday, November 10-12, 1988. For the second year in a row we will return to a former meeting site. How many of you remember that it was "Houston in 1975"?

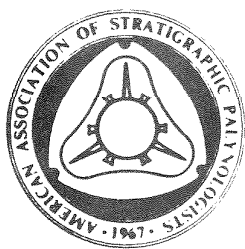


HOTEL - The Houston '88 co-Chairpersons, Vaughn Bryant, John Clendening, and Bob Clarke considered a number of convention facilities, but again selected the Westin Oaks Hotel that is connected to the Galleria Shopping Mall as the best choice. The Mall area has been tripled in size and the hotel has been refurbished since 1975. There are now more than 300 individual shops, an Olympic-size ice skating rink, four cinemas, a roof-top jogging track, tennis courts, swimming pools, and over 40 places to eat! So much for places and activities to take up our spare time.

JOINT SYMPOSIUM - The Society for Organic Petrology (TSOP) will be meeting on Monday and Tuesday, November 7-8 at a hotel across the street from the Westin. We plan to host a joint symposium at their hotel on Wednesday, November 9. The symposium is titled *The Relationships of Temperature, Mineralogical Alterations, and Related Phenomena in the Processes of Organic Maturation, Hydrocarbon Phases, and Reservoir Creation and Destruction*. There will be a separate registration charge for this symposium which is not part of the AASP meeting proper. We think that this symposium will be attended by 250-300 individuals. Additionally, we also believe that it will increase attendance at the AASP meeting.

AASP MEETING PROGRAM - The AASP meeting proper will have a 1/2 day symposium on the Paleozoic (chaired by Gordon Wood) and another 1/2 day symposium on the Quaternary (chaired by Steve Hall and/or Owen Davis). No, the symposia won't be scheduled opposite each other! One will be in the morning and the other in the afternoon on Thursday, November 10. Friday and Saturday will be reserved for general technical sessions chaired by other members of AASP.

FIELD TRIP - Maybe the land is too flat here, or perhaps we feel we can better spend our time and efforts on the joint AASP/TSOP symposium; but we are not planning to conduct a field trip in 1988.

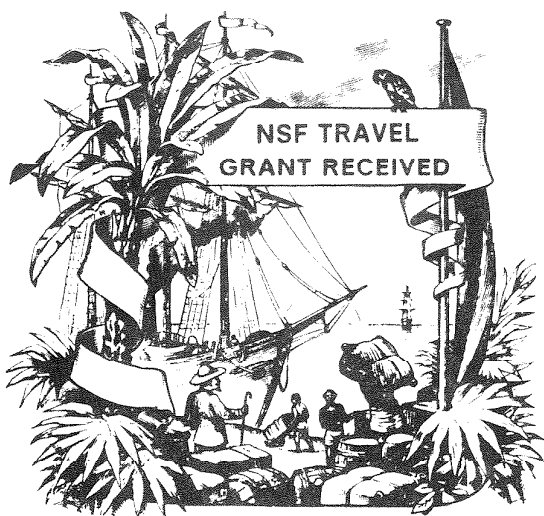


AASP NEWSLETTER

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J. H. WRENN, EDITOR



AASP has been awarded a National Science Foundation (NSF) grant in the amount of \$25,000 to pay airfare (up to \$1500 per recipient) of AASP members in good standing, to the International Palynological Congress in Brisbane, Australia, in August/September 1988. An explanation of the grant proposal was given in the October 1987 Newsletter. AASP members need not be citizens or permanent residents of the U.S. in order to receive travel support from this grant (question 2 -- about citizenship -- on the Travel Grant Application therefore is meaningless). However, because NSF is an agency of the U.S. Government, all airline tickets paid for by this grant must be with U.S. airlines. All applicants will be notified by April 30, 1988, whether they have been awarded travel support from this grant as judged by the Peer Review Group (see October Newsletter). The procedure for actually reimbursing the cost of airline tickets will be explained in detail in the letter notifying the applicants who are selected to receive the grant support.

Norm Frederiksen
President, AASP

MIDYEAR MEETING: AASP BOARD OF DIRECTORS

The midyear meeting of the AASP Board of Directors will be held in Denver, Colorado, on Saturday, March 5 and Sunday, March 6. The Comfort Inn at

Stapleton International Airport was chosen to be the site of the meeting because of its ready access from the airport and inexpensive room rates.

The meeting is open to all members of AASP, and you are encouraged to attend. Hope to see you there!

POSITION WANTED

Mr. Zuo-Ji Wu of Hong Kong seeks a position as a Tertiary palynologist. Wu has 25 years experience studying the Tertiary and Quaternary palynology of China and the South China Sea. He has studied Tertiary dinoflagellate cysts from south and east China during the past eight years. Wu spent two years of this period as a visiting scientist in academic and industrial research facilities in the United States. He earned a BS degree from the Department of Biology at Zhong Shan University and an MS degree from Institute of Geology at the Academy of Geology, both in the People's Republic of China.

Please address inquiries to:

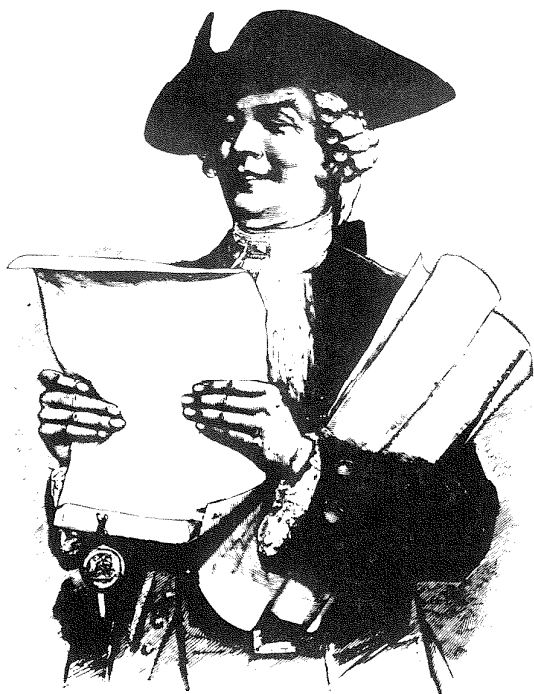
Mr. Zuo-Ji Wu
7-9 Wah Fung St.
5/F. Flat A
Hung Hom, Kowloon
HONGKONG

ADDRESS CORRECTION

The address listed in the AASP Membership Directory for **Dr. Mirta A. Quattrocchio** is incorrect. Mirta lives in Argentina, not Peru, as the Directory indicates. Her correct address is:

Mirta Quattrocchio
U.N.S. Dpto. de Geologia
Martin Rodriques 64
Peru 670
8000 Bahia Blanca
Buenos Aires, Argentina

Our apologies to Mirta for any inconvenience and to the Republic of Argentina for transferring one of their cities to Peru!



PALYNOLOGY DEFENDED BY SELF-APPOINTED AMBASSADOR

In early December, I attended the Eighth Annual Research Conference of the Gulf Coast Section of the Society of Economic Paleontologists and Mineralogists in Houston, Texas. The timely topic of the meeting was "Innovative Biostratigraphic Approaches to Sequence Analysis: New Exploration Opportunities."

The purposes of this meeting of explorationists, paleontologists and researchers from industry and academia were to demonstrate that biostratigraphy is fundamental to sequence analysis and to present examples of integrated biostratigraphical, geological, geophysical and geochemical studies. The meeting was a great success.

A number of AASP members made contributions to the success of the meeting. Ed Davies and Jon Bujak (Bujak-Davies Group, Calgary, Canada) presented an excellent poster session and a talk on Plio-Pleistocene palynology in the Gulf of Mexico. Yow-Yuh Chen (Exxon Production Research Co., Houston, Texas) presented an interesting study entitled "Palynofacies Analysis of the Blue Lias (Lower Jurassic) Dorset, Southern England." Leonard N. Ford, Jr. and David K. Goodman presented an extensive paleoenvironmental study entitled "Ecostratigraphic analysis of Dinoflagellate Data from the Nanjemoy Formation (Ypresian) of Maryland, USA." (Expanded abstracts of these presentations are contained in the Conference's "Selected Papers and Abstracts Volume." (See comments on this volume under "For Your Bookshelf," at the end of this Newsletter.) These fellows carried the message of palynology to a broader audience, as was declared

necessary at the round table discussions held during the 1986 AASP annual meeting in New York and in Don Benson's first "President's Message" (see AASP Newsletter, 19(4), p. 3).

The one untoward event that occurred at the SEPM Research Conference was a vociferous attack on palynology. The speaker, who shall remain nameless, informed the audience that he had assessed a very large palynologic consulting study of Plio-Pleistocene deposits in the Gulf of Mexico. He concluded that the study was utter rubbish and that the hundreds-of-thousands of dollars spent on it had been wasted. Furthermore, palynology could not be applied successfully in the Plio-Pleistocene deposits because reworked palynomorphs dominated all assemblages and there were few, if any, spore-pollen stratigraphic tops in that part of the section.

"Forget palynology," the speaker counseled, and directed the audience to use only his brand of biostratigraphy.

A rebuttal to these comments and a defense of palynology was given at the Speaker's Round Table held on the evening of the verbal assault reported above. As the round table was ending, a self-appointed ambassador for palynology sought permission to address the meeting. His comments, as best I can remember, were as follows:

"Ladies and gentlemen, obviously I am not a scheduled speaker, but I would like to talk to you for just a moment anyway. It is so self-evident in these distressful times for paleontology, that it seems somehow inane to mention this. But after today's meeting, it is necessary.

"It is in the self-interest of all practicing paleontologists to recognize the utility and the fundamental worth of all fields of study within paleontology. Furthermore, we should all speak well of each of those fields.

"This is not to say that bad science should be covered up or swept under the carpet. After all, bad science is just that, bad science. There is no room for bad science in palynology, anymore than there is in any other field of study. One bad or misguided study should not, and does not, condemn a whole field of study, whether it is palynology, foraminferology or whatever -ology you happen to have.

"Palynology has a unique, yes unique, destiny in the Plio-Pleistocene studies of the Gulf of Mexico. You ask why? Because Plio-Pleistocene deposits are nothing if they are not climatically derived sediments. They are the direct product of some of the most catastrophic climatic events that have ever overtaken our planet. One of the most, if not the most, compelling records of those events in the Gulf of Mexico Plio-Pleistocene deposits is that of the palynomorphs.

"For those of you unfamiliar with the term "palynomorph," it is a general term that includes all organic world, acid-resistant microfossils, regardless of their origin, be they are marine, terrestrial or something in between. Consequently, palynomorphs are useful in a broad spectrum of paleoenvironments, ranging from the open ocean to the shoreline, from terrestrial to lake, riverine and montane environments. Palynomorphs can bridge the correlation gap between the marine and terrestrial realms.

"Earlier today, palynology was declared "persona-non-useful" in Plio-Pleistocene deposits of the Gulf of Mexico. This is just not correct. I would guess that there are only two people in this room who would know -- two palynologists who have worked the Plio-Pleistocene deposits in the Gulf of Mexico. Ed Davies is one of those people. You have seen his excellent poster display in the room next door, and I can tell you that that display is not a lot of sales hype. It should be taken as seriously as any other poster session, at any scientific meeting that you have ever attended. I know this because after studying the palynology of those deposits for four years, I can tell you that he is on the right track. His approach to correlating and determining paleoenvironments in the Plio-Pleistocene deposits is sound.

"Palynology can do a lot in that dirt pile; it can establish a biostratigraphic framework, correlate, interpret paleoclimates and possibly identify depositional systems and facies and a couple of other things that I cannot mention. Of course the best approach is to integrate the palynologic studies with those of other microfossil groups.

"So if you have not used palynology, you might want to consider utilizing this very important tool. It may not be designer science, but it has the right stuff. If you do not have a palynologist (on your staff), go out and buy one; we all ought to have at least one!"

These comments were approved of and roundly welcomed by the audience. Who the speaker was is not important, his message and actions are important. Can any of us afford not to be ambassadors and spokesmen for our profession?

John H. Wrenn
Editor, AASP Newsletter

"Paleontologists...not very good scientists." - says Luis Alvarez

As if to emphasize the validity of the comments reported in the previous article, Luis W. Alvarez, winner of the 1968 Nobel Prize in Physics, lambasted all paleontologists in an interview in the New York Times (Tuesday, January 19, 1988). The article, written by Malcolm W. Browne, noted that Alvarez had recently published his autobiography (Alvarez: Adventures of a Physicist) in which he ridiculed skeptics of

his impact theory. (Alvarez contends that a comet or asteroid struck the earth at the end of the Cretaceous and caused the extinction of the dinosaurs.) Such skeptics he considered to be bad scientists. In a telephone interview, Alvarez is reported to have said: "I don't like to say bad things about paleontologists, but they're really not very good scientists. They're more like stamp collectors."

One of the major critics of the Impact Theory is AASP member Dewey McClean. Dewey has his own theory on the extinction of dinosaurs. Dewey contends that raised atmospheric CO₂ levels, derived from mantle degassing, during emplacement of the Deccan Traps in India, triggered the greenhouse effect. This led to such high global temperatures that dinosaur reproduction was hampered, resulting in their extinction. Furthermore, the widespread iridium layer at the Cretaceous-Tertiary boundary might have resulted from the catastrophic volcanism in India at that time. (Alvarez claims the iridium layer is extraterrestrial in origin and proof that a significant body struck the earth at the end of the Cretaceous.)

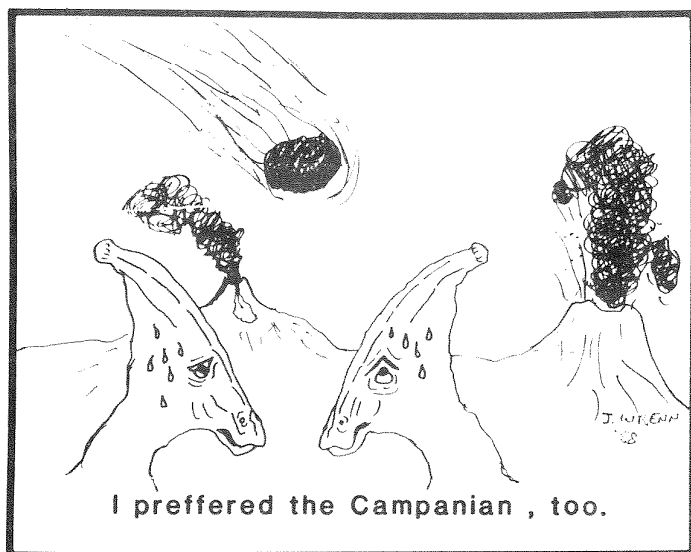
Alvarez did not think much of the volcanic extinction theory, or apparently, of Dewey's opposition to the impact scenario. In fact, Dewey charged that associates of Alvarez attempted to undermine his career and discredit his research. Sources that requested anonymity supported Dewey's claim, according to author Browne.

Alvarez denied involvement in any such activities but according to Browne, added that: "If the president of the college had asked me what I thought about Dewey McClean, I'd say he's a weak sister. I thought he'd been knocked out of the ball game and had just disappeared, because nobody invites him to conferences anymore." (Quite to the contrary, Dewey's ideas and work were favorably portrayed in a review article on dinosaur extinctions in Science, Vol. 238, 27 November 1987, p. 1237-1242.)

Dewey is not the only paleontologist taken to task by Alvarez in the New York Times article. Dartmouth College professors Charles B. Officer, Charles L. Drake and Robert Jastrow are all raked over the coals.

Whether or not Alvarez will eventually win the debate on the demise of the dinosaurs remains to be seen. If he succeeds, it will be because he manages to marshal the necessary data to support his theory, and not because he has won converts by diplomacy.

[The article discussed above has created almost as much uproar as the Alvarez comet may have! Eric Gerber, columnist for The Houston Post, has written an entertaining commentary on the comments of Alvarez. See The Houston Post, Thursday, February 4, 1988, p. 2E.]



AASP SELECTED TO AID STUDY OF MASS EXTINCTION THEORIES

Although dinosaurs are dead ducks (in a fowl evolutionary sense), they continue to churn up a lot of mud, and even mud-slinging, as noted above. In order to document the colorful events of late, William Glen, Science Historian with the U. S. Geological Survey and History Editor of EOS, is conducting a long term study of the debates on theories of mass extinction and the various mechanism espoused to explain them. The membership of AASP has been selected to participate, along with a number of other scientific societies, in a survey to assess scientific opinion on mass extinctions and their causes.

A cover letter from Bill explaining the study and a survey form is attached to the rear of the Newsletter. We encourage all of you to take a couple of minutes to fill out the form and mail it to:

William Glen
c/o U.S. Geological Survey
Mail Stop 941
345 Middlefield Road
Menlo Park, CA 94025

This is a valuable opportunity for palynologists to speakout and be heard by the general scientific community. Mass extinctions have had a broad appeal, both within science and without. Let each of us convey our thoughts on these events by completing the form that Bill has provided. Please fill out only one form for Bill. If you have received a form from another society to which you belong, do not fill out a second form.

WORKSHOP REPORT: "Concepts, Limits and Extension of Indian Gondwana"

The term Gondwana System was proposed by

H. B. Medlicott in 1872 in his report on the Satpura Basin, but was omitted from the report when published (Mem. Geol. Surv. India, 10(1):133-188). The term was revived by Ottokar Feistmantel in 1876 (Rec. Geol. Surv. India, 9:28) and was adopted by the Geological Survey of India in 1879 (Manual of the Geology of India by H. B. Medlicott and W. T. Blanford). Since then it has been used in all official publications of the Survey.

The first available comprehensive definition is by Fox (1931). According to him (1931, Mem. Geol. Surv. India, 58:78) "The name Gondwana System was applied to the deposits of conglomerates, sandstones, shales and coal-measures of fluviatile or lacustrine origin which occur in the Indian Peninsula and whose geological age ranges from middle Carboniferous to upper Jurassic. The fauna and flora of these Gondwana sediments are largely of terrestrial forms and include some fresh water fishes and amphibians."

The term Gondwana acquired several meanings with the passage of time. Extrapeninsular coeval sedimentary sequences were classified under the Gondwana due to mere presence of *Glossopteris* or *Ptilophyllum* floral associations, even if the sediments were primarily of marine origin. Similarly, the coastal sedimentary sequences with *Ptilophyllum* floral association were classified as Coastal Gondwana disregarding undoubted marine signatures.

The Geological Survey of India therefore organized a colloquium, in 1984, on Gondwana Stratigraphy for bringing a precision in the definition of the term. A revised definition of the Gondwana Sequence was proposed to include mainly terreginous facies with "Gondwanic" floral/faunal bondage.

The Birbal Sahni Institute of Palaeobotany invited a select gathering of Gondwana specialists to take stock of Gondwana related data generated so far, at a workshop on "Concepts, Limits and Extension of the Indian Gondwana" (November 14-18, 1987). State-of-the-art reports on key areas of Gondwana research were presented with a view to identify problems and areas that require immediate synergistic research. Inaugurating the Workshop, Shri D. P. Dhoundial, Director-General of the Geological Survey of India observed that the term Gondwana, in its wide usage, often carries different connotations to stratigraphers, palaeontologists or workers in geotectonics and this has made its definition somewhat flexible. He advised that besides taking due note of terrestrial Lower Gondwana elements in Tibet, glaciomarine sediments in Burma, Thailand, etc., the possibility of Gondwana elements occurring in the Naga Patkai-Arakan-Andaman-Nicobar belt should be explored. Achievable short and long range programmes should be formulated to develop a composite lithostratigraphic, palynostratigraphic and magneto-stratigraphic data base for complete sedimentary columns in representative basins.

Introducing the theme, B. S. Venkatachala observed that when first marine signatures were discovered in

Indian Gondwana at Umaria, these were regarded as marine intercalations in predominately fresh-water facies. However, subsequent discoveries of marine signatures in the Talchir sediments of Son-Mahanadi, Satpura, Damodar and Pranrita-Godavari grabens, Palar and Rajasthan basins and in the Barakar, the Barren Measures and the Raniganj formations (B. S. Venkatachala and R. S. Tiwari; this workshop) necessitate a relook at the definition of the term Gondwana. Should it be restricted to continental facies *sensu stricto* or should it include both continental and marine facies sharing common biota? He emphasized that the mere presence of a Gondwanic flora does not make a sedimentary sequence the Gondwana *sensu stricto*. He exhorted the participants to examine if it was any more worthwhile to retain this term. In the latter case, the lower and upper boundaries have to be clearly defined and demarcated, though there does not seem to be much discrepancy about the lower limit. The glacial episode is mostly accepted to demarcate this limit. But, the reasons for fixing the upper limit of the Gondwana above Neocomian are obscure. If a typical floral assemblage characterizes the Gondwana, then the provincialism exemplified in the Permian floras is no more evident even in the Late Triassic.

R. Garg, K. Ateeqzaman and K. P. Jain recommended that Late Triassic may be considered to mark the upper age limit of Gondwana sequences. There being no definite evidence of nonmarine Jurassic sediments in intracratonic Gondwana basins, the Neocomian nonmarine deposits of peninsular India are a post-Gondwana event. Jai Krishna also suggested exclusion of marine and/or pericratonic units from Gondwana even if a characteristic Gondwana flora is found in them.

However, N. D. Mitra would restrict the term Gondwana to essentially terrestrial or deltaic sediments, but having characteristic Gondwana flora and fauna. Accordingly, the open sea deposits, such as Tethyan sediments or the *Gangamopteris*-beds of Kashmir, are not to be included in the Gondwana. The Indus-Suture zone is the established northern limit of Indian plate. To extend the limit beyond this, more evidences are needed. R. S. Tiwari and Vijaya observed that the Permian and Triassic palynofloras or Tethyan Himalaya exhibit a major relationship with the Gondwana floras although Cathaysian and middle-east influence is noticeable. Again in the Jurassic, uniformity in assemblages is pronounced. They suggest the accretion of microplates at different times, a possible extension of the Indian Plate into northern Tibet, and a narrower Tethys. S. C. Srivastava, A. Prakash and T. Singh reported that palynofossils from the Permian of Eastern Himalaya depict an eastward extension of the Gondwana flora.

Taken in conjunction with geotectonic data, S. K. Acharya discussed the occurrence of tillite and cold water faunas in northern Tibet, peri-Indian ophiolite belts, and magmatic sections or ocean pelagic sediments that suggest a larger Indian Plate in Permian

and Triassic. The ophiolites of the Indus-Tsangpo and Naga-Chin Hills - Andaman belts respectively, delineate the northern and eastern continental margins of India. Most of Tibet and Arabia were a part of Gondwanaland during Permian and Triassic time; the Cathaysian domain was also not far away.

H. K. Maheshwari and Usha Bajpai analyzed the floras that grew around the northern margin of eastern Gondwana and concluded that, though some of the floral assemblages contain certain "Gondwanic" elements, their overall composition, except of the one from Kashmir, is basically Cathaysian. This, coupled with the occurrence of "northern" Mesozoic floras at Fukche, Ladakh and near Lhasa, Tibet, restricts the northern boundary of the Indian Gondwana along the Indus-Yarlung-Zangbo suture. H. M. Kapoor and G. Singh also observed that the Permian flora of North-West Himalaya is distinguished from the peninsular Gondwana flora by the presence of some northern elements. Palaeontologically, the Karakoram Basin matches that region of southern Tibet which is situated north of the Indus Suture. On the other hand, F. Ahmad contends that geological, faunal and floral evidence overwhelmingly suggests that Tibet was not separated from India in Permo-Triassic time, hence the Indus-Suture zone concept is not valid.

The floras are the best indicators of the palaeogeographic limits of any region. D. D. Pant remarked that coal-forming Gondwana floras thrived in a different set of climatic conditions than that of Euramerican and Angara floras. The *Glossopteris* flora developed from the Lower Carboniferous *Rhacopteris-Lepidodendropsis* flora by mutation, probably brought about by sudden chilling through the widespread glaciation. Seasonal fluctuation is indicated by marked annual rings in Permian wood. Shaila Chanda, Anil Chandra, R. S. Tiwari and Archana Tripathi enumerated the changing patterns of climate during the Gondwana period on the basis of mega- and micro-plant remains, respectively. Palynologically, a dry arid climate during the Barren Measures and the Panchet is not supported.

Commenting on the Gondwana palaeodrainage, S. M. Casshyap said that each basin grew in size to a unified longitudinal basin, broader than the existing one as sedimentation progressed through time. The river system drained from southeast to northwest and westnorthwest, following the northerly palaeoslope, into Tethyan Sea of Sikkim and Nepal. Post-Triassic fragmentation and drifting of India from Antarctica witnessed large scale eruptions of the Deccan Traps, palaeo-slope reversal and the development of basins along the newly created southern margin of peninsular India. C. Tripathi pointed out that north-east Traps, Abhor Volcanics, Sylhet and Rajmahal Traps continuing into Tertiary Deccan Traps were responsible for the break up and movement of the Indian Plate. He suggested a reclassification of Gondwana, and use of the term "Gondwanozoic" for Palaeozoic deposits ranging in age from basal Cambrian to Late Permian.

S. C. Ghosh and coworkers reviewed the morphography and distribution of various estherids from Gondwana sediments of peninsular as well as extrapeninsular equivalents, with reference to biozonation on the basis of index taxa. The Permian-Triassic boundary can be demarcated in a number of Gondwana grabens by the appearance of typical estherids at the close of Permian. S. C. Shah pointed out that the Raniganj/Panchet boundary in the Raniganj Coalfield represents the P/T boundary although elsewhere the data is not yet complete enough to draw a clear picture. S. C. Srivastava strongly contended that *Dicroidium* and *Lepidopteris* establish a Triassic age for the Nidpur assemblage; palynology ascertains that the Nidpur beds are younger than the Panchet. P. P. Satsangi felt that the area needs attention for more positive evidence regarding age.

H. P. Singh and B. S. Venkatachala demarcated the Upper Jurassic/Lower Cretaceous palynoassemblages of peninsular India on the basis of the appearance of a new set of cryptogamic spores which possess distinctive morphology and can be used effectively as boundary markers. They consider that the palynoflora of the continental deposits of the Rajmahal Basin (Neocomian) compares closely with the palynoflora of the Great Artesian Basin of Australia. According to Sukh-Dev, the Jurassic-Early Cretaceous flora of India contains a mixture of European as well as Gondwana elements. The late Cretaceous flora assumed a new dimension which continues to maintain its southern heritage until today.

R. V. Savanur and A. K. Roy reported that the Gondwana coals are bituminous and sub-bituminous in rank and contain high ash. The occurrence of coking coal and superior grade noncoking coals are very limited and are confined mostly to Damodar Valley coalfields. The total coal resources in the Gondwana are assessed at 157,623 metric tonnes. D. C. Bharadwaj suggested intensification of the palynological correlation of coal seams by emphasizing the typification of coal seams on the basis of similarity in qualitative composition and also, to some extent, by quantitative assessment of palynofloras. Utilization of megaspores for stratigraphic zonation of Gondwana sediments was demonstrated by H. K. Maheshwari and Rajni Tewari.

Valuable reviews on vertebrate faunal assemblages were presented, which mainly centered around the data from Pranhita-Godavari Valley. T. S. Kutty, S. L. Jain, T. Roy Chowdhury, P. Yadagiri, B. R. J. Rao and P. P. Satsangi gave an account of the recent discoveries of palaeontological remains and their significance in dating and palaeoecology of various strata in the peninsular India. The vertebrate bearing formations from Pranhita-Godavari Valley have been correlated with coeval rocks elsewhere in the world. Overwhelming evidences of a fresh water environment of deposition and a Liassic age for the Kota Formation were presented.

Manju Banerjee regards the Karharbari as a biozone, because its identification as a formation is not unequivocal. B. C. Pande presented his views on the concept of the Kamthi. B. S. Venkatachala and A. Rajnikanth demonstrated that the occurrence of marine intercalations, earlier considered sporadic, is more of a rule than an exception in the East Coast "Gondwana." Therefore, they recommend the use of chronostratigraphic terms like Cretaceous for these sediments.

As a result of this effort, the following problems and areas were identified for synergistic investigations:

1. Lower age limit of the Gondwana.
2. Nature and chronological development of Gondwana vegetation.
3. Permian/Triassic boundary in key areas.
4. Biological affinities of the Gondwana related extrapeninsular basins.
5. Triassic/Jurassic boundary.
6. Upper age limit of the Gondwana.

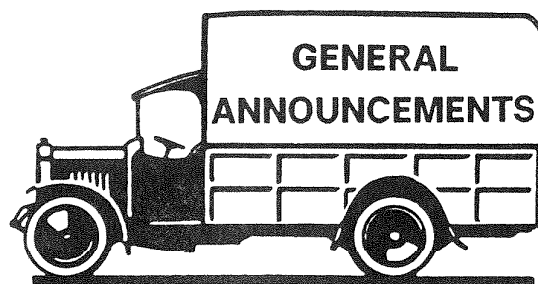
It was recommended that groups of specialists in different fields should simultaneously work on these problems to facilitate quick synthesis and collation of data generated through their efforts. The Geological Survey and the Birbal Sahni Institute would act as nodal agencies to coordinate the efforts of participating institutions.

Report by:

Hari K. Maheshwari
R. S. Tiwari

Submitted by:

B. S. Venkatachala
Director, Birbal Sahni Institute of Palaeobotany
Lucknow, India



Palynology Manuscripts Requested

There is still room for a number of manuscripts in Volume 12 of **Palynology**, to be published in late 1988. Dave Goodman, Journal Editor, is seeking quality papers on any aspect of palynology and requests that

authors follow the **Palynology** format. Authors should refer to a recent issue of **Palynology** as a useful guide in the preparation of manuscripts, paying particular attention to the section entitled "Instructions for Authors" in the back of each volume (pages 266-268 in Volume 11). Manuscripts to be considered for publication should be sent to Dave at the following address:

Dr. David K. Goodman
ARCO Oil and Gas Company
2300 West Plano Parkway
Plano, TX 75075 U.S.A
Telephone: (214) 754-6504

Remember, **Palynology** is published yearly and, believe-it-or-not, time is running short to have your paper appear in this year's volume of your AASP journal. **SUPPORT YOUR LOCAL JOURNAL - PUBLISH IN PALYNOLOGY!** The Editorial Staff appreciates your support.

Erratum, Corrections and Apologies

In the last issue of the Newsletter (Volume 20, No. 4), everyone was encouraged to check the year on the first line of their mailing label (page 2) to determine the last year for which they had been credited for dues. It was then stated that, "If it does read '87' or higher, you will not receive any further AASP publications..." Obviously, this is an editing error on my part (sorry about that). It should have read "If it does not read '87' or higher you will not receive any further AASP publications..."

Also with regards to labels, dates, dues and the shipment of publications, approximately 12 members, who should have received publications, did not. There are a number of reasons for this, and they may be of interest to all members. There is usually a lag time between the Secretary-Treasurer receiving your dues and the updating of the year on the mailing labels. (Yup, the same year and mailing labels noted above.) This lag exists because the Secretary-Treasurer cannot generate mailing labels in his office in Houston, TX--the Newsletter Editor (that's me) does it in Tulsa, OK. Consequently, the information must be transmitted between offices. When a mailing of **Palynology**, a need to update the mailing labels, Christmas and vacations all come together, some errors may occur.

In addition, the Secretary-Treasurer often gets dues payments (bank drafts or cash) without any indication of whose membership account it should be accredited to. (Many overseas banks not only do not pass along this information, they don't even bother to answer enquiries by the Secretary-Treasurer regarding their bank draft!) Of course, there are always mail strikes (often in Canada) in which dues are delayed and, yes, even lost.

Add all these possibilities for delays and mistakes to our mistakes and multiply by 945--then rejoice that only a dozen or so individuals were inconvenienced.

Our apologies to those folks--it wasn't intentional. Really, it wasn't.

Mystery dues check received!

Secretary-Treasurer Gordon D. Wood has received a Barclays Bank check from England for \$40.00, without the name of the sender appended. The check arrived February 2nd, accompanied only by a copy of the AASP April 24, 1987 form letter that was sent to members whose dues were in arrears. There was no cover letter indicating to whose account the check should be credited.

Please contact Gordon if you think this is your check. Because Gordon received a number of Barclay checks at about the same time, enclose the number from your bank cheque receipt so that Gordon can credit the correct account. Thank you.

Microscopy Supplies

A new catalog, entitled "Microscopy - Off the Shelf, 1988," has just been issued by the McCrone Accessories and Components Company of Westmont, Illinois. The catalog lists a variety of microscopy supplies ranging from field finders, books and microscopes to light filters, reference slides, videotapes on microscopy, watch and immersion oils. The hundreds of items listed will be of interest to most palynologists. A free copy of the catalog can be obtained by writing to:

McCrone Accessories & Components
850 Pasquinelli Drive
Westmont, IL 60559-1275
USA

or call: 312-887-7100.

Kodachromes of the T. F. Vozzhennikova Dinocyst Types Available

Judith Lentin has informed me that a set of 100 Kodachrome slides of the holotypes and lectotypes in the T. F. Vozzhennikova collection is now available. These slides, photographed in Novosibirsk, USSR illustrate the 47 species for which the holotypes either have not been lost or for which lectotypes were selected. Additional details of this slide collection and an order form for the collection is attached to the rear of this Newsletter.

Research Muscle for Mussel Research

As most Canadians are now aware, an outbreak of shellfish poisoning has recently affected the east coast, leading to the death of three persons (at the time of writing) in addition to many others affected in unpleasant but less severe ways, including the federal Minister of Health who has taken the rap for - amongst other things - having advisory staff who do

not know the difference between a shrimp and a mussel.

The shelly culprits in this latest toxic event are said to be mussels, clams, oysters, and similar molluscs, when their soft parts are eaten fresh and in toto. No one yet knows for sure what is ultimately causing the problem, in spite of an intensive federal government crash program in research, a complementary public awareness program, and the collective media "nose" which is probably sensing another Contaminated Tuna Scandal. Some scientists suspect a link with paralytic shellfish poisoning (PSP) or diarrhetic shellfish poisoning (DSP). Both PSP and DSP are well known phenomena usually linked to red tides, which are cyclic and the natural ecologic results of proliferation of dinoflagellates (microscopic unicellular algae) in the marine water column. Bivalves acting as filter feeders become contaminated with PSP and DSP toxins from the briefly abundant dinoflagellates. (Ambient densities of dinoflagellate cells rise by several orders of magnitude during a red tide episode.) The toxins accumulating in the mollusc gut do not affect the bivalves but are extremely powerful nerve poisons to predatory mammals such as you and I (and to the mouse volunteers used as test subjects in government monitoring programs). Red tides typically last for several weeks to several months but occasionally for more than a year, and appear to be triggered by physical changes in the water mass promoting growth of dinoflagellate cysts resting in "seed beds" in bottom sediments on the shelf and adjacent coasts and estuaries.

Red tide events are well known in the stratigraphic column, with fossil dinoflagellates available by the millions in a typical handful of Phanerozoic mudstone or siltstone. The earliest dinoflagellate fossils occur in the Lower Paleozoic, but many biologists believe on the basis of cell chemistry and genetics that they must have a long evolutionary history extending back into the Precambrian. Dinoflagellates are curiously over-endowed with chromosomes, having hundreds to thousands of times more DNA per cell than other unicellular algae. This may be part of the reason why fossil dinoflagellates show such great morphologic complexity and evolution, and which is why they are so useful in biostratigraphy and petroleum exploration.

Plans are underway in the USA to set up a Center for Toxic Dinoflagellate Research as a joint venture between various universities in southeast USA, other invited participants, and the Government of Florida which has suffered severely over the years with red tides and PSP and DSP. The Center will undertake fundamental research on the physiology, toxicology, evolution and ecology of dinoflagellates. Geoff Norris has been asked to participate in this research thrust and plans to continue to investigate the paleobiology of dinoflagellates associated with toxic blooms in shallow marine environments, work started by him at the Florida Department of Natural Resources and the University of South Florida in St. Petersburg. This work

will require close cooperation with marine biologists, palynologists, oceanographers, and remote sensing specialists. The Center will provide an inter-disciplinary research environment, largely free of the pressures of public and political panic which are characteristic by-products of toxic shellfish outbreaks, as we have seen in Canada this December.

A fascinating aspect of dinoflagellate research at the University of Toronto has been the discovery that fossil dinoflagellates act as locations or focal points for the concentration of trace metals in their resistant organic wall. Collaborative work between John Rucklidge, Geoff Norris, Silvana de Gasparis and the Iso Trace Laboratory - a tandem accelerator mass spectrometry facility - has demonstrated that amongst other metals, fossil dinoflagellates are notably enriched in platinum. Marine biologists have reported enhanced levels of other metals in living dinoflagellate blooms but have not tested for platinum as far as we are aware. The Iso Trace Laboratory is uniquely well-equipped to handle these analytical challenges (dinoflagellates are very small and seldom exceed much more than 100 μm in diameter) with a proven ability to analyze milligram samples to accuracies measured in parts per billion. With platinum prices currently at approximately \$500 US per ounce, these tiny creatures may be a nuisance, but a potentially valuable one.

The economic loss for even one outbreak of PSP or DSP can be enormous, with closure of commercial fisheries leading to unemployment, and lost productivity for those unfortunate enough to be hospitalized. A modest investment in fundamental scientific research applied to understand dinoflagellates and the havoc they can cause would seem to be justified. The U.S. initiative to set up a Center for Toxic Dinoflagellate Research makes a lot of sense and will likely become a focal point for major advances in this fascinating interdisciplinary area.

Geoff Norris
Department of Geology,
University of Toronto,
Toronto, Canada.

(Reprinted from: Department of Geology Newsletter,
University of Toronto; Pierre A. Zippi, Editor.)

Computer Software

AASP member Pierre Zippi has written two computer programs for use on McIntosh Computers that have palynological applications. Pierre's Ternary Plot 3.0 and Vector Rose 1.0 are outlined below; additional information on these programs can be obtained by writing to:

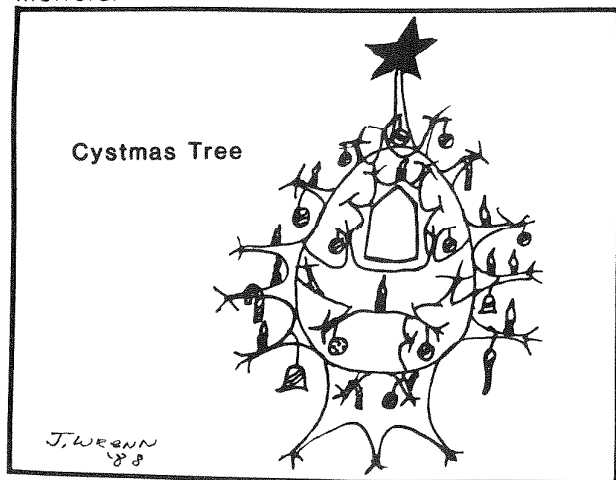
Pierre A. Zippi
 Department of Geology
 University of Toronto
 170 College Street
 Toronto, Ontario M5S 1A1
 CANADA

TERNARY PLOT 3.0 is a graphic plotting package that normalizes and plots three values on a triangular diagram. Data can be entered in four ways: (1) read from text files (Excel, Word, etc.), (2) from data copied to the clipboard, (3) directly from the keyboard, (4) or interactively by clicking mouse in triangle. Diagrams can be plotted at three sizes (1.3", 2.6", and 4.2" side) or a corner of the triangle can be enlarged to fill the screen. Diagrams copied to the clipboard and pasted in a Paint or Draw application can be resized or graphically enhanced.

Seven plot symbols as well as samples numbers and tie lines can be plotted. Additional symbols can be created by plotting the same dataset as an overlay with a different symbol to produce a combination symbol. An unlimited number of data sets can be plotted on the same diagram. High quality prints of MacDraw type output can be made using an ImageWriter or LaserWriter.

VECTOR ROSE 1.0 calculates vector (circular) statistics and plots a circular histogram for directional data (any data with a circular distribution). Statistics include mode, mean, standard deviation, resultant amplitude, vector magnitude, Rayleigh test, and F-test.

Program features include plots scaled relative to modal maximum, or scaled to 100%. Full (360°) or half (180°) rose histograms may be plotted. Data entry is from reading text files (Excel, Word, etc.), from clipboard or from keyboard. Variable arc width for modal classes (5°, 10°, 15°, 20°, 25°, and 30°). The axis scale is represented as concentric circles or as a vertical line with tic marks. North or 0° can be rotated to any desired position. Vector Rose 1.0 prints high quality output to a LaserWriter or ImageWriter. Plots can be resized or graphically enhanced by pasting the image into a Draw or Paint application, or even MSWord!



Short Course on Quantitative Biostratigraphy

Raymond A. Christopher and George F. Hart will be offering a "hands-on" short course on Quantitative Biostratigraphy. September 5-9, 1988. The course will be given at the University of Queensland, Brisbane, Australia, immediately following the 7th International Palynology Conference. The course covers the following topics:

DATA MANAGEMENT. (Data management systems, data base design).

DATA CONCEPTS USEFUL IN BIOSTRATIGRAPHY. (Reliability, data types, variable types, quantitative procedures, biostratigraphic problem domain).

ANALYSIS OF SINGLE SAMPLES. (Measurement restrictions, diversity, equitability).

ANALYSIS OF BOREHOLE DATA. (Similarity and difference measures of association, cluster analysis, contour analysis, graphic correlation, no-space graphs, probability methods, principal components analysis, biostratigraphic fidelity, multivariate methods).

FUTURE TRENDS. (Workstation for taxonomists and stratigraphers; artificial intelligence).

In addition to the course notes, class material will include a data base for Permian palynology, part of the HARTAX biostratigraphic analysis program for the ZENITH-386 (executable form for diversity, similarity and difference coefficients measurement), and source codes for no-space graphs, probability methods, and principal components analyses.

The course will be restricted to 40 participants. The course fee is not yet finalized but will be no more than \$250 US.

For more information contact:

George F. Hart
Department of Geology and Geophysics
Louisiana State University
Baton Rouge, LA 70808
Phones: (504) - 388-2780 (office)
(504) - 766-1240 (home)
(504) - 388-3353 (geology office)

**Symposium: "The Proterozoic Biosphere:
A Multidisciplinary Study"**

The Precambrian Paleobiology Research Group-Proterozoic (PPRG-P), is a 50-member international multidisciplinary consortium investigating interrelated biospheric-lithospheric-environmental evolution during Proterozoic time. We will convene a two and one-half day symposium at UCLA in August 1988, outlining the results of this work.

The symposium will be held August 20-22, 1988, at the center for the Study of Evolution and the Origin of Life, University of California, Los Angeles USA. The symposium schedule is:

Saturday, August 20th:	Registration; Mixer
Sunday, August 21st:	Symposium; Posters
Monday, August 22nd:	Symposium; Posters; Banquet

Registration is U.S. \$10.00, but it is waived for those who preregister prior to June 1. Topics addressed will include:

Geology and Paleobiology of the Archean Earth.
Geologic and Environmental Evolution of the Proterozoic Earth.
Proterozoic Biogeochemistry.
Modern and Proterozoic Mat-Building Microbial Communities.
Proterozoic Microfossils, Megafossils, and Biostratigraphy.
Biochemical Phylogeny and the Proterozoic Fossil Record.
Patterns of Evolution and the Development of Proterozoic Ecosystems.

For additional information, a list of participants, and preregistration materials, contact:

Dr. J. William Schopf
CSEOL-PPRG
Geology Building
U.C.L.A.
Los Angeles, CA 90024-1567
[phone: (213) 825-1170
BITNET:ESG5BT1@UCLAMVS].

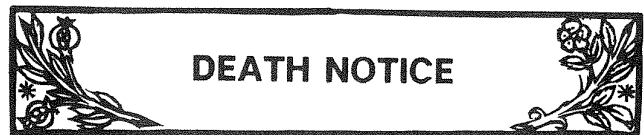
**Anadarko Basin Workshop,
April 5-6, 1988, Norman, Oklahoma**

The Oklahoma Geological Survey and the U.S. Geological Survey are co-sponsoring a workshop on the Anadarko Basin. The meeting will be held April 5-6, 1988, at the Oklahoma Center for Continuing Education (OCCE) on the campus of the University of Oklahoma in Norman, Oklahoma.

The focus of the symposium will be presentation of 24 papers dealing with current and ongoing research activities. Research topics include basin history, sedimentology, structure, stratigraphy, petroleum exploration, source rocks, thermal history, oil characterization and migration, and hydrology. Proceedings of the workshop will be published as a bulletin of the Oklahoma Geological Survey late in 1988. In addition to oral presentations, a poster session will be held in the Forum Building.

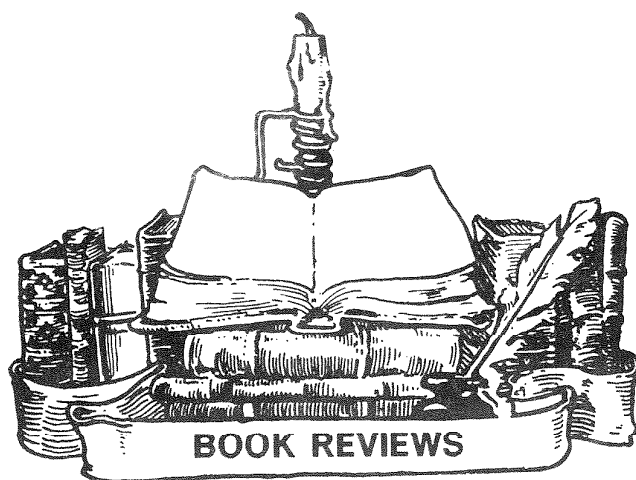
Advance registration (received before March 1, 1988) is \$45.00. On-site registration is \$55.00. Registration includes the two days of technical sessions, a luncheon on both days, coffee breaks and a copy of the proceedings. Lodging also will be available at OCCE at rates of about \$27 (single) and \$32 (double).

Contact Dr. Kenneth S. Johnson, Oklahoma Geological Survey, University of Oklahoma, Norman, OK 73019 (phone: (405) 325-3031) for registration forms and/or more information.



DEATH NOTICE

We are saddened to announce the death of Dr. Wilhelm Klaus of the University of Vienna, Vienna, Austria. Wilhelm passed away on November 13, 1987. A memorial is planned for a future issue of the News-letter.



Short Reviews of Books Received in 1987

Reviewed by
E. Reed Wicander
Department of Geology
Central Michigan University
Mt. Pleasant, MI 48859

Correlation of the Silurian rocks of China (a part of the Silurian correlation for East Asia),

Mu En-zhi, A. J. Boucot, Chen Xu, and Rong Jia-yu.
The Geological Society of America Special Paper 202,
1986, 80 pp. GSA Publication Sales Desk 281,
P. O. Box 9140, Boulder, CO 80301. \$16.50.

This publication is a compilation of the available physical and paleontological data of Chinese rocks available through 1980. One hundred forty-four Silurian stratigraphic units are described and almost 200 references are provided. This publication is part of the continuing series of Silurian Correlation Charts for the world being edited and prepared by Berry and Boucot.

Following the introduction, a historical review of the Silurian stratigraphy of China is presented. This is followed by a discussion and description of the Silurian lithofacies and biofacies of China. A discussion on the division and correlation of the Chinese Silurian is then presented followed by a discussion of faunal sequences including the graptolite, brachiopod, coral, nautiloid, trilobite, and crinoid faunas. The benthic ecostratigraphy is then presented and this is followed by a discussion of the paleogeography and paleobiogeography of China, including three paleogeographic maps for the Early, Middle, and Late Silurian.

The last section is an alphabetical listing of the Chinese Silurian stratigraphic units. Included with this publication is a large foldout showing the correlation of the various units and their relationship to the stand-

ard graptolite zones and the ranges of selected shelly taxa.

This publication is a welcome addition to the Silurian Correlation Series, particularly since it deals with an area of the world for which there has been little information available outside of China.

Relative motions between oceanic and continental plates in the Pacific Basin.

D. C. Engebretson, A. Cox, and R. G. Gordon. The Geological Society of America Special Paper 206, 1985, 59 pp. GSA Publication Sales Desk 281, P. O. Box 9140, Boulder, CO 80301. \$12.50.

As the title of this Special Paper states, this publication concerns the relative motions between oceanic and continental plates in the Pacific basin. A model is presented for the movement between western North America, eastern Eurasia, and the adjacent oceanic plates for the last 180 million years. The model is based on the assumption that the Atlantic region hotspots have remained fixed relative to the Pacific basin hotspots. A series of eight maps showing reconstructed plate boundaries for the past 140 million years based on fixed hotspot reference frames is provided. Analysis of the data indicates the age and bathymetry of the descending plates varied markedly along the strike of the trenches.

Community palaeoecology as a geologic tool: The Chinese Ashgillian-Eifelian (latest Ordovician through early Middle Devonian) as an example.

Wang Yu, A. J. Boucot, Rong Jia-yu, and Yang Xuechang. The Geological Society of America Special Paper 211, 1987, 100 pp. GSA Publication Sales Desk 281, P. O. Box 9140, Boulder, CO 80301. \$18.50.

This publication presents, for the first time, the faunal data for the Chinese latest Ordovician through early Middle Devonian in a community, community group, and community evolution context. The paper provides a summary of Boucot's views on using faunal communities in time and space. The materials and procedures used in the study are briefly discussed followed by the main thrust of the paper, a discussion of community evolution as it applies to the evolution of the Chinese Ashgillian through Eifelian level-bottom brachiopod communities. A series of 11 diagrams showing the community framework for successive geologic periods is provided. Each one has Boucot's Benthic Assemblages 1 to 6 forming the x-axis and the y-axis delineating quiet or rough water and level or variable relief bottoms. This paper also contains 20 excellent plates of latest Ordovician to Middle Devonian (Eifelian) brachiopods from China. This publication should be of interest to anyone concerned with Chinese Paleozoic stratigraphy. The underlying community evolution principles should be useful to all paleontologists and biostratigraphers regardless of what part of the geologic column they work.

Palynologie.

Sciences Geologiques, Bulletin 38, No. 1, 1985, 136 pp. Universite Louis Pasteur de Strasbourg Institut de Geologie, Bibliotheque de L'Institut de Geologie, 1, rue Blessig, 67084, Strasbourg, France. No price given.

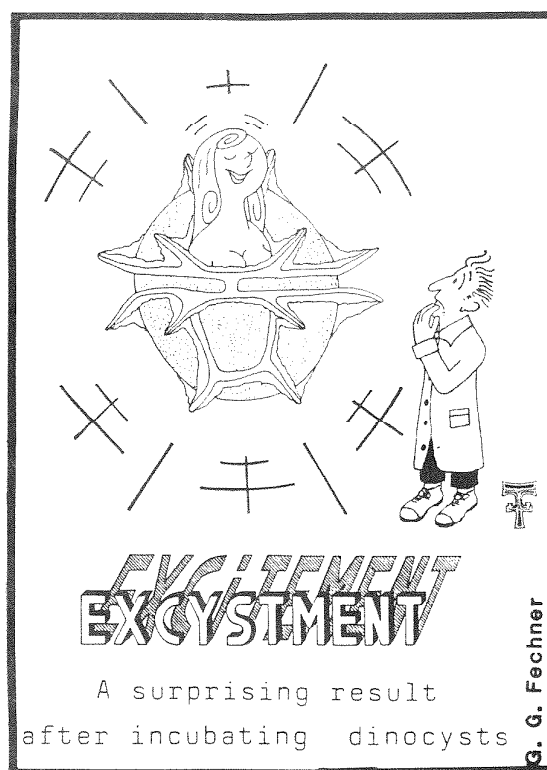
This volume contains 13 papers from the VIII Symposium of the Association des Palynologues de Langue Francaise held in Paris, October 10-12, 1983. The general theme of this volume is palynology and correlation between marine and continental environments. The papers cover a wide range of topics and range from acritarchs of the Upper Proterozoic and Lower Paleozoic of Romania to palynological and sedimentological studies of a coastal environment: the peat bog of Thiaye (Senegal). There are two papers covering the Paleozoic, two papers on the Mesozoic, and six papers on the Cenozoic. In addition, three papers are concerned with pollen wall structure.

Silurian and Devonian spore zones of the Old Red Sandstone Continent and adjacent regions.

J. B. Richardson and D. C. McGregor. Geological Survey of Canada Bulletin 364, 1986, 79 pp. Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario, Canada K1A 0S9 \$10.00 Canada, \$12.00 other countries.

This Bulletin is a welcome addition for any palynologist working on Silurian-Devonian aged rocks. Prior to this publication, there was no internationally accepted spore zonation for the Silurian and Devonian. Richardson and McGregor propose a zonation based mainly on miospores from numerous Silurian and Devonian marine and nonmarine stratigraphic sections from the Old Red Sandstone Continent and adjacent regions. The proposed zones are regarded as assemblage biozones. While this is the most comprehensive Silurian-Devonian zonation proposed, the authors recognize that the zones should not be considered as final and as work progresses, additional zones will be recognized and modifications will need to be made.

In the text of the paper, each zone proposed has an age, reference section for the base of the zone, range of the zone, characteristic species, description, distribution, and remarks. The characteristic species are figured in the 21 plates. Furthermore, there are two large foldouts. One foldout contains the data for the illustrations and the lithology, depositional environment and fossil content of the spore zone in the vicinity of the reference sections. The second foldout includes the approximate correlation of selected spore zones with the spore zones described in this paper; the stratigraphic ranges of characteristic species of the described spore zones and the suggested approximate correlations of the spore assemblage zones with the standard graptolite, conodont, and ammonoid zones. This Bulletin contains a wealth of data and should be in the library of every Paleozoic palynologist.



Studies in Australian Mesozoic Palynology.

P. A. Jell (Editor) Association of Australian Paleontologists, Memoir 4, 1987, 341 pages, ISBN 0 949466 03 4 ISSN 0810-8889. Published by the AAP, Sydney N.S.W. - available from Dr. P. A. Jell, Queensland Museum, P. O. Box 300, South Brisbane, Queensland 4101, Australia. Price A\$40 + A\$5 postage.

This memoir comprises 14 papers pertaining to the stratigraphical palynology of Australia. The majority of the work was undertaken by Robin Helby and Lew Stover, who are authors/co-authors of nine and seven of the contributions, respectively. The remaining participants are Alan Partridge (three papers), Jill Stephens (two), John Backhouse (one), Fred E. May (one), and Roger Morgan (one). The volume was partly funded by the Esso/Exxon companies and Robin Helby and Alan Partridge made personal donations toward the cost of publication.

The first (and longest at 94 pages) paper is a Middle Triassic to lowermost Paleocene palynological zonation scheme for Australia and was written by Messrs. Helby, Morgan and Partridge. This project was initiated in 1975 based on studies in different areas of Australia. It was aimed at producing an integrated (microplankton/spore-pollen) zonal framework to supersede the numerous dinoflagellate cyst and spore-pollen schemes previously used by the hydrocarbon exploration industry throughout Australia. Various versions have evidently been utilized for some time as oral presentations of the biozonation were given in 1978 and 1979. Also, an early draft was included in the dinoflagellate cyst zone compilation of Williams and Bujak (1985).

This biozonation is based on a massive amount of material, some 11,000 samples from over 300 sections. The majority of Australian Mesozoic depocenters have been examined in addition to the Papuan Basin (Papua, New Guinea). The concept of a comprehensive, integrated zonation over such a large area is, at certain intervals, impaired by provincialism, together with paleoecological overprinting. To overcome this, different spore-pollen zones have been delineated for west and east/south Australia.

The age control of the Triassic and Jurassic strata studied is relatively sparse, so European dinoflagellate cyst datums are used in conjunction with the available molluscan and conodont data. In the Cretaceous, the dinoflagellate cyst zones have been assigned ages using planktonic foraminiferal and coccolith evidence. The zonation adopts a strict hierarchical approach with broadly-defined superzones (seven based on dinoflagellate cysts and five on spore-pollen) which, given reasonable productivity, can be distinguished by the briefest perusal. Superzones are divided into varying numbers of zones; in the case of the dinoflagellate cyst zones (45 in total), they are largely interval zones, but include other types. The critical miospore taxa tend to have sporadic occurrences, so these zones are chiefly assemblage zones (20 zones in the west, 28 zones in the east and south). Where practicable, all intervals are delineated on range bases.

Papers 2-14 are largely devoted to the description and illustration of stratigraphically significant forms, many of which are new (10 genera and 64 species). These contributions have been largely subdivided by geological age and/or region. For example, the second paper, by Robin Helby, is a brief account of three new forms (two pollen; one acritarch) from the Late Triassic of northwestern Australia.

The purpose of paper 3 (Stover and Helby) is the description of 13 new microplankton taxa cited as short-ranging types in the zonation and to effect various taxonomic changes to other biostratigraphically useful species. This account includes the morphologically spectacular *Suessia listeri* and *Tubotuberella missilis*. The next contribution describes another interesting dinoflagellate cyst; *Ternia balmei* Helby & Stover, from the Middle Jurassic of Australia and Papua, New Guinea, appears to be a possible relative of living dinophysalian genera. This is potentially important from an evolutionary viewpoint as the traditional interpretation of *Nannoceratopsis* Deflandre 1938 having dinophysalian affinities has been disputed by Piel and Evitt (1980).

Four of the remaining ten papers are also monographic studies; these are of *Omatia* and allied genera, *Dolldinium sinuosum*, *Dissimulidinium lobispinosum* and *Muderongia*. The latter, by Robin Helby, is a comprehensive review of the stratigraphically important genus *Muderongia* and its relatives in the latest Jurassic and Early Cretaceous of Australia. The majority of the rest of the volume (five papers) is

comprised of studies of specific zones (the *Kalypteawisemaniae* and *Cassiculosphaeridia delicata* dinoflagellate cyst zones and *Tricolporites apoxyxenus* pollen zone) or sections (the Vinck-1 and Houtman-1 wells, both offshore western Australia). These are principally taxonomic studies, where most of the memoir's host of new genera and species are formally described. All the figured material is superbly preserved and again several flamboyant types are included, for example, the early Cretaceous *Flamingoia cometa* Stephens & Helby.

Paper 10 by John Backhouse describes a Lower Cretaceous (Valanginian to early Aptian) microplankton Oppel-zonation of the Warnbro Group, Perth Basin, western Australia. The five zones are defined using 30 of the 100 plus microplankton taxa encountered. This zonal scheme differs from the equivalent sequence in the Helby *et al.*, integrated zonation described earlier in this memoir. Nine new dinoflagellate cyst species and one acritarch are described by Backhouse in this account.

Throughout the entire volume, the descriptions and illustrations are exemplary, all line drawing and photomicrographs being consistently of the highest standard. The new taxa are lavishly illustrated, often by more than one plate per species. The dinoflagellate cyst paratabulation is described in terms of the traditional Kofoidian style.

The perennial logistical and financial problems of presenting large amounts of range data has been neatly sidestepped by including five microfiche. These comprise various palynological studies of individual wells or areas, authored largely by Robin Helby and Alan Partridge. These reports include relevant locality maps and range charts.

Much of the previous research on Australian Mesozoic microplankton was undertaken between the late 1950s and early 1970s by Isabel Cookson and Alfred Eisenack and was chiefly taxonomic. Reading the volume under discussion, one is struck by the fact that their original descriptions and illustrations were remarkably good; very little of Cookson and Eisenack's work has required substantial emendation.

To conclude, this contribution is a superb achievement and is an "instant classic." Minor criticisms seem churlish in the extreme. However, it seems a shame that the palynological community has had to wait so long for this enormous volume of data. Possibly, commercial pressures precluded the earlier publication of a preliminary zonal scheme using forms in open nomenclature as indices.

References

- Piel, K. M. and Evitt, W. R.
1980 Paratabulation in the Jurassic dinoflagellate genus *Nannoceratopsis* and a comparison with modern taxa. **Palynology**, 4: 79-104.

Williams, G. L. and Bujak, J. P.
1985 Mesozoic and Cenozoic dinoflagellates,
pp. 847-964 in: Bolli, H. M., Saunders, J. B.
and Perch-Nielsen, K. (editors), Plankton
Stratigraphy, Cambridge University Press
(Cambridge Earth Science Series).

Reviewed by:

J. B. Riding
British Geological Survey
Keyworth
Nottingham NG12 5GG
U.K.

FOR YOUR BOOK SHELF

**Taxonomy and biostratigraphy of schizaealean
spores from the Jurassic-Cretaceous boundary
beds of the Aklavik Range, District of Mackenzie,**
by Rob Fensome. *Palaeontographica Canadiana*
No. 4.

This volume is available for C\$20.00 plus mailing and
handling, C\$4.50 in Canada and C\$6.75 outside
Canada. Send check or money order in Canadian dol-
lars to:

Canadian Society of Petroleum Geologists
#505, 200-7th Ave. N.W.
Calgary, Alberta
CANADA T2P 0W7

or

Geological Association of Canada Publications
111 Peter Street
Toronto, Ontario
CANADA M5V 2H1

(Note: A copy of this volume is currently under
review, the results of which will appear in a future
issue of the Newsletter).

Land Plants, Notes for a Short Course Organized

by R. A. Gastaldo,
T. W. Broadhead (ed.), University of Tennessee Stu-
dies in Geology, Volume 15, 226 p., 1986. This volume
contains 12 contributions by 17 authors covering
aspects of evolution, paleoecology and biogeography.
This volume costs \$12.00 plus \$1.50 overseas mail
(domestic mail postpaid, 4th class). Prices payable in
U.S. dollars to the Department of Geological Sciences.

Order from:

Publications Editor
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University of Tennessee
Knoxville, TN 37996-1410
U.S.A.

Innovative Biostratigraphic Approaches to Sequence Analysis: New Exploration Opportu- nities. Selected Papers and Abstracts,

Eighth Annual Research Conference. 170 p., 1987.
Society of Economic Paleontologists and Mineralogists
Foundation, \$24.00, plus \$2.00 shipping and handling
for U.S. orders; \$5.00 for all foreign orders. (Texas
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AASP NEWSLETTER TECHNICAL SECTION

In Praise of Pyrocystis

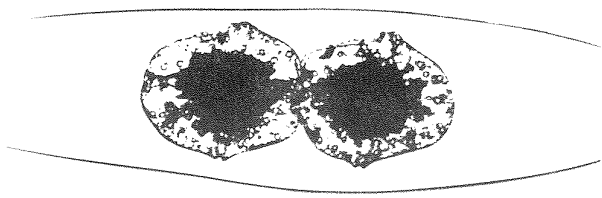
by Beatrice M. Sweeney
Department of Biological Sciences
University of California
Santa Barbara, CA 93106

I imagine that most of you have seen one or another of
the species of *Pyrocystis*, but do you realize what an
opportunity for fancy research some of these provide?

Pyrocystis is in some ways an odd dinoflagellate.
Except when in the act of cell division, it is enclosed in
a cystlike cell wall without plates or other structures
visible in the light microscope. The wall is thick and
composed of alternating layers of fibers at right angles
to each other and, at the E.M. (electron microscope)
level, can be seen to be covered with very thin hairs.
Not much like its cousin, *Gonyaulax*! The cells of the
genus, *Pyrocystis*, are not spherical or polyhedral
except immediately after cell division. They are
shaped like halfmoons or long ellipses with pointed
ends. All species are capable of brilliant biolumines-
cent flashes, hence the name, "fiery cyst."

My favorite in this interest group is *P. fusiformis* which
I cultured from a net sample taken from the R.V. Alpha
Helix in the Halmahera Sea in S.E. Asia. It is fairly
common in all subtropical oceans though. In the first
place, I like it because it is a very large cell, as long
as 1 mm from tip to tip, but it is quite flat so that the
cell contents are easy to see in the light microscope.
Unlike most dinoflagellates, *P. fusiformis* has a large
central vacuole. This property has allowed
Dr. Edith Widder in my department to insert elec-
trodes and record the action potential which precedes
a flash of bioluminescence.

For studies of the cell division cycle, *P. fusiformis* has
several great advantages. Its generation time is long,
at least five days. Furthermore, cells at different
phases of the cell cycle look quite different. Cells at
the end of cytokinesis elongate to full fusiform shape



P. fusiformis at cell division, the only time in its life that it looks like a real dinoflagellate.

within 15 minutes. This process is accompanied by rotation of both daughter cells, as we discovered much to our surprise when we made a time-lapse movie of its development. During the first day after cell division, the cell contents form many cytoplasmic strands across the vacuole, a stage unromantically known as "speckled." The following night, the cytoplasm reorganizes to form two thick transvacuolar strands in the shape of a "V" with the point at the nucleus. The cells remain in this stage throughout G1, as we were able to show by measuring the DNA content of cells in different stages. When DNA doubles in the "S" phase, the protoplast in the middle of the cell is drawn away from the wall slightly, then more and more until it only contacts the wall at each cell tip resembling a bow with the nucleus at the center like the bowknot. Finally, the protoplasm also pulls away from the tip of the cell and contracts to the center where the nucleus divides and daughter cells are formed. These stages are so distinct that it is very easy to recognize them and hence to know in what part of the cell division



Pyrocystis fusiformis is such a large cyst (about 1 mm long) that it is quite difficult to photograph using a good photomicroscope usually used for dinoflagellate studies. This specimen is one of the few photographs the author has of an entire cyst.

cycle any cells are. Another advantage of *P. fusiformis* is that cell division in populations can be synchronized quite easily by a simple technique devised by my graduate student, Grace Fabros. She took advantage of the fact that during vegetative life, the cells are neutrally buoyant. You can centrifuge them without sedimenting them. But when dividing, the new cells are for a short time heavy because they have not yet developed a vacuole and thus they sink. Because of its circadian rhythm, cell division takes place only during the night, most cells dividing toward the middle of a dark period 12 h. long. Spinning at midnight, discarding the supernatant containing vegetative cells

and resuspending the dividing cells in fresh medium is a procedure that yields about 80% synchrony. This can be improved by reisolating the top of the culture and the next morning, now containing neutrally buoyant cells in phase 1.

Most fortunate of all is the fact that *P. fusiformis* has a biological clock capable of timing several circadian rhythms: in bioluminescence, in cell division, in photosynthesis and in the position of the chloroplasts. During the day no bioluminescence can be stimulated mechanically and only a small amount of light appears in the center of the cell on acidification. Soon after dark, however, a bright flash can be produced by either mechanical or acid stimulation. This does not depend on darkness but can be seen in cells kept in light during the night. While bioluminescence occurs only during the night part of a day: night cycle, photosynthesis is confined to daytime even when cells are kept in darkness for several days. Cells divide only during the night "phase." Very dramatic is the circadian rhythm of chloroplast position. During the day "phase" chloroplasts are found dispersed throughout the cell, in position for maximum light absorption, while at the beginning of the night or the night "phase" in continuous light, all chloroplasts quickly migrate to the center of the cell where they form a dark mass. Because all the light-absorbing pigment is now concentrated in one small volume, the culture as a whole appears clear rather than orange as it does during the day. The chloroplasts move back as far as the tips of the cell very quickly before dawn. The speed with which the chloroplasts move both in at

dusk and out again at dawn is quite surprisingly high. We do not yet know how they move, but inhibitor studies strongly suggest that movement toward the center of the cell is along microtubules, while movement out seems to be by another mechanism. This interesting phenomenon is the subject of the research of Grace Fabros in my laboratory. We hope to be able to add details to this story soon. (Reprinted from the Round Brown Newsletter, J. L. Lentin, Editor.)

ANNOUNCING

A set of 100 kodachrome slides of the holotypes and lectotypes in the T.F. Vozzhennikova collection is now available. These slides, photographed in Novosibirsk, USSR illustrate the 47 species for which the holotypes either have not been lost or for which lectotypes were selected. Of the 74 legitimate species named by Vozzhennikova, 19 holotypes have been destroyed by desiccation of the glycerine mounts and have no available lectotypes, 3 have been combined as junior synonyms and slides were not taken of the types, and lectotypes 4 species avoided my net and had black and white photos taken but no slides and the holotype of one species is housed at another institute and was not photographed.

The price of the set is \$300.00 Canadian (the "little" dollar) and includes the slides as well as data regarding each species.

----- O R D E R F O R M -----

Please send me _____ sets of slides @ \$300/Can.

Name: _____

Address: _____

Telephone: _____

Please send checks or money orders with your orders to:

Dr. Judith Lentin
L.I.B. Consultants Ltd.
Suite 2110 - London House
505 - 4th Ave. SW
Calgary, Alberta
CANADA T2P 0J8

Telephone: (403) 264-0173

**PROJECT IN THE HISTORY OF THEORIES OF MASS EXTINCTIONS
BY METEORITE IMPACTS AND ALTERNATIVE CAUSES**

C/O U.S. Geological Survey
Mail Stop 941
345 Middlefield Road
Menlo Park, CA 94025

Dear Member of the American Association of Stratigraphic Palynologists:

I am now in the third year of an historical study of the ongoing debates about theories of mass extinctions by meteorite impact, massive volcanism, periodicity in the natural record and other related ideas. It is the first long-term study of a diverse series of interconnected theoretical debates in which historical data, including taped interviews with the principal participants, are being gathered continually as the debates evolve. The attached question set at the end of this Newsletter is part of that study.

This work is supported by the National Science Foundation, the American Institute of Physics, and the University of California, Berkeley. The set is brief and will take only a few minutes to complete. You must remain completely anonymous, but kindly supply the few required biographical data requested. The results of this mail survey will not be published for several years and will thus not affect the refereeing process in science.

Your cooperation would be greatly appreciated--a high proportion of returns is needed for the analyses proposed in this study. Kindly return the question set to the above address.

Sincerely,



William Glen, Principal Investigator

QUESTION SET FOR PALEONTOLOGISTS

1. Birth year _____ 2. State of birth _____ 3. Town of birth population: <5,000____;
5-50,000____; 50,000-250,000____; >250,000_____.
4. Highest degree earned _____ 5. Zip code (or country if not U.S.A.) of work place _____.
6. Employed in: Academe____; Industry____; Federal____; State and local_____.
7. What discipline other than your own has had the greatest impact on your work _____.
8. What source of information has most influenced your thinking about these debates?
a. professional research publication(s); specify: _____
b. review and opinion commentary in the literature including editorials_____.
c. discussions with knowledgeable colleagues____. d. lectures_____.
9. With what fossil group are you most familiar_____.
10. With what stratigraphic interval and geographic area are you most familiar_____.
11. With what paleontological issue have you been most concerned during the past five years _____
during the five years prior to that_____.
12. What field experience at a mass extinction horizon have you had_____.
13. Have you published on the cause of mass extinctions?____; if so, give: horizon(s)_____
causal mechanism_____; pro or con _____.

**PLEASE FEEL FREE TO ELABORATE ON ANY OF THE ABOVE (ESPECIALLY QUESTION 12)
ON REVERSE SIDE OF COVER LETTER**

**RESPOND BY MARKING (1) FOR VERY LIKELY, (2) FOR LIKELY, (3) FOR INDETERMINATE,
(4) FOR UNLIKELY, (5) FOR VERY UNLIKELY. MARK [6] FOR NO OPINION (UNINFORMED).**

(1) (2) (3) (4) (5) [6]

1. There was an impact at the end of the Cretaceous. () () () () () []
2. An impact event at the K-T boundary was the major cause of that mass extinction. () () () () () []
3. A K-T boundary impact was preceded by a several million year period of environmental stress prior to the boundary. () () () () () []
4. Mass extinctions at times other than the K-T boundary were also caused by impacts. () () () () () []
5. The K-T terminal mass extinction was caused by great volcanism unrelated to impact. () () () () () []
6. The major mass extinctions are periodic. () () () () () []
7. One of the 3 celestial theories (twin star, Z oscillations, planet X) must explain periodic extinctions. () () () () () []
8. Schindewolf's idea of macroevolutionary leaps seems borne out by the fossil record. () () () () () []
9. The destruction of biomass in a mass extinction must be much greater than is suggested by considering only percentage of taxa made extinct. () () () () () []
10. Overemphasis on the bias of the fossil record has led to unwarranted suppositions that encumber our true understanding of the history of life. () () () () () []
11. The accuracy of the stratigraphic record (utilizing all dating methods) is sufficient to conclude that mass extinctions were not geologically instantaneous, i.e., they did not occur within only a few days, weeks, months, or years. () () () () () []

QUESTIONS 12-30 ON REVERSE SIDE OF THIS PAGE

12. Plate tectonic motions can bring about ecologic change that can result in mass extinction often referred to as geologically instantaneous. ☐ ☐ ☐ ☐ ☐ ☐ ☐
13. The continental K-T boundary in western N.A. and the marine K-T boundary at Stevns Klint in Denmark are coeval in the sense of geologic instantaneity. ☐ ☐ ☐ ☐ ☐ ☐ ☐
14. There are no profound qualitative differences between background and mass extinctions, i.e., Jablonski's recent surmises are either much overstated or incorrect. ☐ ☐ ☐ ☐ ☐ ☐ ☐
15. Mass extinctions are not catastrophic and represent misinterpretations of chance clustering of poorly understood variables. ☐ ☐ ☐ ☐ ☐ ☐ ☐
16. The demise of large, land animals such as the dinosaurs cannot be as well understood as that of the better-represented, microscopic, planktonic, marine fossils. ☐ ☐ ☐ ☐ ☐ ☐ ☐
17. An impact would be recorded very differently in different environments; i.e., its effects would be clear in some deposits and not recognizable in others. ☐ ☐ ☐ ☐ ☐ ☐ ☐
18. The fossil record is mainly in accord with the idea of punctuated equilibrium. ☐ ☐ ☐ ☐ ☐ ☐ ☐
19. A K-T boundary impact was one impact of several in the late Cretaceous that produced the step-like extinction pattern of that interval over a few million years. ☐ ☐ ☐ ☐ ☐ ☐ ☐
20. The pattern of differential survivorship by taxa across the the K-T boundary is not in keeping with the environmental changes postulated for an impact. ☐ ☐ ☐ ☐ ☐ ☐ ☐
21. Uncertainties about dating, definition of taxonomic units, the Stage and other variables, preclude valid postulates of periodicity of extinction. ☐ ☐ ☐ ☐ ☐ ☐ ☐
22. Several extinction events of marine invertebrate groups during the later Cretaceous, prior to the terminal event, were due to causes unrelated to the terminal event. ☐ ☐ ☐ ☐ ☐ ☐ ☐
23. Severe climatic change wrought by causes other than catastrophic can adequately account for most major mass extinctions. ☐ ☐ ☐ ☐ ☐ ☐ ☐
24. Profound sea level changes wrought by causes other than catastrophic can adequately account for most major mass extinctions. ☐ ☐ ☐ ☐ ☐ ☐ ☐
25. Episodes of spillover or sudden connection between major water bodies can account for most major mass extinctions. ☐ ☐ ☐ ☐ ☐ ☐ ☐
26. The plant evidence for extinction at the K-T boundary indicates a geologically instantaneous (as in question 11) catastrophic environmental change. ☐ ☐ ☐ ☐ ☐ ☐ ☐
27. The dinosaur stock had been declining in numbers and diversity for several million years prior to the Cretaceous terminal extinction event. ☐ ☐ ☐ ☐ ☐ ☐ ☐
28. Major impacts have caused great volcanism, both contribute to mass extinctions; impacts have shorter term extinction effects, volcanism longer term effects. ☐ ☐ ☐ ☐ ☐ ☐ ☐
29. All mass extinctions can be explained by non-catastrophic environmental factors that have operated either singly or in concert at different extinction horizons. ☐ ☐ ☐ ☐ ☐ ☐ ☐
30. When Lyellian uniformitarianism is broken into substantive and methodological parts "catastrophes" in earth history become more acceptable. ☐ ☐ ☐ ☐ ☐ ☐ ☐

Please return to: Dr. William Glen, C/O U.S.Geological Survey, M/S 941,
345 Middlefield Road., Menlo Park, CA 94025