Commission Internationale de Microflore du Paléozoique

NEWSLETTER 53 Oct. 31, 1997

President:

Geoffrey Clayton
Dept. of Geology
Trinity College
Dublin 2
Ireland
Phone: 353 (0)1 6 7021235
Fax.: 353 (0)1 6 773072
E-mail: gclayton@tcd.ie

Secretary-General:

Jacques Verniers
Lab. Paleontologie
Universiteit Gent
Krijgslaan 281 S8
B-9000 Gent, Belgium
Phone: 32 (0)9 - 264 46 14
Fax.: 32 (0)9 - 264 49 97
E-mail: jacques.verniers@rug.ac.be

Note of the Secretary-general

In this issue we distribute the **Newsletter 17 of the Subcommission Chitinozoa** and **Newsletter 12 of the Subcommission Acritarchs** to the respective members of these subcommission. I'm pleased to see much activity in these two subcommissions and interested members can always ask the secretaries or myself for additional copies.

The crew of Prof. Marco Tongiorgi from Pisa continues the preparation of our CIMP Symposium with a very promising field trip to Sardinia (see first circular included). I wish we will have an excellent Symposium next year.

Palynos from june 1997 will be distributed to the CIMP members who asked for it.

We have received one **candidature for the position of CIMP president.** Bernard Owens, who has kept the post in the 1980's, is willing to candidate for the post for two years. His many contacts in both academia and commercial research institutions makes him an excellent candidate to represent and promote the CIMP. No candidatures for the post of secretary-general were received yet (but some persons are still hesitant). I propose to postpone the postal ballot until next Newsletter 54 (spring 1998) and to have the election in late spring - early summer. We can start than with the new presidium at our CIMP Symposium in Pisa.

Finally, I wish to thank all members who paid their CIMP annual contributions and the regional collectors for their help in collecting the funds especially C. Hartkopf-Fröder. It allows the CIMP Newsletter to appear regularly. Also Dr. J. Canright, Past-President of the IFPS, is acknowledged for donated a sum to the CIMP at his retirement.

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10 Announcement of the **Ninth Brazilian Meeting of Paleobotanists and Palynologists (IX Reuniao de Paleobotánicos e Palinólogos)** Guarulhos/SP/Brazil.
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11 First Circular CIMP Symposium and Workshops Pisa 1998.
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14 Agenda of future palynological conferences, symposia, meetings and workshops.

New CIMP Members or new members of the Subcommissions:

Debbie Hennessey
Department of Geology
University College Cork
Cork Ireland

Acritachs + Chitinozoa subcommissions

Antonio Ancilletta
Dipartimento Scienze della Terra
Universitá de Cagliari,
Viale Trentino, 51
I-09127 Cagliari Italy
Email: (provisional) pittaup@vaxca1.unica.it

Acquisitions Section
Dep. Library & Information Serv.
The Natural History Museum
Cromwell Road
London SW7 5BD U.K.

Carlos Azcuy
Mercedes di Pasquo
Eduardo Ottone
Gustavo Holfeltz
all at the
Facultad Cs. Exactas & Naturales
Depto. Ciencias Geologicos
Ciudad Universitaria, Pab. N° 2
C.P. 1428 Buenos Aires Argentina

Acritarchs Subcommission

Carol Connery
Department of Geology
University College Cork
Cork Ireland

Diear H. Baban
Almas Distr. House N° 142-112
P.O.Box 52002-251
Kirkuk Iraq

Alexey F. Weiss
Geol. Inst.
Russian Academy of Sciences
Pyzhevskii per., d:7
Moscow 109017 Russia

Can anyone inform me on the new address of the following CIMP Members

Dr. T.L. Potter
previously at Shell Den Haag The Netherlands

Dr. Zelia Pereira
Geological Survey of Portugal

Ross Parkes
Australia

Changes of address

Dr. Thomas Servais
Université Sciences et Techniques de Lille
URA 1365 du CNRS
F-59655 Villeneuve d'Ascq Cedex
Email: thomas.servais@univ-lille1.fr

Dr. David Loydell
Department of Geology
University of Portsmouth
Burnaby Building, Burnaby Road,
Portsmouth PO1 3QL United Kingdom.
Email: Gary.Mullins@port.ac.uk

Dr. Syed M. Rasul
32 Waltham Avenue
Kingsbury
London NW9 9SJ England

Morton Smelror
NTNU Vitenskapsmuseet,
N-7004 Trondheim, Norway.
Email: morton.smelror@vm.ntnu.no

Drs M. Bouman
EPT-LD, Shell Training Centre "Leeuwenhorst"
P.O.Box 663
NL-2501 CR The Hague
Dr. John D. Shane, Director of Research,
McCrone Resaerch Inst., 2820 Michigan Ave,
Chicago, Illinois 60616 - 3292 USA

Dr. Ryszard Wrona
Polska Akademia Nauk
Instytut Paleobiologii
Im. R. Kozlowskiego
Ul. Twarda 51/55
PL-00-818 Warszawa, Poland
Email: wrona@twarda.pan.pl

Dr. Marzena Stempien-Salek
Polska Akademia Nauk
Instytut Nauk Geologiscznych
Im. R. Kozlowskiego
Ul. Twarda 51/55
PL-00-818 Warszawa, Poland
Email: mstempie@twarda.pan.pl

Dipl.-Geol. Simone Müller
Hessisches Landesamt für Bodenforschung
Hasengaretnstr. 26
D-65189 Wiesbaden Germany

The Laboratory of Palaeontology at the University of Liège has moved last spring. Their telephone, fax and email numbers are the same as before, but their address is now
Université de Liège, Services Associés de Paléontologie,
Allée du Six Aout, Bâtiment B18,
Sart Tilman, B-4000 Liège, Belgium.

Evolution of the Marine Phytoplankton

30th Annual Meeting
of the
American Association of Stratigraphic Palynologists

Program and Abstracts

(Selection of Precambrian to Triassic and general topics)

edited by

Reed Wicander
Sarah Damassa
Paul K. Strother

September 14 - 19, 1997
Swope Center, Marine Biological Laboratories
Woods Hole, Massachusetts

PALYNOLOGY OF THE SILURIAN ARISAIG GROUP, NOVA SCOTIA, CANADA

John Beck

Boston College Weston Observatory, 381 Concord Road, Weston, Massachusetts 02193, U.S.A. and Boston University, Department of Geosciences, Boston, Massachusetts 02215, U.S.A.

The Arisaig Group in Nova Scotia (western Avalonian Terrane) represents one of the most complete sections of nearshore, siliciclastic, marine deposits of Silurian age in North America. Facies changes throughout the unit are gradual, rarely are the sediments coarser than silt, and virtually all the samples examined were richly palyniferous. Combining information from invertebrate paleontology, sedimentology, and palynology, the Arisaig Group can be subdivided into three nearly complete depositional sequences, each bounded by a nearshore or nonmarine erosion surface.

Given this context (i.e. gradual facies changes and continental shelf setting), the deposits at Arisaig provide an ideal medium in which to study several aspects of both marine and nonmarine organic evolution during the Silurian. Acritarchs are the most abundant marine palynomorphs found in most samples and provide a background "biomarker" to which the relative percentage and type of other palynomorphs may be compared in depositional studies. Of the 130 acritarch taxa identified throughout the section, the greatest diversity occurs in middle to outer shelf deposits of the Llandovery, after which overall diversity declines in keeping with global evolutionary patterns and greater local depositional instability. Certain constraints on acritarch distribution, such as the inability to characterize facies below the member scale, were found to both limit and enhance the usefulness of acritarchs in depositional and biostratigraphic studies respectively.

Similarly, nonmarine macerals (particularly spores and cryptospores) are well preserved and diverse at Arisaig. Although they are not as abundant as acritarchs, thirty-six species were found with the first major diversity escalation event occurring in the Homerian. This event occurs well before the first comparable evolutionary event provided by plant macrofossils which do not become morphologically diverse until the latest Silurian/earliest Devonian. This pattern is consistent with findings observed globally and highlights the utility of nonmarine microfossils in understanding regional and local evolutionary events. In terms of paleoecology, the increase in recalitrant plant detritus into nearshore sediments during the mid-Silurian probably affected the type and trophic structure of burrowing infauna. At Arisaig, deep bioturbation and average bedding thickness of sedimentary layers was observed to increase after this time. What other effects this newly evolving resource had on the environment, such as sediment stabilization, increased weathering, or enhanced nutrient release, await further study.

EVOLUTION OF THE MARINE ECOSYSTEM

Richard K. Bambach

Department of Geological Sciences, Virginia Tech, Blacksburg, Virginia 24061-0420, U.S.A.

For the first 2.5 billion years of the history of life, the ecosystem was confined to the primary system of producers and decomposers. The potential for the more complex ecosystems of the Phanerozoic only began to develop about one billion years ago with the start of the radiation of the various eukaryote crown groups. The first preserved record of an ecosystem that includes a secondary component (consumers) appears in the Vendian.

A new physiological categorization of various animal taxa reveals underlying patterns of diversity change that must relate to basic changes in ecosystem structure in the marine realm during the Phanerozoic. There are four major intervals with fundamentally different interrelationships of ecological importance: (1) the Early Paleozoic (with its dramatic changes in diversity and in dominance), (2) the bulk of the Paleozoic (during which diversity fluctuated but did not trend up or down and diversity proportions within the fauna remained stable and unchanging despite faunal turnover), (3) the Mesozoic (where a new balance of diversity relations was maintained as diversity increased), and (4) the Cenozoic (in which diversity has increased at markedly different rates in different groups but a near constant proportionality - the reverse of that maintained in the Paleozoic - has persisted).

Knowledge of how changes in the consumer side of the ecosystem that differentiate these major intervals are linked to primary producers will be necessary to integrate a full understanding of the evolution of the marine ecosystem. Ultimately we must answer two questions: (1) what changes in the primary ecosystem influence the consumer system and (2) what are the feedbacks from consumers that influence primary producers?

ANALYSIS OF PALAEONTOLOGICAL DATA ON THE INTERNET

Michael C. Boulter

University of East London, Romford Road, London E15 4LZ, United Kingdom

It is a fortunate coincidence that at the same time as we appreciate the need for an inventory of all known fossil species, global computer networks are becoming more sophisticated. Some examples of palaeontological databases will be presented here and techniques to search and link these on the Internet will be demonstrated.

The latest interactive programs allow such selected data to be downloaded for mapping and analysis and examples of two major advances in data analysis will be given. Thorne's biogeographic database of angiosperm families can be plotted globally and palaeogeographic maps are also available when stratigraphic data are given. The geological times of first and last appearances of all biological families from the fossil record show an exponential curve, meaning that biological evolution is a self-controlling system.

LARGE ACANTHOMORPHIC ACRITARCHS: THEIR EVOLUTION, DIVERSIFICATION AND EXTINCTION ACROSS THE NEOPROTEROZOIC - A CASE HISTORY FROM THE KROL FORMATION, LESSER HIMALAYA, INDIA

Rajita Gautam[1] and Vibhuti Rai[1]

[1]Department of Geology, University of Lucknow, Lucknow, India

The Neoproterozoic time span encompassing about 460 million years of Earth history occurs as a transitional period representing the feebly developed biota of the Proterozoic and the sudden explosion of life during the Phanerozoic. Various physical and chemical changes occurred during this period which affected the evolution of the biotic community. Of these, the evolution of phytoplankton with its abrupt and index changes during the terminal Proterozoic is of great significance. The phyutoplankton community of the Neoproterozoic Krol Formation is well represented by acritarchs. The thin-section study of bedded black cherts, interlayered within shallow marine carbonate deposits, from the Krol 'A' Member of the Krol Formation has yielded an exceptionally well preserved silicified microbial assemblage form the Himalayan successions. The assemblage comprises planktic as well as benthic, mat-building, colonial and solitary forms of cyanobacteria and other algal groups. Confirmed occurrences of eukaryotic algae and acritarchs are also recorded. The acritarchs range from small- to large-sized vesicles, simple sphaeromorphic to highly ornamented acanthomorphic forms.

The large acanthomorphic acritarchs occur mainly as collapsed and compressed vesicles with some robust forms preserved *in-toto*, clearly showing their morphological details. A remarkabel increase in taxonomic diversity as well as in the number of these forms denotes the evolutionary changes that occurred during this time. The adaptation of acritarchs to these evolutionary changes and newly evolved ecological niches is also reflected in the increased size (gigantism) and process morphologies, which range from simple to complex variations of conical, spiny and hairy types. Some of the larger forms have been identified as *Ericiasphaera*, *Appendisphaera*, *Asterocapsoides*, and *Baltisphaeridium*. However, a majority of the acritarchs are unique to the assemblage as they do not show any resemblance to the known existing forms. The evolutionary pattern of these acritarchs can be traced along the sequence where an increase in the size, number and morphology is seen from the lower horizons of the Krol 'A' Member with a gradual decrease towards the top of the succession in the loermost part of the overlying Tal Formation. The occurrence and evolutionary significance of these previously unrecorded forms which form an important component of the microplanktonic community of the Neoproterozoic Himalayan successions is discussed in this paper.

AN APPLIED INTEGRATED APPROACH (PALYNOLOGY, MICROPALAEONTOLOGY, AND STRUCTURAL RESTORATION) TO OCEANIC/SHALLOW MARINE ECOSYSTEMS OF OFFSHORE NORWAY.

Gavin K. Gillmore[1,2], Tomas Kjennerud[1] and Eric Monteil[1]

[1]IKU Petroleum Research, N-7034 Trondheim, Norway

[2]Nene College of Higher Education, School of Environmental Science, Earth Science, Park Campus, Boughton Green Road, Northampton, Northamptonshire, NN2 7AL, United Kingdom

Until now, available data relative to palaeowater depths has been poorly documented. Generally, authors cite water depths for species/genera with little or no support for their conclusions, or give no clear indication on what their conclusions are based. Typically, a very subjective approach is adopted, and workers in this field often support palaeowater depth estimates on their own (and more rarely others) experience rather than on a particular methodology. The aim of this research is to develop a methodology in palaeowater depth assessment that is objective and reproducible.

In order to carry out this research, an integrated approach to palaeobathymetry using micro-palaeontology (foraminifera, radiolaria, and diatoms), palynology (dinoflagellates and palynofacies), and structural restoration techniques is adopted. This approach delineates palaeobathymetric trends and assesses lateral faunal and floral changes along shelf to basin transects. Palaeowater depth is fundamental to basin modelling, but is probably the hardest parameter to measure. This is because few sedimentological criteria are controlled precisely by water-depth. Most organisms which show a so called depth-related distribution are, in fact, controlled by an interaction of multiple factors.

Foraminiferal assemblages have been widely used for palaeoenvironmental interpretations in the Mesozoic and Cenozoic, and a limited number of palaeobathymetric models have been proposed for Cretaceous sediments. The use of dinoflagellate cysts in palaeoenvironmental reconstruction is a recent approach, and only a few sophisticated palaeo-environmental models have been proposed for the Tertiary.

The depth distribution of foraminifera is a function of several interacting factors, such as temperature, salinity, oxygen levels, nutrients, and the nature of the substrate. The depth distribution of dinoflagellate cysts, however, is more complex. In modern oceans, distribution of the planktonic stage of dinoflagellates is largely a function of temperature, salinity, and distance from the coast. Absolute abundance, or productivity, is dependent on light, salinity, temperature, nutrient supply, oxygen levels, and current conditions. On a global scale, the distribution of motile dinoflagellates is basinwards-landwards and oceanic-climatic. The distribution of cysts is dependent on several factors, including distribution of motile stage species, biological and ecological controls over encystment, and the behaviour of cysts as sedimentary particles in the hydrographic regime. Over and above this, the distribution of sedimentary organic particles, and thus distribution of dinoflagellate cysts in sediments, are also highly influenced by the change in stacking patterns of depositional systems (LST, TST or HST).

This unified micropalaeontological and palynological approach is combined with a new structural restoration technique. The latter modifies the traditional structural restoration method to take into account palaeobathymetry in an extensional regime (using simple shear as a deformation mechanism). Based on depth converted and interpreted seismic sections, a relative relief is restored for each timestep taking into account the geometries of the seismic sequences. In some cases when the conditions are favourable (laterally uniform subsidence, pin points such as coal horizons and prograding clinoforms that can be measured), these relative profiles can become close approximations to absolute ones.

This integrated approach enables the identification of likely palaeowater depths based on upper depth limits provided by foraminiferal and palynological studies and the deepest likely scenario obtained from the geometry of seismic sequences. By combining the palaeowater depth ranges derived from micropalaeontology and palynology studies, with angles obtained from the seismic sequence under study, angular ranges for the studied time slice and associated sediments between at least two wells, can be used to constrain palaeodepth estimates.

Accurate assessment of palaeobathymetry is important in predicting the distribution of sediments and burial history, source rock stratigraphy, and source rock potential. This combined approach also gives better control on the evolution of reservoir rocks through time (hydrocarbon migration pathways).

THE GLOBAL POLLEN DATABASE

Eric C. Grimm[1] and John Keltner[2]

[1]Illinois State Museum, Research and Collections, 1011 East Ash St., Springfield, Illinois 62703, U.S.A.

[2]NOAA Paleoclimatology Program, 325 Broadway E/GC3, Boulder, Colorado 80303, U.S.A.

The global Pollen Database (GPD) contains Quaternary pollen data from the Americas, Europe, Africa, northern Asia, and the Indo-Pacific region. New data are organized and made available by various regional data cooperatives. The GPD began with the development in 1990 of the independent but compatible North American and European Pollen Databases (NAPD and EPD). The GPD was conceived in 1994 with the development of the Latin American Pollen Database, which was integrated with NAPD from the outset. Beginning in 1997, the GPD has incorporated date from the Indo-Pacific Pollen Database and non-restricted data from the EPD.

The objective of the GPD is to assemble pollen data for Quaternary deposits and modern surface samples into a relational database and to make these data readily available to the scientific community. The database contains original pollen counts, radiocarbon dates, site data, bibliographic data, worker information, and other relevant data.

The database makes an important distinction between *archival* data and *research* data. Archival tables store the count data, radiocarbon dates as reported by the radiocarbon laboratories, and other basic data not expected to change, except to add missing information or correct errors. Research tables store data that are derived by manipulation of the archival tables and are of an interpretive or subjective nature. Probably the most important of the research tables are those containing age models and chronologies, including the assignment of an age to each pollen sample.

The GPD is available from the World Data Center-A for Paleoclimatology, which is housed at the National Geophysical Data Center in Boulder, Colorado. In addition to the database tables themselves, that data are available in several file formats via the World Wide Web (http://www.ngdc.noaa.gov/paleo/pollen.html) and anonymous FTP (Ftp.ngdc. noaa.gov in/paleo/pollen).

LIFE IN THE PRECAMBRIAN OCEANS: EVIDENCE AND QUESTIONS

Andrew H. Knoll

Botanical Museum, Harvard University, Cambridge, Massachusetts 02138, U.S.A.

We know, and have known for decades, that Phanerozoic ecosystems were preceded by a long interval of Precambrian evolution. The biology of Archean oceans remains poorly constrained, but in recent years, taxonomic, paleoenvironmental, and stratigraphic patterns have emerged that enable us to approach the Proterozoic fossil record in a predictive fashion that looks to generalizations about early life.

Cyanobacteria are among the most morphologically diverse and developmentally complex of all eubacteria, making them one bacterial clade for which morphology provides useful systematic characters. Cyanobacteria were widely distributed in Proterozoic environments favoring fossil preservation, and were of paramount ecological and biogeochemical importance on the early Earth. Even shallow branches of the cyanobacterial tree, including the heterocyst-bearing *Nostocales*, are represented in fossil assemblages 2,100 Ma or older, indicating that much cyanobacterial diversification occurred during the Archean or earliest Proterozoic Eon. Eukaryotes are represented in Proterozoic rocks by both morphological and biomarker remains. Simple microfossils and steranes of probable eukaryotic origin can be traced back to 1,800 Ma and possibly as far as 2,450 Ma; however, there is little evidence for pronounced algal diversification until 1,200-1,000 Ma, when green, red, and chromophyte algae first appear in the rock record.

If the distribution of Proterozoic fossils in time and space is becoming better known, fundamental questions remain about the ecological structure and productivity of early oceans. It is tempting to address such issues by starting with current ecosystems and subtracting from them those components known to have evolved during the Phanerozoic Eon; however, the prevalence of non-linear responses in ecology discourages overreliance on this approach. Important constraints are likely to emerge from rapidly improving biogeochemical data on Proterozoic ocean basins, but such studies, however promising, are in their infancy.

MESO- AND NEOPROTEROZOIC ACRITARCHS IN CHINA

Yin Leiming

Institute of Geology and Palaeontology, Academia Sinica, Nanjing 210008, People's Republic of China

In the Early Mesoproterozoic Changcheng series of North China, acritarchs are dominated by simple sphaeromorphic forms, and specimens with membranous envelopes which, in comparison with prasinophites, appear firstly. Up to Late Mesoproterozoic strata, spheromorphic acritarchs are still common but edromorphic taxa also occur. Exceptionally, some acanthomorphic acritarchs such as *Shuiyousphaeridium*, *Tappania*, and others, have been found from the Late Mesoproterozoic Ruyang Group on the northern slope of the Qinling ranges. In the Early Neoproterozoic, acritarch assemblages from the North China are characterized by sphaeromorphic and polysphaeromorphic forms, and similar specimens of *Asterocapsoides*, *Trachyhystrichosphaera*, and others also appear in the assemblage near the Late Neoproterozoic glaciation.

Large acanthomorphic acritarchs have been obtained from cherts and phosphorites of the Doushantuo Formation in South China at the stratigraphic interval after the Late Neoproterozoic Nantuo glaciation and just before the radiation of the Ediacaran fauna. During the duration of the Ediacaran radiation, acritarchs were distinctly reduced in their abundance and diversity. Small acanthomorphic taxa such as *Micrhystridium*, *Filisphaeridium*, and others occur in the strata near the boundary between Neoproterozoic and the Early Cambrian in South China.

INTERNATIONAL QUATERNARY ASSOCIATION (INQUA) DATA-HANDLING METHODS AVAILABLE FREE ON THE WORLD WIDE WEB

Louis J. Maher, Jr.

Department of Geology and Geophysics, University of Wisconsin, 1215 West Dayton St., Madison, Wisconsin 53706, U.S.A.

At the XIIth International Quaternary Association (INQUA) meeting in Ottawa, 1987, Dr. Brigitta Ammann, President-elect of the Holocene Commission, established a working group on data handling coordinated by R. C. Ritchie. The group assembled a mailing list of colleagues interested in a continuing flow of useful information on developments in computer and other technology that help handle, exchange, analyze and otherwise deal with data more effectively. The group produced a simple newsletter about twice a year that was distributed internationally to more than 200 laboratories and individuals. At the XIV INQUA meeting in Berlin, 1995, the Working Group was transformed to a Sub-Commission on Data-Handling Methods. J. C. Ritchie edited and coordinated the Newsletter from June 1988 until January 1990, L. J. Maher served as editor from July 1990 until January 1997, at which time K. D. Bennett assumed that duty. A small group of colleagues has served as an advisory panel: Keith Bennett, John Birks, Rick Battarbee, Owen K. Davis, Lou Maher, and Jim Ritchie. These and many others contributed to the Data-Handling Methods Newsletter over the years, both as Working Group and Sub-Commission.

When data-handling methods were discussed, the Working Group always tried to make the computer programs available so that others could try them out with their own data. At first the programs were distributed on floppy disks, but as the Internet became more accessible, text copies of the newsletters, lists of mail/e-mail addresses, and self-expanding zipped packages of computer programs and sample data were kept in an anonymous ftp site at **<geology.wisc.edu>** in the directory **/pub/inqua**. That set of files became known as the *INQUA File Boutique*; a "readme.txt" file described the contents of the directory.

With the advent of the World Wide Web, the File Boutique became a web site. Its URL is **<http://www-palecol.plantsci.cam.ac.uk/inqua>**, and it contains all the newsletters with their full text and illustrations, searchable by author, title or key word(s). The site contains references to 900 papers on numerical methods, Kovach's multivariate statistical package MVSP, Green's interactive time-series analysis program, many programs for analyzing pollen data and several that produce professional-grade diagrams. There are several programs for recording and processing pollen counts and others for making and editing random access keys. Keltner's MapPad allows one to keep data files that can be brought up by "clicking" their position on a map on the screen. There are also programs for collecting and processing sample data from electronic balances, and global positioning receivers. There are digital data from almost 300 Quaternary pollen sites, and much more.

For those with slower transatlantic links an INQUA File Boutique mirror site can be reached at **<http://www.geology.wisc.edu/~maher/inqua.html>**.

PALYNOLOGICAL CHARACTERIZATION OF A SILURIAN TRANSGRESSIVE EVENT

Merrell A. Miller

Amoco Exploration and Production Technology Group, P.O. Box 3092, Houston, Texas 77253-3092, U.S.A.

A sea level rise following the Late Ordovician glaciation of Gondwana resulted in several major Early Silurian transgressive events. Global transgressions became less common in the Late Silurian; however, a Ludlow sea level rise is widely recognized. The Ludlow flooding event occurred during *Polygnathoides siluricus* time and is recognized in paleobathymetric settings that are palynologically dissimilar. The units were independently dated by either conodont or graptolite control and their paleobathymetric settings determined by megafossil communities.

The shallowest depositional setting occurs in the Pittsford Shale, Vernon Formation, Salina Group, New York, which contains a near-shore *Lingula* benthic community. The Pittsford Shale is an organically lean black shale, of probable shallow lagoonal origin. The palynomorph composition of this unit is relatively diverse but lacks chitinozoans and contains a relatively abundant spore flora. Also present in this assemblage are eurypterid fragments which indicate shallow water depositional settings.

An intermediate depositional environment is characterized by the graptolitic beds in the basal part of the Henryhouse Formation of southern Oklahoma (northern flank of the Arbuckle Mountains). The transgressive beds are gray marls with rare graptolites interbedded with fine-grained carbonates. The Total Organic Carbon (TOC, wt. %) values of these beds are less than 1%. The palynomorph composition of these marls is dominated by acritarchs. Spores and eurypterid fragments are absent or rare. An important component in this transgressive unit is prasinophyte algae (*Tasmanites* and *Pterospermella*). Prasinophytes very often occur in transgressive units and can be used to recognize episodes of sea level rise and maximum flooding surfaces.

A Ludlow black shale from the subsurface of central Tunisia is the deepest setting examined. This Ludlow succession is dated by graptolites. The TOC values can exceed 10%, and the assemblage consists of graptolites and *Tasmanites* (or thick- walled *Leiosphaeridia*). These black shales are considered to represent a condensed succession characterized by a slow rate of deposition in an anoxic setting. This depositional setting ensured that a lipid-rich, nearly monospecific palynomorph assemblage was preserved. The prasinophyte assemblage differs from the two previous examples that contained diverse palynomorph assemblages and low TOC values.

In conclusion, depositional facies can be recognized on the basis of their palynomorph content. Prasinophytes are an important group for identifying transgressive events in the Silurian, as well as in younger systems, and are a prominent component of Early Paleozoic source facies.

EARLY SILURIAN ACRITARCHS AND PRASINOPHYTES FROM THE SUBSURFACE OF SOUTHEASTERN TURKEY

Merrell A. Miller[1], Nihat Bozdogan[2], Kaya Ertug[2], Gordon D. Wood[1], Levent Akça[3] and Wally Pierce[4]

[1]Amoco Exploration and Production Technology Group, P.O. Box 3092, Houston, Texas 77253-3092, U.S.A.

[2]Turkish Petroleum Corporation, Research Center, Mustafa Kemal Mahallesi, 2. Cad. No. 86, 06520 Ankara, Turkey

[3]Turkish Petroleum Corporation, Exploration Group, Mustafa Kemal Mahallesi, 2. Cad. No. 86, 06520 Ankara, Turkey

[4]Amoco, Strategic Exploration Organization, P.O. Box 3092, Houston, Texas 77253-3092, U.S.A.

Core samples from the Telahasan 1 well, southeastern Turkey, yielded a rich assemblage of thermally unaltered acritarchs and prasinophytes. Present in this assemblage are: *Ammonidium microcladum*, *Baiomeniscus* sp., *Carminella maplewoodensis*, *Dictyotidium* sp., *Diexallophasis denticulata*, *Diexallophasis denticulata medarbaensis*, *Domasia bispinosa*, *Elektoriskos* spp., *Eupoikilofusa* spp., *Helios armaides*, *Helosphaeridium pseudodictyum*, *Leiofusa estrecha*, *Leiosphaeridia* spp., *Multiplicisphaeridium* spp., *Onondagella asymmetrica*, *Oppilatala insolita*, *Pterospermella martinii*, *Quadraditum fantasticum*, *Schismatosphaeridium perforatum*, *Sol* sp., *Tunisphaeridium caudatum*, *Tunisphaeridium tentaculiferum*, *Veryhachium* spp., and *Visbysphaera* spp., among others. The presence of *Domasia bispinosa* in the core samples suggests a latest Llandovery to earliest Wenlock age when compared to its distribution in Great Britain, Sweden and North America.

This subsurface unit is unnamed but is correlative with the late Llandovery/ Wenlock portion of the Mudawwara Formation of Jordan and probably part of the Qalibah Formation of Saudi Arabia. It also has similarities with the Tanf Formation of Syria. This unit is palynologically distinct from the Dadas Formation of southeastern Turkey which contains a Late Silurian to possibly earliest Devonian assemblage.

Cuttings samples from section stratigraphically below the core also contain infrequent Early Silurian acritarchs, however, rare specimens of well-known Ordovician acritarchs such as *Villosacapsula setosapellicula*, *Peteinosphaeridium* and *Actinotodissus* are present. From the data available, it is not possible to determine if these fossils are recycled or Ordovician section was penetrated.

AN UNCONVENTIONAL BIOSTRATIGRAPHIC APPROACH: THE CONCEPT OF MORPHOSTRATIGRAPHY

Eric Monteil[1] and Robert W. Williams[2]

[1]IKU Petroleum Research, N-7034 Trondheim, Norway

[2]Norwegian Petroleum Directorate, Postboks 600, N-4001 Stavanger, Norway

The aim of this unconventional approach is to provide an alternative biostratigraphic method that is independent of the concept of generic and specific taxonomic units. The alternative method, called morphostratigraphy, is based on variations of unambiguous morphological features through time. This new approach offers the generation of multiple events (event-maximization) that have applications in various fields of geology (biostratigraphy, ecostratigraphy, and graphic correlation).

Dinium-Alpha's morphostratigraphic logging and plotting functions provide a tool for recording and processing large amounts of morphostratigraphic data. This opens a new era in reservoir high-resolution biostratigraphy and modelling, inter-regional and inter-facies correlations, and understanding of palaeoenvironmental factors controlling dinocyst assemblage composition.

INTERNET RESOURCES AVAILABLE TO PALYNOLOGISTS

Owen K. Davis

Department of Geosciences, University of Arizona, Tucson, Arizona 85721, U.S.A.

The Internet has transformed computing, and has become a primary resource and form of communication for some fields. Many palynological web sites have sprung up in the last few years, offering a variety of useful information including addresses for fellow palynologists, software, and data of various kinds.

Three information transfer protocols are GOPHER, FTP, and HTML. All three are easily accessed graphically through html web sites by URLs (uniform record locators: gopher://, ftp:// and http://). The HTML page consists of combined text, graphic, and audio files within a structure of TITLE, HEAD, and BODY. These files are transferred to the user's computer where the interpreted file is displayed by the user's Internet browser.

The capabilities of the browsers vary greatly, with advancements far out pacing standardization. All browsers are capable of transferring text information and graphics files, advanced browsers host conferencing, display full animation and sound, and can act as the primary desktop for personal computing.

Several web sites now include identification keys with graphical information, but the potential for collaboration is far from fully recognized. Conceivably, within the next few years, a global database of illustrations and descriptions will be seamlessly integrated on the Internet, permitting rapid identification of modern and fossil palynomorphs.

ANALYTICAL TOOLS FOR USE WITH PARADOX-BASED POLLEN DATABASES

Phillip L. Leduc[1], John W. Williams[1] and Thompson Webb III[1]

Department of Geosciences, Brown University, Providence, Rhode Island 02912, U.S.A.
email: phillip_leduc@brown.edu, jww@brown.edu, thompson_webb_iii@brown.edu

The assembling of regional and global pollen databases did not begin with the invention of the Internet, but the Internet makes it much easier for palynologists around the world to access these data warehouses. Current on-line databases, most of which are maintained by the NOAA Paleoclimatology Program, include the North American Pollen Database (NAPD) (http://www.ngdc.noaa.gov/paleo/napd.html), Global Pollen Database (http://www.ngdc.noaa./paleo/gpd.html), European Pollen Database (http://www.ngdc.noaa.gov/paleo/epd.html), African Pollen Database, and Latin American Pollen Database (http://www.ngdc.noaa.gov/paleo/lapd.html) with others under construction. The databases are continually maintained and updated, and offer data that has been quality checked and is in standardized formats. But ease of access is not the same as ease of use: one of the great problems posed by this wealth of data is the need for programs that can search and manipulate the databases. At Brown University, we work extensively with the NAPD, and have developed a tool kit, called PATools (this stands for Pollen Analysis Tools) to aid paleovegetation reconstructions.

A major difficulty for would-be users of the NAPD is that it is not a single data table (this would be far too unwieldy), but instead consists of many tables, complexly linked together. PATools is a collection of Paradox tools developed over the last three years at Brown University that enables analysts to extract information from the NAPD via a graphic user interface of drop-down menus and pushbuttons. Although PATools has been developed for use with the NAPD, it could be adapted to other pollen databases of similar structure. A user of PATools first chooses the pollen types for display, the pollen sum, and the sites for study. Sites can be selected by latitude and longitude, political division, age, and/or type of record (core vs. section vs. surface sample). When these selections are complete, PATools gathers the relevant information from the NAPD and dynamically builds pollen count and percent tables and can interpolate between pollen samples to produce data for specific timeslices. Pollen counts, percentages and interpolated percentages with supplementary site and chronology information can be printed as individual site reports. PATools will identify which sites have incomplete data (e.g. are missing a chronology) and can produce a report listing such sites and their data gaps. PATools can convert radiocarbon dates into calendar years for the past 50,000 rka, and is fully usable in either form. PATools allows the user to analyze a site's chronology by ranking chronology quality, i.e. the number and proximity of bracketing dates for a given timeslice, and by allowing an analyst to experiment with modifying chronologies by use of an interface that instantly shows the effects of adding or removing dates upon pollen sample ages. We recently added an analogue capability to PATools, allowing PATools to search a pollen database for closest analogues to a given pollen sample or timeslice. The user can select from six measures of dissimilarity and can accept the default threshold values or use his or her own. PATools has several utility tools, including the ability to compare tables, number records or samples within a table, and convert between pseudo-decimal and decimal latitude/longitude formats.

A few disclaimers: PATools is written for Paradox 7 (the database manager used by NAPD), so users must have this software before they can make use of the tools. PATools works within the Paradox 7 environment, so does not relieve the user of the need to have some familiarity with the software. We plan to make PATools publicly available but do not yet have a help feature, nor is it yet documented. However, PATools is fairly intuitive to use.

MEGA-CARBONACEOUS PHYTOPLANKTON REMAINS FROM PROTEROZOIC BASINS OF INDIA: A STUDY OF THEIR MORPHOTAXONOMY, TAPHONOMY, AND EVOLUTION

Vibhuti Rai

Department of Geology, University of Lucknow, Lucknow, 226007, India

Mega-carbonaceous remains of Proterozoic age have been studied the world over for their significance in understanding the evolving biosphere during that time-span. Of late, it is believed that the major biological events that triggered the Phanerozoic explosion of life have their precursors in the Proterozoic strata by way of well-developed fossiliferous horizons. Although rare in occurrence, India is one of the few countries with exceptionally well developed Proterozoic basins which have yielded definitive evidence for highly diversified macro-planktic and macro benthic communities. These basins are located both in the Peninsular India, namely the Vindhyan, Kurnool, Kaladagi and Bhima basins, as well as in the Himalaya, the Krol and Deoban basins.

Amongst the mega-planktic community of the Proterozoic, *Chuaria circularis* and *Tawuia dalensis* are the most commonly occurring taxa. These are millimetric to a centimetre in size, usually preserved as compressed vesicles, and usually found in the shale/ micritic-limestone intercalations. A detailed analysis of these fossils indicates that taphonomic factors and morphological features influence the preservation of the fossils to an extent where a range of morphologies are generated. A sequential analysis of these forms has been accomplished by developing a preservational model for these fossil forms.

A host of other associated fossils such as *Grypania*, *Beltina*, *Lanceoforma*, *Longfengshania*, and *Beltanelliformis* have also been recorded from several horizons of Indian Proterozoic basins. A detailed distribution pattern of these fossils in lateral and vertical profiles has been drawn. A few newly discovered fossil forms are described in light of such occurrences from China and Canada. The exceptionally well-preserved forms from the Deoban basin in the Himalaya add new information in the establishment of a firm biostratigraphic scheme for global correlation. Using the distribution pattern, possible paleogeography and evolutionary scheme for gigantism in the planktic and benthic communities, these occurrences from India are discussed, synthesized, and used for generating a biostratigraphic scheme.

ACRITARCH EVOLUTIONARY LINEAGES DURING THE ORDOVICIAN

Thomas Servais[1] and Stewart G. Molyneux[2]

[1]Technische Universitat Berlin, Institut fur Angewandte Geowissenschaften II, Ernst-Reuter-Platz 1, Sekr. EB 10, D-10587 Berlin, Germany

[2]British Geological Survey, Keyworth, Nottingham NG12 5GG, United Kingdom

It is very difficult to establish evolutionary lineages for the acritarchs, as studies on molecular phylogeny are not available and evolutionary models are essentially based on comparison of morphological characters. Few evolutionary lineages of acritarch morphotypes have been published. Loeblich & Tappan (1971) illustrated a perceived phylogenetic trend in the Ordovician genus *Orthosphaeridium*. This model has frequently been cited by acritarch workers as the prime example of phylogenetic relationships in acritarchs, although it was seriously criticized by Cramer, in Eisenack *et al.* (1979). Other examples in the literature are Eiserhardt's (1989) modified model of the same genus, and the hypothetical phylogenetic relationships of some *Ladogella* species proposed by Di Milia, Ribecai & Tongiorgi (1989).

As acritarch taxonomy is essentially phenetic, the first step towards understanding the evolution of acritarch morphotypes is to select characters which may be useful for the delimitation of taxa. However, as most parameters appear to be extremely variable, it is essential to investigate large populations of well-diversified assemblages to understand the evolution of individual species. Studies on the variability of several Ordovician taxa reveal that morphotypes which were originally clearly distinguished by specific characteristics grade into each other through intermediate forms which combine those characteristics. The major problems in developing a reliable model of an evolutionary trend for the acritarchs are the understanding of variability, and the distinction of palaeoenvironmental and biostratigraphical effects on morphology.

The study of large populations of discrete morphotypes in the *messaoudensis-trifidum* acritarch assemblage from the subsurface of Rügen (Germany) may provide useful information to help understand the evolution of some Early Ordovician taxa, as this characteristic assemblage can be considered as being transitional between known Tremadoc and Arenig assemblages. Transients between the genera *Acanthodiacrodium* (very abundant and characteristic for many Tremadoc assemblages) and *Coryphidium* (a typical Arenig genus) indicate that the coryphid acritarchs may have originated from the diacrodians.

"LEIOSPHERES" AND PALEOECOLOGY

Paul K. Strother

Department of Geology and Geophysics, Boston College Weston Observatory, 381 Concord Road, Weston, Massachusetts 02193, U.S.A.

Precambrian and Lower Paleozoic assemblages are plagued by the occurrence of leiospheres, generally smooth-walled spherical cysts lacking in distinctive taxonomic characters. These forms are usually considered to be of a marine origin, following the description of numerous taxa from marine sediments. The depositional setting of leiosphere-dominated assemblages has been hypothesized to be both near-shore shelf to basinal, especially following the work of Dorning in the Silurian Welsh Basin, published during the 1980s.

This class of objects represents a wide range of organisms, but there are several lines of evidence that may help to establish a non-marine source for a subset of the simple spherical cysts: 1) leiospheres tend to track with non-marine indicators in the shallow marine Arisaig sequence (Silurian) of Nova Scotia; 2) a detritivore"s coprolite from Wales is dominated by spores (indistinguishable from "leiospheres") which gives us a snapshot of non-marine cysts in the Pridoli; 3) new findings from Middle Cambrian sediments from the Grand Canyon contain well-preserved "leiospheres" of probable non-marine provenance, and 4) acritarchous assemblages from paralic deposits in the Late Cambrian - Early Ordovician of northern Spain contain a high percentage of leiospheres.

When depositional setting can be determined independantly of palynological analysis, leiospheres often turn up as a non-marine component. The next step is to find a consistent set of morphological characters that differentiates between the marine and non-marine species in this group.

AFFINITIES OF LOWER CAMBRIAN ACRITARCHS STUDIED BY USING MICROSCOPY AND BIOMARKERS

Nina Talyzina[1], J. Michael Moldowan[2], and Gonzalo Vidal[1]

[1]Institute of Earth Sciences, Micropaleontology, Uppsala University, Norbyvägen 22, S-752 36 Uppsala, Sweden

[2]Department of Geological and Environmental Sciences, Stanford University, Stanford, California 94305-2115, U.S.A.

The first attempt to characterize acritarchs by application of different types of microscopy in combination with biomarkers (molecular fossils) and fluorescence properties of acritarch cell walls is made. Optical techniques used in the investigation include Laser Confocal Scanning Microscopy, Scanning Electron Microscopy, Transmission Electron Microscopy, Fluorescence Microscopy and Transmitted Light Microscopy. Chemical analyses were carried out using Gas Chromatography-Mass Spectrometry-Mass Spectrometry.

The analyses made it possible to establish links between the studied microfossils and particular groups of the modern phytoplanktic microbiota. This microscopy-molecular level combined approach gave new evidence that the group Acritarcha is polyphyletic. Key biomarkers suggest the presence of Lower Cambrian acritarchs with dinoflagellate and prasinophycean affinities.

PALYNOLOGY, PALYNOFACIES AND PALEONTOLOGY OF THE PENNSYLVANIAN-PERMIAN COPACABANA FORMATION, PERU

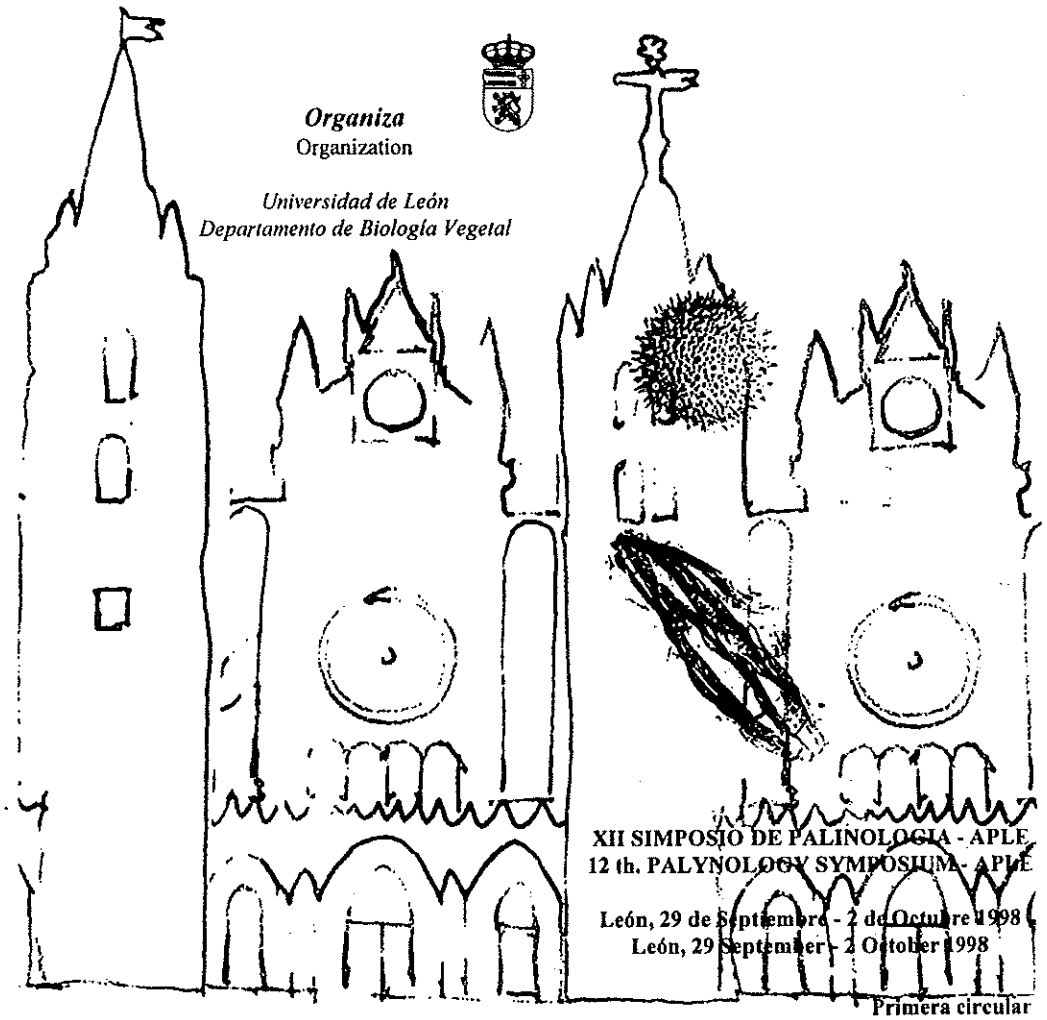
Gordon D. Wood[1], Greg P. Wahlman[1], John R. Groves[1] and Paul L. Brnekle[2]

[1]Amoco Exploration and Production Technology Group, P.O. Box 3092, Houston, Texas 75253-3092 U.S.A.

[2]1 Whistler Point Road, Westport, Massachusetts 02790 U.S.A.

Analyses of palynomorphs and calcareous microfossils from sections of the Copacabana Formation, exposed along the Rio Camisea and Rio Urubamba (Pongo de Mainique) indicate that both Pennsylvanian and Lower Permian rocks are present. The Pennsylvanian (Morrowan/Atokan) Foraminifera and associated calcareous microfossils include *Eoschubertella mosquensis*, *Millerella extensa*, *M. marblensis*, *Biseriella parva* group, *Calcitornella* sp., *Consobrinella* sp., *Diplosphaerina inaequalis*, *Earlandia elegans*, *E. minima* group, *Endotaxis brazhnikovae*, *Endothyra* sp., *Endotyranella* sp., *Globivalvulina bulloides* group, *Monotaxinoides transitorius*, *Palaeonubeculatia* sp., *Planenodothyra aljutovica*, *P.* sp. and *Tubisalebra* sp. This foraminiferal assemblage displays strong affinities to the United States midcontinent, Solimões and Amazon basins of Brazil, and the Madre de Dios Basin of Bolivia. The palynomorph assemblage includes *Potonieisporites* sp., *Protohaploxypinus* sp., *Spelaeotriletes* sp., *?Striatoabietites* sp., undescribed taeniate bisaccates/striate monosaccates and the fungus *Reduviasporonites stochiana*. Kerogen preparations are dominated by terrestrially derived plant debris.

The Lower Permian (Wolfcampian) calcareous microfauna includes the fusulinaceans *Pseudschwagerina ayacuchensis*, *P. broggi*, *P. diorbingnyi*, *P. vilcanotensis*, *P. uddeni*, *P. kozlowkii*, *Schwaterina munaniensis*, *S.* aff. *S. bowmani*, *S.* spp. indeterminate, *Schubertella* cf. *S. kingi*, *Triticites peruensis* and *T. titicacaensis*; the smaller foraminifera *Nodosinelloides aequiampla*, *N.* sp., *Syzrana bella* and *S. confusa*; and calcareous alga *Fourtonella johnsoni*. The fusulinacean taxa exhibit clear affinities to Late Wolfcampian faunas of the midcontinent and southwest United States, but relative ranges of fusulinacean taxa and faunal associations in Peru appear to differ somewhat. For example, medium-sized *Triticites* spp. in Peru that resemble typical Late Pennsylvanian species in the United States are commonly associated with *Pseudoschwaterina* spp. and *Schwaterina* spp. of Wolfcampain age. Also, according to earlier publications, the uppermost Copacabana Formation displays a mixing of fusulinacean types that characterize the Late Wolfcampain species in the southwestern United States, but also contains associated taxa more typical of the Late Pennsylvanian and Early Leonardian faunas of the United States. Palynomorph recovery from the Lower Permian was not very good or yielded non-diagnostic forms, and is believed related to the absence of suitable lithologies.



Organiza
Organization

Universidad de León
Departamento de Biología Vegetal

XII SIMPOSIO DE PALINOLOGIA - APLE
12 th. PALYNOLOGY SYMPOSIUM - APLE

León, 29 de Septiembre - 2 de Octubre 1998
León, 29 September - 2 October 1998

Primera circular
First circular

SECRETARIA XII SIMPOSIO DE PALINOLOGIA
Mª Amor Fombella Blanco
Dpto. Biología Vegetal
Campus de Vegazana. Universidad de León
24071-León
Tel. (987) 291556- Fax (987) 291558/63
Correo electrónico: dbvmfb@unileon.es

INVITACIÓN

Según el acuerdo de la última Asamblea General de la Asociación de Palinólogos de Lengua Española (A.P.L.E.), realizada en Marchamalo (20 de septiembre de 1996) durante el Congreso organizado por la Universidad de Alcalá de Henares, la ciudad de León será la próxima sede para la celebración del XII Simposio de A.P.L.E. Dicha reunión tendrá lugar del 29 de septiembre al 2 de octubre de 1998.

Con motivo del XX Aniversario de la Asociación, te animamos a participar, rogándote al mismo tiempo que des la mayor difusión a esta 1ª circular, para que pueda llegar a todas las personas interesadas.

PROGRAMA

La presentación de las comunicaciones, tanto orales como posters, se distribuirán según los siguientes apartados:

Actuopalinología
Aeropalinología
Biología del polen
Melisopalinología
Paleopalinología

Las sesiones se organizarán en función de la participación y si fuera necesario, de forma simultánea, evitando en la medida de lo posible el solapamiento de temas.

CUOTAS DE INSCRIPCIÓN

Las cuotas de inscripción que se establecen son

Socios de APLE
19.000 ptas.
No Socios de APLE
21.000 ptas.
Estudiantes
5.000 ptas.
Acompañantes
10.000 ptas.

PUBLICACIÓN

Los trabajos presentados se publicarán en un volumen de la revista ***Polen.***

CALENDARIO

Fecha límite de preinscripción ..... 31 de octubre 1997
Segunda circular ..... 15 de febrero 1998
Resúmenes ..... 30 de abril 1998
Envío de los artículos para publicar: 15 de noviembre 1998

La 2ª circular se enviará a las personas que hayan formalizado la preinscripción.

INVITATION

At the last General Assembly of the APLE, held in Alcalá de Henares following the XI Symposium on Palynology, León was chosen as the city to host the XII Symposium on Palynology. We cordially invite you to attend this event, which will take place September 29th to October 2 nd, 1998.

Please feel free to send this circular to as many people as possible. All those interested in attending can use a photocopy of the registration form for preinscription.

PROGRAM

Contributions, can be presented as either an oral communication or a poster, preferably in Spanish, contributions will be grouped into the following sections:

Actuopalynology
Aeropalynology
Melitopalynology
Paleopalynology
Pollen biology

REGISTRATION FEES

APLE members ..... 19.000 ptas.
Non-members ..... 21.000 ptas.
Students (including post-grads) ..... 5.000 ptas.
Accompanying persons ..... 10.000 ptas.
Participants will be requested to show proof of their registration category

PUBLICATION

Presented paper will be submitted to the journal ***Polen*** for publication in a single issue.

CALENDAR

Deadline for pre-registration ..... October 31st, 1997
Second circular ..... February 15th, 1998
Deadline for summary submission .....April 30th, 1998
Submission of papers for publication... November 15th, 1998

The second circular will specify all details on formal inscription, payment of registration fees, transportation, accomodation, notice to authors etc.

UNIVERSIDAD DE LEON
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BOLETÍN DE PREINSCRIPCIÓN
PRELIMINARY REGISTRATION FORM

Apellidos 9
Surname .....
Nombre .....
First name .....
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Teléfono .....
Telephone .....
Presentará comunicación Oral ☐ Póster ☐
I would like to submit a comunication
Título provisional .....
Provisional title .....

La preinscripción se puede enviar por correo electrónico a la siguiente dirección: dbvmfb@unileon.es
Pre-registration can also be send by e-mail to the following address: dbvmfb@unileon.es

ANNOUNCEMENT:
THE NINTH BRAZILIAN MEETING OF PALEOBOTANISTS AND PALYNOLOGISTS
(IX REUNICO DE PALEOBOTANICOS E PALINOLOGOS)
in memoriam: Prof. Dr. Murilo Rodolfo de Lima
9-12 DECEMBER 1997 - Guarulhos/SP/Brazil

Realization: UNIVERSIDADE GUARULHOS - UnG Geoscience Department

The Ninth Brazilian Meeting of Paleobotanists and Palynologists (IX Reunico de Paleobotánicos e Palinólogos - IX RPP) will be held on December 9-12, 1997, at the Universidade Guarulhos in the Greater Sco Paulo metropolitan area. After nearly 20 years at the Universidade of Sao Paulo (I-VIII RPPs), this meeting will mark the beginning of what we hope will be a scientifically stimulating rotativity of this traditional scientific meeting among the major Brazilian centers of research in Paleobotany and Palynology.

As in all previous meetings in this series, this year's program offers a broad spectrum of activities, divided approximately equally between technical sessions (oral and poster presentations), on the one hand, and special events, on the other, which will include lectures on "Biochemistry in the Classification of Plants" and "Statistical Methods Applicable to Palynology and Paleobotany"; keynote speeches followed by round-table discussions on Carboniferous Basins of South America, the Origin and Evolution of Angiosperms, and Late Quaternary Climatic Changes in Brasilian Vegetation; and a 4-hour short course on the computer program "Tilia", popular among palynologists.

We would like to invite all interested persons to attend. The registration fee is US$80, payable by check to António Roberto Saad.

Abstracts for oral presentations (15 minutes plus 5 minutes for discussion) and posters should be mailed by 30 May 1997 in hard form and 3" diskette (WORD 5.0 OR 6.0 format; Times New Roman 12 font). All text, title, author's names and affiliations, etc. Should fit within a single page of A4 paper (210 x 297mm) with 3.5 cm upper margin, 2.0 cm right margin, 3.0 cm left margin, and 2.5 cm lower margin.

Full papers of up to 20 pages (including all text, figures, and references) may also be submitted for publication in the Universidade Guarulhos Publications in Geosciences. Their deadline is also 30 May 1997.

Information on accommodations and how to get to the meeting site will be furnished in a second Circular to be sent out in July but will also be avaliable after mid-May by e-mail.

For further information, contact:
Profa. Dra. Maria Judite Garcia (President, Organizing Committee)
Universidade de Guarulhos, Departamento de Geocijncias
Praga Tereza Cristina, 01
Guarulhos, SP, Brazil - 07023-070
Telephone: 55 (11) 6464-1708
Fax. 55 (11) 6464-1702 , 6464-1708 or 6440-2030
e-mail: geo@server.ung.br
website: www.ung.br

VISEAN - NAMURIAN PALYNOSTRATIGRAPHY

During the meeting of the Subcommission on Carboniferous Stratigraphy (SCS) held at the 13th International Congress of Carboniferous - Permian (ICCP) in Krakow in 1995, it was proposed to establish a multidisciplinary working group on the definition of the Viséan - Namurian boundary and its global equivalents.

One of the first steps was to set up a palynological sub group to compile and contribute to the palynological component of the Project. John Utting (GSC Calgary) and Zhu Huaicheng (Nanjing) agreed to help me in establishing this new CIMP working group. We now need to ask for your assistance.

If you have any interest in Viséan - Serpukhovian or Late Mississippian palynology, why not join us? Maybe you could supply data or material. All offers of help are particularly welcome. The first objective will be to establish a global network for co-operation on this problem and to make real progress before the next ICCP in 1999.

Why not join now! Write to me, Bernard Owens, British Geological Survey, Keyworth, Nottingham NG12 5GG, U.K. and tell us how you can contribute, what you are working on and what material you are able to offer for study.

CIMP Symposium and Workshops Pisa 1998

Registration Form

Please, fill this form even if you have already returned the one included in the Preliminary Circular.

Please, return this form by December 31, 1997. Next circulars will be sent only to those who filled the registration form included in the present Circular.
Please, send this form by mail to the Organizing Committee CIMP '98. Dipartimento di Scienze della Terra, via S. Maria 53 - I 56126 Pisa (Italy); or by fax to R. Albani, +39 50 500932; or by Email to albani@dst.unipi.it..

Name and Surname .....

Institution .....

Mail address .....

.....

Number of accompanying persons.....

Fax number .....Email number.....

I wish to attend the Pisa CIMP Symposium YES ☐ POSSIBLY ☐ NO ☐

I intend to present a POSTER ☐ ORAL COMMUNICATION ☐

Provisional title.....

.....

.....

pre-Registration to the Excursion to Sardinia

I will attend the Sardinia Excursion ..... YES ☐ NO ☐ POSSIBLY ☐

I prefer:

deckhouse ship accommodation .....☐

Second class, four-berth cabin .....☐

Second class, two-berth cabin .....☐

First class, four-berth cabin .....☐

Number of accompanying persons.....

After the excursion, I would like come back to Roma (via Civitavecchia) by ship..... ☐

I would like to book a flight from the Cagliari Airport..... ☐

CIMP Symposium and Workshops Pisa 1998

First Circular

Venue
The Società Paleontologica Italiana, the Consiglio Nazionale delle Ricerche (CNR), the Università degli Studi di Pisa and the Department of Earth Sciences (Pisa) invite you to attend the General Meeting of the CIMP, which will be held in Pisa (Italy) from September 11 to September 15, 1998.

Organizing Committee
General Chairman: Marco Tongiorgi
Field excursion Chairman: Paola Pittau
Secretary: Roberto Albani

Historical remarks
Pisa was a pre-Roman town probably of Ligurian origin. Etruscan remains date back to the 6th century B.C., and in Roman times the town was a *municipium* and colony. Since in the 11th century, Pisa became one of the most powerful of the Italian maritime republics, expanding rapidly as a trade centre until it was defeated by the naval fleet of Genova in the battle of Meloria in 1284. It was during this period of prosperity that the most important buildings of Pisa were erected, such as the Leaning Tower, the Baptistery and the Cathedral. Thereafter, under the domination of Firenze, Pisa became an important centre of studies and the seat of one of the oldest universities in Europe (founded in 1343).

Symposium site
The meeting will be held in Tirrenia, an attractive seaside resort with pleasant pine woods, about fifteen minutes by car from Pisa.

How to reach Pisa
By air. The airport of Pisa "Galileo Galilei", 2 km from the city centre, serves national and international airlines. It is possible to reach Pisa directly with daily flights from London, München, and Paris, or through connections with domestic flights from Roma and Milano airports. Another suitable international airport is that of Firenze "Peretola" (80 km from Pisa).
From Pisa airport, the central railway station may be reached by train from the station inside the airport, in a few minutes.
By train. The central railway station of Pisa (Pisa Centrale) is an important junction of the Italian railway system. It can easily be reached from all major Italian cities.
By car. Pisa is directly connected to the Italian motor-way network, and can be reached by an uninterrupted motor-way journey starting from all Italian border crossing points.

How to reach Tirrenia
City buses from Pisa to Tirrenia and return are available every half-hour. A special bus will facilitate the transfer of the participants from Pisa to Tirrenia, after the official Symposium Opening session which will be held in the historical main building of the University.

Weather
Central Italy has a delightful climate. In early September the sun can be expected to shine about 80 percent of the time during the day, with daily maximum temperature averaging 26°C (80F) and sea-bathing is very agreeable.

Accommodation
Participants will be accommodated at the "Regina Mundi" residence hall in Tirrenia, which is located close (50 m) to the sea shore. Scientific sessions will be held in the same building. However, accommodation in hotels in Tirrenia is possible at the Symposium time. Links with the Regina Mundi residence hall will be ensured by a mini-bus of the Department of Earth Sciences. Camping sites are also available in Pisa and Tirrenia. A Youth Hostel is available about two km north of Pisa.

Registration
Participants should register by filling and returning the enclosed Registration Form. Those who need a personal invitation to attend the Symposium should apply to the Organizing Committee.

Registration fees
The registration fees have been set as follows (prices are in Italian Lire):

Active participant	180,000
Student	100,000
Accompanying person	60,000

The registration fee will include: - the meeting programme - *the abstracts volume - participation in the scientific programme - welcoming party on Friday evening, September 11 - coffee

breaks - guided tours and drink parties - *proceedings volume.

(*) accompanying persons excluded

Accommodation at the Regina Mundi residence hall.
Full board per room and per day at the Regina Mundi residence hall costs:

Single room	75,000
Double room	60,000

Rooms in the Regina Mundi residence hall are available from September 11, 13h. Participants arriving on September 10 or before are invited to personally contact the travel agency "Norci Viaggi" (Corso Italia 51, 56125 Pisa; phone +39 50 502424; fax +39 50 502466) for hotel accommodation in Pisa or Tirrenia.

Hotel accommodation
A range of hotel accommodation is available in Tirrenia, where, at the Symposium time, hotel rates will be lower than in Pisa. 1997 prices are:

****hotels	
Single room	185,000 B/B
Double room for single	210,000 B/B
Double room	270,000 B/B
***hotels	
Single room	73,000 B/B
Double room for single	90,000 B/B
Double room	110,000 B/B
**hotels	
Single room	55,000 B/B
Double room	80,000 B/B
*hotels	
Single room	35,000 B/B
Double room	40,000 B/B

In 1998 an increase of about 5-10% may be expected.

Participants preferring an accommodation in hotel are invited to personally contact (before March 30, 1998) the travel agency "Norci Viaggi" (Corso Italia 51, 56125 Pisa; phone +39 50 502424; fax +39 50 502466).

Participants lodged in hotels may book meals (excluding breakfast) in the Regina Mundi residence hall; meals should be booked and separately paid at the registration desk, before the Symposium Opening session.

Gala Dinner
The approximate price is 35,000 Lire.

Remittance of fees
Registration fees should be paid in advance in Italian Lire only, either by eurocheques or international money order to the CIMP Symposium Organizing Committee, as specified in the next Circular.

Payment of accomodation fees (except for individual accommodation in hotels) should be made in Italian Lire at the registration desk, before attending the Opening session of the Symposium. Payment should include full board (or meals only) in the Regina Mundi residence hall, and Gala Dinner.

Language
The official language of the meeting will be English. No simultaneous translation services will be provided.

Scientific programme
The provisional programme includes invited lectures, plenary scientific sessions, two Subcommission symposia (running in parallel), short workshops of CIMP working groups and a microscope session. Contributed oral and poster communications will be accepted, and no parallel scientific activities will take place during the poster session. Business Symposiums are also foreseen.

Invited lectures (provisional)
P. Pittau: The Palaeozoic of Sardinia: an introduction to the excursion.
M. Moczydlowska: The Lower-Middle Cambrian boundary recognized by acritarchs in Baltica and at the margin of Gondwana.

Abstracts
Abstracts (for both oral and poster presentations) should be written in English and typed as follows:
Title: Capital letters
Author(s): type the first letter only of the family name in capital letters, and give the initial(s) of the name(s) only. No address or affiliation should be added.
Text: single spaced and left justified, if a word processor is employed.
Font: Times, 12pt is preferred.
Paragraphs: no indentation nor tabs.
References: no references are accepted.
Figures: no figures are accepted.
Length: the length should correspond to a maximum of 200 words. Abstracts exceeding that length will be shortened by the Organizing Committee.
Send the abstract on diskette (MS.DOS or Macintosh formatted), possibly written in one of the following formats: Text-only, Word for MS.DOS or Macintosh, Word for Windows 2, Word-Perfect 5 or 5.1. Type-written abstracts are also accepted, provided that they are typed with a new, black ribbon and without emendations (they should be easily read by the scanner).

Social events and shopping
Two guided tours to the medieval towns of Lucca and Pisa are planned in the afternoon of Semptember 12 and in the afternoon of September 14, respectively. Sponsored drink parties are foreseen during both tours.
A visit to the Natural History Museum of Calci may be included.
An open-air banquet (Gala Dinner) featuring regional cuisine will take place in the hilly country near Pisa on Monday evening, September 14.
The last day, before embarking towards Sardinia, is free for shopping.

Field trip
Together with Corsica, Sardinia is a fairly complete and well preserved segment of the Southern Europe Hercynian Chain; moving from SW to NE of the island, the External-, Nappe-, and Axial- Zones of the chain can be crossed.
The main goal of the excursion is the observation and sampling the palyniferous, Cambrian to Carboniferous sequences in Central and South Sardinia (External Zone and Nappe Zone, respectively).

September 16
(Nappe Zone of Central Sardinia):
Rio Araxisi and Lago Medio del Flumendosa: geology of the Sarcidano Units; Cambrian to lower Ordovician from the Solanas Formation.
Lower Flumendosa valley: Middle-Upper Cambrian near Cuili Biringoni; Tremadoc and Arenig from the Nuxi Formation.

September 17
(Nappe Zone of Central Sardinia)
Sarrabus region: geology of the Genn'Argiolas Unit; the Palaeozoic sequence from Cambrian (medusa bearing layers) to Culm.

September 18
(External Zone)
Gonnesa valley: geological setting, facies, palaeontology and palaeogeography of the Cambrian from Iglesiente; Rhabdinopora flabelliformis beds of the Cabitza Formation.
Guardia Pisano: the Permo-Carboniferous sequence .

September 19
(Arburese Nappe Zone)
Arburese region: the Sardinian unconformity at Nebida; the Cambrian cliff; Caradoc-Ashgill from Portixeddu; Tremadoc-Arenig of the Arburese Unit; overthrust of the Arburese Unit on the "autochtonous" Siluro-Devonian.
Visit to the dunes of Is Arenas.

Field trip costs
The extimated excursion costs are evaluated to about 380,000 Lire depending on the number of participants and on a possible financial contribution from the Sardinia Autonomous Region (to be established at the end of 1997).
In addition, ship ticket from Tuscany to Sardinia should be paid, at the following (1997) price per person:

Simple ticket	56,000

Since the crossing take place over night, one of the following additional tickets (per person) should be foreseen:

deckhouse	8,000
Second class, four-berth cabin	13,750
Second class, two-berth cabin	19,000
First class, four-berth cabin	27,500

Remittance of field trip fees
Field trip fees should be paid in Italian Lire only, either by eurocheques or international money order to the CIMP Symposium Organizing Committee, as soon as the final cost of the excursion is communicated.
Please note that the Organizing Committee needs to know as soon as possible how many people (including accompanying persons) will attend the excursion. In fact, the mountain region of Central Sardinia may only be crossed by mini-buses; furthermore, only small hotels are available in this region. Organisation problems may arise from a too large number of participants. Therefore the Organizing Committee will be able to accept only a limited number of bookings. This will be done on a first come, first served basis.

Next Circulars
Next circulars will be sent only to those who filled the registration form included in the Preliminary Circular or the form in this circular.

Dead/lines
December 31, 1997 - Grant acceptance.
December 31, 1997 - Registration to the Symposium. Title of presentation(s). Field trip pre-registration.
February, 1998 - Second Circular. Scientific program. Ultimate price of the field trip.
March 31, 1998. Abstracts submission.
April 30, 1998 - Payment of Registration and field trip fees.
June, 1998 - Last Circular. Detailed programme of the Symposium, more about Pisa.

Address
Organizing Committee CIMP '98. Dipartimento Scienze della Terra. Università di Pisa, via S. Maria 53 - I 56126 Pisa (Italy). Email: albani@dst.unipi.it.. Fax: +39 50 500932.

C.I.M.P. WORKING GROUPS AND SUBCOMMISSIONS

Vallatisporites Working Group
Contact person: Bernard Owens, British Geological Survey, Keyworth, Nottinghamshire, NG12 5GG, U.K.

"Lycospora" First Occurrence Working Group
Contact person: Elzbieta Turneau, Instytut Nauk Geologicznych, Polska Akademia Nauk, Ul. Senacka 1/3, 31-002 Krakow, Poland.

Upper Devonian "Grandispora" Working Group
Contact person: Ken Higgs, Department of Geology, University College Cork, Cork, Ireland.

Acritarch Subcommission
Chairman: Stewart Molyneux, British Geological Survey, Keyworth, Nottinghamshire, NG12 5GG, U.K. Email: sgm@wpo.nerc.ac.uk
Secretary: Thomas Servais, Université Sciences et Techniques de Lille, URA 1365 du CNRS F-59655 Villeneuve d'Ascq Cedex France.
Email: thomas.servais@univ-lille1.fr

Chitinozoa Subcommission
Chairman: Stuart Sutherland, The Natural History Museum, Dept. of Palaeontology, Cromwell Road, London, SW7 5BD, U.K. Email: ses@nhm.ac.uk
Secretary: Esther Asselin, Centre Géoscientifique de Québec, 2535 Laurier Boulevard, P.O.Box 7500, Sainte Foy, G1V 4C7, Québec, Canada. Email: asselin@gsc.NRCan.gc.ca

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From the C.I.M.P. constitution: **"members of C.I.M.P. shall be all palynologists who desire to belong to C.I.M.P."** The C.I.M.P. Newsletter is open for all members for announcements for symposia or conferences, abstracts of previous ones, news from the working groups and subcommissions, changes of address of members or other messages. These should reach the secretary the end of march and of october.

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In order to maintain our aim of issuing at least two Newsletters each year (may and november), it is vital that we receive your subscriptions on a regular basis.

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North America:	Dr. Gordon D. Wood, Amoco Production Co., P.O. Box 3092, Houston, Texas, 77251, USA.
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U.K./Ireland:	Dr. P.J. Hill, Dept. of Geology, Derbyshire College of Higher Education, Kedleston Road, Derby, England, U.K.
Belgium:	Dr. M. Vanguestaine, Lab. ass. Palaeontologie, Université de Liège, 7 Place du Vingt Aout, B-4000 Liège, Belgium.
Germany:	Dipl. Geol. C. Hartkopf-Fröder, Geologisches Landesamt Nordrhein-Westfalen, Postfach 1080, D-47710 Krefeld, Germany; Konto N° 208487-437 bei Postbank Essen, BLZ 360 100 43.
Others:	President or Secretary-general

Rates for 1997 (unchanged since 1995) : 5£, 40FF, 250BF, 12DM, 13fl, 8 US$.

Make sure that all bank charges are paid by yourself in addition to the amounts above (this means in practice: double the amounts: half will go to the banks, half to CIMP).

AGENDA OF FUTURE PALYNOLOGICAL CONFERENCES, SYMPOSIA, MEETINGS, WORKSHOPS 1997-1999:

1997

November 7-8 1997: **Ordering the fossil Record - Challenges in Stratigraphy and Paleontology** (Cor Drooger Symposium). Contact: Ank Pouw, Institute of Earth Sciences, Utrecht University, Budapestlaan 4, 3584 CD Utrecht, the Netherlands. Tel;: +31 30 253 5117; Fax.: +31 30 2535117; Email: apouw@omega.earth.ruu.nl.

November 15-16 1997: **8th Plant Taphonomy Meeting, Cardiff 1997** (U.K.). (see announcement CIMP NWL 52).

December 9-12 1997: **Ninth Brazilian Meeting of Paleobotanists and Palynologists (IX Reuniao de Paleobotánicos e Palinólogos)** Guarulhos/SP/Brazil (see announcement in this journal).

1998

May 18 - 20 1998: **GAC/MAC Meeting, Québec City, Québec**. Special Session on "Distribution Patterns of Fossils in Palaeozoic Sequences of Northeastern North America"; Field trips to Mingan Islands and Anticosti. Contact: Mme Agathe Morin, Dép. Géologie et Génie Géologique, Université Laval, Pavillon Adrien-Pouliot, Sainte-Foy, Québec, G1K 7P4, Canada. Tel.: 1 (418) 656 2193; Fax.: 1 (418) 656 7339; Email: quebec1998@ggl.ulval.ca; Website: http://www.ggl.ulaval.ca/quebec1998.html.

June 15-18 1998: **Field Meeting of the Subcommission on Silurian Stratigraphy** in SW Iberian Peninsula, Spain and Portugal. Contact: Juan Carlos Gutiérrez-Marco, VEI Paleontologie, Univ. Complutense 28040 Madrid, Spain, tel.: +34 1 244 5459; fax.: +34 1 394 4849; or José Manuel Piçarra d'Almeida, Instituto Geológico e Mineiro, Apartado 104, Beja 7800, Portugal, tel.: +351 84 32 40 19; fax.: +351 84 32 59 74.

June 26-30 1998: **5th European Palaeobotanical-Palynological Conference** Kraków, Poland. Contact: Mgr. Gregorz Woorbiec, W. Szafer Institute of Botany, Polish Academy of Sciences, Lubicz 46, 31-512 Krakow, Poland. Fax.: 48 12-21 97 90; Email: worbiec@ib-pan.krakow.pl. (see also announcement NWL 52).

June 28 - 5 july 1998: **Gondwana 10, Cape Town, South Africa**.
Contact: Organizing Committee Gondwana 10, Department of Geological Sciences, University of Cape Town, Rondebosch, South Africa. Tel.: +27 21650 3171; Fax.: +27 21650 3167.

July 6 - 8 1998: **International Symposium Palaeodiversifications Land and Sea Compared.** Lyon, Paris, including the second official meeting of the IGCP Project 410 "The Great Ordovician Biodiversification Event". Contact: Mireille Gayet, UFR Sciences de la Terre, Université Claude Bernard, Lyon I, 27-43 Bd du 11 novembre 1918, F-69622, Villeurbanne, France. Tel.: 33 (0) 472 44 83 98; Fax.: 33 (0) 472 44 84 36; Email: gayet@univ-lyon.fr.

July 6 - 9 1998: **Pollen and Spores: Morphology and Biology.** International Conference of the Linnean Society Palynology Specialist Group in collaboration with teh Royal Botanic Gradens, Kew and The Natural History Museum, London. Contact: Lisa von Schlippe, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB, U.K.: Tel.: 44 (0) 181-332 5198; Fax.: 44 (0) 181-332 5176; Email: l.von.schlippe@rbgkew.org.uk.

July 28 - 2 august 1998: **The Upper Permian Stratotypes of the Volga Region, Kazan, Russia.** Contact: Dr. Natalia K. Esaulova, Kazanian State University, 18 Kremlyovskaya str., Kazan 420008, Tatarstan, Russia. Tel.: +7 843 2315 425; Fax.: +7 843 2364 704.

September 11-15 1998: **CIMP Symposium and Workshops Pisa 1998**
(see announcement)

September 29 - October 2 1998: **XII Palynology Symposium - APLE, León, Spain.**
(see announcement)

1999

August 14-25 1999: **XIV International Congress on the Carboniferous-Permian, Calgary, Alberta, Canada.** Contact: Dr. Charles Henderson, Associate Professor, Department of geology and Geophysics, The University of Calgary, N-W Calgary, Alberta, Canada T2N 1N4. Tel.: +1 403 220 6170; fax.: +1 403 285 0074; email: henderson@geo.ucalgary.ca.

(announced) **8th International Symposium on the Ordovician System**, organized by Ordovician Stratigraphic Subcommission, Prague, Czech Republic. Contact: see next CIMP Newsletter.

(announced) **Fourth Symposium of African Palynology**, Sousse University, Tunisia.

2000

(announced) **10th International Palynological Congress (IPC).** Nanjing, China