



COMMISSION INTERNATIONALE
DE MICROFLORE DU PALEOZOIQUE

NEWSLETTER 27

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I. Editorial

With the last Newsletter of 1981 we are pleased to issue the first Bulletin from the Subcommittee on Scolecodonts and Newsletter No 3 from the Subcommittee on Chitinozoa. (If you are a member of the Chitinozoan Subcommittee you will have already received your copy.). Whilst talking of publications we are also glad to see the appearance of the two parts of the Revue of Palaeobotany & Palynology which contain the contributions to the CIMP sponsored symposia at the ICP Conference in Cambridge 1980. We are particularly grateful to Henk Visscher for coordinating their production with the publishers.

With the first Newsletter of 1982 we will be sending you notice of your CIMP subscriptions. We are pleased to tell you once again we will not be raising the rates next year. It would however be most helpful if those members who have not paid their 1981 dues could do so through the usual channels as soon as possible.

II. NEXT MEETING

PALYNOLOGY OF THE NORTH-ATLANTIC MARGINS

TRINITY COLLEGE, DUBLIN 13-15 September 1982

A joint meeting of the Commission Internationale de Microflore du Paleozoique and the American Association of Stratigraphic Palynologists.

1. The second circular for this meeting was included with the last Newsletter in July 1981. Already more than 130 people have returned their Registration Forms. If you have not already done so please complete it as soon as possible. It is most important that the organisers have an accurate idea of hotel accommodation etc which will be required. We wish as far as possible to keep participants in a small number of hotels and it is important that we make reservations early in 1982.

2. It is not too late to offer to read a paper. We have approximately 40 offered so far but we can accommodate a few more in the programme so let us have your titles as soon as possible.

3. Please send registration forms and the title of any paper to:
Dr Geoff. Clayton, Dept of Geology, Trinity College, Dublin 2, Eire.

4. It is still possible for you to reserve a place on either of the post conference field excursions:

1. Lower Palaeozoic of SE Ireland (Co. Wicklow, Co. Wexford, Slievenammon Inlier and Co. Tipperary).
2. Devonian & Lower Carboniferous of S and SE Ireland (Co. Tipperary, Co. Cork and Co. Wexford).

A small number of places still remains on both excursions. If you are interested and wish to reserve a place, book it now.

5. L R Wilson Award

This new award administered by the AASP is the result of a generous bequest from Prof L R Wilson, University of Oklahoma, and will be awarded at the Dublin meeting for the outstanding student paper. (See AASP Newsletter January 1981 (Vol. 14 No. 1). The award consists of:

1. A commemorative plaque
2. A monetary award (likely to be in the order of 300 dollars).
3. Two years free membership of AASP.

The award is made in recognition of the highest level of professional accomplishment by students in conducting and presenting results of their research in palynology.

III. ABSTRACTS OF SOME OF THE PALAEOZOIC AND KEROGEN PAPERS PRESENTED AT ANNUAL MEETING OF AMERICAN ASSOCIATION OF STRATIGRAPHIC PALYNOLOGISTS, NEW ORLEANS, OCTOBER 1981

THE GENERA CALYPTOSPORITES, GRANDISPORA (?) AND SAMARISPORITES FROM THE CEDAR VALLEY FORMATION (MIDDLE DEVONIAN) OF IOWA AND MISSOURI, USA

Bruce P Bradshaw II

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Studies of plant spores from four measured sections of the Cedar Valley

Formation in Iowa and Missouri reveal that the genera Calyptosporites, Grandispora(?), and Samarisporites are important components of the Cedar Valley flora. Major representatives of these genera include Calyptosporites proteus, Calyptosporites velata, Grandispora(?) naumovii, Grandispora(?) tomentosa, Samarisporites orcadensis, and Samarisporites triangulatus. Based on faunal content, the Cedar Valley Formation is considered to have a Givetian age. The presence of these spore species in the Cedar Valley Formation gives them a definite Givetian occurrence in North America.

ENVIRONMENTAL DISTRIBUTION OF PALAEOZOIC ACRITARCHS

Ken Dorning

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Examination of acritarch assemblages from a wide range of different lithologies, lithofacies and paleogeographic situations, mostly from the Palaeozoic, but also from the Mesozoic, has outlined some of the overall trends in the assemblages that relate to palaeoenvironments. Distinct assemblages are recorded from near-shore, shelf and deep water areas. Taxonomic diversity is greatest on wide shelf areas and decreases both towards the shoreline and into deeper water. In the Lower Palaeozoic spheromorph acritarchs are plentiful in both nearshore and off-shore deep water conditions. An understanding of the environmental tolerances of microplankton taxa, in particular key taxa of well defined stratigraphic range, provides for an improved biostratigraphy, as well as giving data for environmental reconstructions.

BIOSTRATIGRAPHY AND TAXONOMY OF LOWER SILURIAN ACRITARCHS FROM ANTICOSTI ISLAND, QUEBEC

Susan L Duffield

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An 800 meter section on Anticosti Island from the top of the Ellis Bay Formation (Upper Ordovician-Lower Silurian) through the Becscie, Gun River, Jupiter and Chicotte Formations (Lower Silurian) represents apparently continuous deposition from the Late Ordovician through the Early Silurian. Acritarchs collected from this interval are being studied to determine the position of the Ordovician-Silurian boundary and to provide a zonation of the Llandoveryan (Anticostian).

Ordovician samples from the Ellis Bay Formation are dominated by species of Baltisphaeridium and Goniosphaeridium in an assemblage similar to those reported from the Ordovician of Sweden and Poland. The Silurian samples yield abundant and diverse assemblages dominated by species of Multiplicisphaeridium. The Silurian section can be divided into at least four zones based primarily on species of Multiplicisphaeridium. One zone encompasses the remaining part of the Gun River Formation. The Jupiter Formation can be divided into two zones. Other taxa present include species of Leiofusa, Verhachium and Micrhystridium.

The 300 Anticosti samples yield abundant representatives of forms typical of the Estiastra, Pulvinosphaeridium palynofacies. These forms are species of Estiastra, Pulvinosphaeridium, Goniosphaeridium, and Multiplicisphaeridium with similar morphology and mode of preservation, which can be organized into gradational series based on number and nature of processes. Their wall structure is currently being studied. Although these forms are of limited biostratigraphic value their paleoecology is being examined in detail.

A PALYNOLOGICAL ANALYSIS OF FOURTEEN COALS FROM THE CHEROKEE
GROUP (PENNSYLVANIAN), MARION COUNTY, IOWA

Barbara E Egnor

Amoco Production Company, Houston, Texas 77001

The Cherokee Group (Des Moines Series, Pennsylvanian System) of southern Iowa consists of a complex sequence of marine and non-marine sediments including numerous coals. Complex facies relationships characterize these sediments and confuse stratigraphic correlation.

Recent palynological work has confirmed the need, at least in some areas, for a more detailed study of the vertical miospore succession within the coal seams.

This study provides a detailed palynostratigraphic reference section for the Cherokee Group in Iowa. The project encompasses the analysis of miospores in 14 coals from Iowa Geological Survey Coal Division core CP-41 in Marion County, Iowa. This 449'2" core contains a sequence of coals and sediments spanning the entire Cherokee (331'7" of the entire core). The miospore succession within each coal as well as the succession through the entire sequence of coals was studied to accomplish the following goals: (1) identification and documentation of miospores; (2) refinement of the biostratigraphy; (3) documentation of the paleoecology trends both within individual seams and throughout the sequence of coals present in CP-41.

CLASSIFICATION AND ORIGIN OF MACERALS IN CLASTIC SYSTEMS

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Macerals found in clastic sediments are divisible into Phytoclasts, Zooclasts, Protistoclasts, Sclerotoclasts and Receptoclasts. The characteristics and origin of each clast group is reviewed and the characteristic maceral spectra to be expected in different clastic environments indicated. On the basis of maceral spectra the hydrocarbon potential of different environments can be speculated.

EXPERIMENTAL MECHANICAL DEGRADATION OF THE POLLEN EXINE

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Fresh pollen of thirteen taxa consisting of: Amaranthus palmeri, Artemisia tridentata, Carya illinoensis, Iva angustifolia, Juniperus monosperma, Picea pungens, Pinus edulis, Populus alba, Pseudotsuga menziesii, Quercus virginiana, Salix nigra, Typha angustifolia or T. latifolia, and Zea mays were utilized to test environmental parameters which act to degrade the pollen exine. Among the parameters investigated were moisture, utilizing cycles of wetting and drying; and temperatures which used alternating cycles of freezing and thawing. Results of this investigation using both Scanning Electron Microscopy (SEM) and Transmitted Light Microscopy (TLM) revealed distinctly different effects between the two experimental parameters. Cycles of freezing and thawing temperatures appeared to have very little effect on the pollen exine. On the other hand, pollen grains exposed to only 25 cycles of alternating moisture conditions were normally very much altered. This damage appears to vary with the structure of the pollen exine as well as with the effects of specific parameters. Results of these experiments are then used to provide estimates of potential recovery of palynological data.

LATE SILURIAN AND DEVONIAN SPORES FROM BOLIVIA

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Late Silurian and Devonian marine strata occur extensively in the Cordillera Oriental of Bolivia. Their benthic faunas, especially abundant in the Lower and Middle Devonian, are endemic and represent the cold-water Malvinokaffric Realm. No detailed information on the palynology of these rocks has been published.

Diverse and well-preserved spores and marine palynomorphs occur in outcrops of the Tarabuco, Santa Rosa, Icla, and Huamampampa Formations near Tarabuco, Chuquisaca Department. The spore assemblages bear similar association of species and zonal successions, to those of Ludlow to Eifelian age from the UK, western Europe, North Africa and eastern Canada. On the other hand, some of the Bolivian species are unknown in the Northern Hemisphere, anchor-spined spores were not found, and large-spined grandisporites are rare. Nevertheless, the species and the general form of the spores are sufficiently like those of the Old Red Sandstone region and adjacent areas to suggest many constituents in common in the terrestrial floras, and to permit age correlation with Rhenish standard stages with an average degree of resolution of about half a stage.

MORPHOLOGIC VARIATION AND SIGNIFICANCE OF ACRITARCH EXCYSTMENT STRUCTURES THROUGH THE ORDOVICIAN, SILURIAN, AND DEVONIAN

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Recognition of evolutionary lineages in the group Acritarcha Evitt, 1963 is hampered by their unknown biology. It is uncertain if the fossilizable vesicles recognized as acritarchs represent the tests of algal "vegetative stages" or resting stages. Both life cycle stages could conceivably be present among the taxa placed in the acritarchs. Therefore, different life cycle stages as well as biologically unrelated forms of apparent similar morphology may be included in any proposed acritarch evolutionary lineage. More significantly, lineages based on "resting cysts", if acritarchs are resting cysts, may not be representative of the evolution of the algae which produced them and no evidence precludes the possibility that unrelated algal species did not produce morphologically similar resting cysts. These problems notwithstanding, there are unquestionably distinct morphologic changes in acritarchs through time that makes them useful in biostratigraphy.

The excystment structure, an apparently important morphologic feature, and its variation will be examined through the Ordovician, Silurian, and Devonian. Types of excystment structures considered are those with attached opercula, equatorial ruptures, lateral ruptures, margin modified ruptures, pylomes, spiral ruptures found in certain netromorphs, epityches, and those found in Pterospermella and related forms which will be discussed in detail. Epityches, lateral ruptures, and equatorial ruptures are the most readily recognized excystment structures through the time interval considered. Single small pylomes appear restricted to Middle Ordovician through Early Devonian, whereas species with double pylomes are presently known only from the Middle to Late Ordovician. Acritarchs with margin modified ruptures and the excystment openings in pteromorphs are recognized from Silurian and Devonian strata. Spiral ruptures in netromorphic acritarchs have only been observed on certain species from the Silurian and Early Devonian.

Detailed consideration of the variation and dominance of excystment structure types through time and their relative significance in relation to other

morphologic features are considered important and will help create a more consistent taxonomy. For example, the genus Multiplicisphaeridium, which has an excessive number of species, can be subdivided using excystment structures in conjunction with process morphology to establish usable taxonomic subdivisions. These are not only morphologically realistic but also have biostratigraphic significance. A more consistent taxonomy utilizing all morphologic criteria for acritarchs combined with accurate biostratigraphic control may allow recognition of some potentially useful morphologic trends.

UPPER ORDOVICIAN (LOWER RICHMONDLAN) ACRITARCHS AND
CHITINOZOANS FROM SOUTHEASTERN INDIANA, USA

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A diverse and well-preserved acritarch and chitinozoan assemblage has been recovered from the upper part of the Arnheim Formation and from the overlying Waynesville Formation at Bon Well Hill, one mile northeast of Brookville, Indiana. Both of these classical Cincinnati units are now included in the Dillsboro Formation, a lithostratigraphic unit that encompasses all Maysvillian and pre-Saluda Richmondian strata in southeastern Indiana. This section, from the upper part of the Dillsboro Formation - the Richmondian part, is from the type area of the Richmondian and correlative to part of the upper Ashgill. The Cincinnati Series includes, from youngest to oldest, the Richmondian, Maysvillian, and Edenian stages.

Preliminary analysis of nineteen samples indicates representatives of the following acritarch genera are present: Actinotodissus, Aremoricanium, Axisphaeridium, Baltisphaeridium, Carminella, Dicommopalla, Eupoikilofusa, Fractoricomula, Holothuriadeigma?, Leiofusa, Leiosphaeridia, Micrhystridium, Multiplicisphaeridium, Navifusa, Ordovicidium, Orthosphaeridium, Peteinosphaeridium, Polygonium, Veryhachium, and Villosacapsula. Chitinozoan genera present are: Ancyrochitina, Conochitina, Cyathochitina, Desmochitina, and Hercochitina.

The acritarchs from the Arnheim and Waynesville formations are generally comparable to Richmondian assemblages from the Sylvan Shale of Oklahoma and Maquoketa Shale of the Kansas subsurface. Many of the acritarch genera from the Richmondian of Indiana appear to range through the Cincinnati Series and are present in the Edenian; however, there appear to be sufficient differences at the species level to allow differentiation of Richmondian from Edenian. Acritarchs from the intervening Maysvillian Stage have not been examined from Indiana.

Chitinozoans from the Richmondian of Indiana show some similarity to Upper Ordovician assemblages from Oklahoma and Anticosti Island but differ by having Cyathochitina hyalophrys Eisenack 1959, an apparent Cincinnati area endemic species.

APPROACHING A POLLEN/SPORE COLOR STANDARD

Daniel L Pearson

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A practical method of establishing a pollen and spore standard, using 10 Munsell color standards is presented. This standard can provide consistency for making subjective color determinations, as related to organic thermal maturity, among

kerogen workers. Agreement by these workers is needed for both standardization of colors and the numerical scale to be used. The attributes of this type of standard include availability to all persons, inexpensive reproducibility, color stability and definition, and approximate equality to historical thermal alteration index (TAI) data. Five hundred copies are made for initial distribution and will be refined as needed.

THE STRATIGRAPHICAL IMPLICATIONS OF CAMBRIAN AND EARLY ORDOVICIAN
ACRITARCHS FROM THE MANX GROUP OF THE ISLE OF MAN

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The Manx Group crops out over approximately 440 square kilometers on the Isle of Man, which is situated in the northern Irish Sea between Great Britain and Ireland. These rocks comprise a thick sequence of structurally complex, polyphase deformed siltstones, sandstones and mudstones, with minor occurrences of andesitic volcanics at two localities. Until recently, a large part of this sequence has remained undated. The only biostratigraphically useful macrofossils to be obtained from the Manx Group are poorly preserved Tremadoc or early Arenig graptolites which were recorded at only one locality in the late nineteenth century. Within the last twenty years, however, the application of palynological techniques to the Manx Group has resulted in the recovery of acritarchs from several localities. The acritarchs are, in general, poorly preserved and have been subjected to thermal alteration and mechanical damage. They may be described in terms of three assemblages which vary in diversity from poor to moderately good. Assemblage 1, recovered from one locality only, comprises a mixture of early, middle and late Cambrian species which are apparently reworked into beds of probable late Arenig age. There is also evidence for reworking in Assemblage 2 which consists of a mixture of late Cambrian, Tremadoc and Arenig/Llanvirn species. The extent of reworking in this assemblage is difficult to determine but certainly involves the Cambrian as well as possibly some of the Tremadoc forms. It seems unlikely, however, that the samples which yield Assemblage 2 are younger than early Arenig in age, and may be as old as latest Tremadoc. Assemblage 3 includes a number of typical early Ordovician species and is probably late Arenig in age.

The acritarch assemblages confirm that the Manx Group is early Ordovician in age. They do not, however, support recent interpretations of the lithostratigraphy of the Manx Group, the most recent and detailed of which proposes a succession of eleven formations. Assemblage 2 has been recovered from formations placed at the top and near the base of this succession while Assemblage 3 has also been recorded from formations placed at different levels in the sequence. The implication is that the lithostratigraphy of the Manx Group may be simpler than recent accounts suggest, and a tentative division of the group into four informal formations, each of which subsumes several previously defined formations, is proposed. The revised succession is comparable to a contemporaneous succession in the English Lake District, some 80 kilometers along strike to the north-east of the Isle of Man, where graptolite control is more readily available.

USE OF THE COMPARISON MICROSCOPE IN ASSESSING THE THERMAL ALTERATION INDEX

James D Saxton and Henry L Ott

Chevron USA Inc., Denver CO 80201.

It is well established that palynomorph change color with increasing organic metamorphism, and that these changes can be calibrated to indicate zones of hydrocarbon generation and destruction (see Chart 1).

Since 1979, the Chevron palynology department in Denver has been using a comparison microscope for TAI measurements. We regard this as the most precise way of measuring TAI. It allows side-by-side split image matching of individual forms. This allows matching of unknowns against a standard, or direct comparison of specimens from different depth in a well or outcrop. An essential adjunct to the optimum use of the comparison microscope is a detailed reference section showing progressive changes in TAI. We have one compiled by Chevron Oil Field Research Company, which forms the basis for Chart 1, and is illustrated photographically in Chart 2. We will show also some color polaroid photographs taken on the comparison microscope, showing split image fields comparing unknowns with TAI standards.

NON-MARINE PALYNOMORPHS FROM LLANDOVERIAN AND WENLOCKIAN STRATA

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Palynomorphs from non-marine, lower to middle Silurian strata are grouped into several morphological lineages. These include a cross tetrad form (Nodospora), dyads and related monads, alete monads, and tetrahedral tetrads. These variations in palynomorph construction indicate that different stages of plant life cycles were incorporated into the resistant diaspores. Tetrads and monads with intact spore mother cell walls are more closely related to the algae than are dyads and tetrahedral tetrads which are precursors to the trilete condition. Macroscopic fragments of the problematic thallophytic Nematothallus are common in the south-central Appalachians; however, their anatomy and structure remains elusive and it is the study of palynomorphs that we must turn to if we wish to ascertain the nature of the earliest land-dwelling thallophytes.

A PALEOECOLOGICAL INTERPRETATION OF THE FRANCIS SHALE FORMATION (MISSOURIAN) BASED UPON PALYNOLOGY AND INVERTEBRATE PALEONTOLOGY

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²Deceased.

From a 40 foot section of Francis Shale (Pennsylvanian-Missourian) near Ada, Pontotoc County, Oklahoma 63 species in 39 genera of palynomorphs have been identified. The following four environments are represented in the assemblage: (1) an "upland" vegetation consisting of species of Illinites, Platysaccus, Lueckisporites, Potonieisporites and other mono- and bisaccate forms, (2) a low-land coastal element consisting of Calamospora, Punctatisporites, Triquitrites, and others, (3) a marine biota of acritarchs, i.e. Baltisphaeridium, etc., and (4) recycled forms from the Devonian such as Tasmanites, and from the Mississippian, the genera Densosporites, Vallatisporites, and Discernisporites. The recycled palynomorphs are from sources that were exposed to erosion during Missourian time in the Arbuckle Mountains south of the Francis area of deposition. An analysis of the Francis Shale palynomorph assemblage reveals the following percentages of plant groups: Gymnospermae 68.9, Psilopsida 14.9, Lycopsida 5.5, Sphenopsida 4.5, Filicinae 2.9 and unknowns 3.2. Potonieisporites is the most abundant genus with 44.1 percent, Punctatisporites 8.7 and Perisaccus 7.2. The invertebrate fossils consist of an abundant marine assemblage of foraminifera, ostracodes, crinoids and brachiopods all of which confirm the conclusion of shallow marine deposition and Missourian age of the Francis Shale.

IV. THE APPLIED GEOLOGY UNIT, TRINITY COLLEGE DUBLIN.

Celebrating its first birthday in Trinity College Dublin (TCD) is the Applied Geology Unit. This was set up early in 1980 as a joint venture between the Department of Geology in TCD, the Geological Survey of Ireland and the Petroleum Affairs Division of the Department of Energy. The Unit is currently undertaking a four-year project on the detailed biostratigraphy of selected intervals from a number of wells and boreholes both offshore and onshore Ireland. While the Unit operates from its own laboratories in the College, it works in close co-operation with the Department of Geology. The Unit reports its progress back to an advisory team headed by Professor C H Holland and comprising Drs D Naylor (Geological Survey), P. Shannon (Department of Energy) and G. Sevastopulo and G. Clayton, both of TCD.

The Applied Geology Unit is made up of five specialists.

Syed M Rasul, who heads the Unit, has worked previously at Birmingham, Sheffield and King's College, London and has conducted research in areas of Tertiary and Paleozoic palynology with special reference to biostratigraphy and systematics. He is now undertaking an examination of Post-Palaeozoic palynomorph assemblages (dinocysts, spores, pollen and acritarchs).

Colin R Harris, from Birkbeck College, London has been developing Flandrian ostracod and foraminiferal research and sediment pollution studies at TCD. He is concentrating at present on Cretaceous and Jurassic ostracods.

Randall A Penney is a TCD graduate who has worked on the palynology of Holocene lacustrine sediments at Toronto University and is now specialising in Mesozoic spore and early angiosperm pollen work.

Nicola F Horton is from Exeter and Aberystwyth where she has been working on Miocene benthonic foraminifera. She is now investigating Tertiary and Mesozoic foraminiferal faunas.

The onshore boreholes are being examined by Gareth Ll. Jones, from Queen's University in Belfast who is continuing his work on Carboniferous conodonts and thin-section foraminifera. He is currently engaged in refining the Upper Palaeozoic, palaeoenvironmental picture.

Until the members of the Applied Geology Unit are in a position to publish and exchange their data, at present subject to governmental confidentiality restrictions, they would appreciate hearing from other workers in similar fields and also receiving their publications.

V. FORTHCOMING PUBLICATIONS OF AMERICAN ASSOCIATION OF STRATIGRAPHICAL PALYNOLOGISTS

The most recent AASP Newsletter announced the following titles are in preparation for publications as numbers in the "AASP Contribution Series"

"AN ANNOTED GLOSSARY OF FUNGAL PALYNOMORPHS" by the AASP Fungal Study Group, Bill Elsik, Chairman.

"MIDDLE EOCENE SPOROMORPHS FROM SAN DIEGO" by Norman Frederiksen.

"SILICA FORMATION (DEVONIAN) MICROPHYTOPLANKTON" by Reed Wicander and Gordon Wood.

"CATALOG OF NORTH AMERICAN DEVONIAN MICROPHYTOPLANKTON" by Reed Wicander.

At this time, publication of the first three titles listed is anticipated in 1981, and a 1982 date is planned for the fourth.

Anyone interested in joining AASP should write for an application form to Dr John Clendenning, Secretary-Treasurer AASP, Amoco Production Company, PO Box 3092, HOUSTON, Texas 77001.

VI. NEWS OF RUSSIAN PUBLICATIONS

1. BIOSTRATIGRAPHIC ASPECTS OF PALYNOLOGY (methods of interpretations). Abstracts of papers of the 4th all-union palynological conference, Tyumen, 1981, 165 pp. 1 rouble 89 kopeks.

The conference was held in March in Tyumen in West Siberia's Research Oil Institute (2 pSiNIGRI) with several hundred palynologists from nearly all the USSR laboratories. The volume includes abstracts of 224 papers related to all fields of palynology.

2. LOWER CARBONIFEROUS OF MIDDLE SIBERIA V.N. Dubatolov (Ed.), 1981 Trudy Inst. Geol. i Geofiz. SO AN SSSR, 432, 208 pp. Novosibirsk, "Nauka" 3 roubles 30 kopeks.

The book is devoted to the stratigraphy, lithology, palaeogeography and palaeobiogeography of the Siberian platform and Sayan-Altai mountain area. The main sections of the Siberian platform are described. The palaeontological part of the book includes descriptions of new species and genera of miospores and acriarchs by L.L. Dryagina, N.G. Pashkevich and L.N. Peterson.

3. NEW SPECIES OF ANCIENT PLANTS & INVERTEBRATES OF THE USSR I.N. Srebrodolskaya (Ed.) Trudy Vses. Nauch.-Issled. Geol. Inst. (VSEGET), n. ser., 204, 125 pp. 17 pls., Leningrad, "Nedra", 1 rouble 10 kopeks.

In 27 short articles new species and genera are described of algae, mosses, articulates, ferns, gymnosperms and angiosperms ranging from the Precambrian to the Oligocene. Unfortunately most of the comparisons with hitherto described taxa are very sketchy and the photographs on the plates are strongly retouched. This often prevents a clear understanding of some of the taxa, particularly the Palaeozoic ones.

4. THE LOWER CAMBRIAN & CARBONIFEROUS BIOSTRATIGRAPHY OF MONGOLIA The joint Soviet-Mongolian Scientific Research Geological Expedition; Transactions, 26, 192 pp., Moscow, "Nauka", 3 roubles 20 kopeks.

The volume consists of two parts. The second is entitled "The stratigraphy of the Carboniferous deposits of Mongolia", and was written by M.V. Durante in co-authorship with eleven geologists and palaeontologists. The first version of the text was originally written for "Lexique stratigraphique", but has not been published in this edition. Detailed descriptions of the main sections together with lists of plant megafossils and other organic remains are given. Correlations of the sections, their dating and the general palaeogeography of the area of Mongolia in the Carboniferous are outlined. The text is profusely illustrated by stratigraphical columns, correlation charts and palaeogeographic maps.

S.V. MEYEN, MOSCOW (from I.O.P. Newsletter).

VII. SPECIAL PAPERS IN PALAEOBIOLOGY 27

LATE DEVONIAN ACRIARCHS FROM THE CARNARVON BASIN, WESTERN AUSTRALIA

BY

Geoffrey Playford and Roger S Dring

ABSTRACT

Organic-walled remains of marine microphytoplankton (acritarchs) are the predominant palynofloral elements of sub-surface sediments belonging to the Gneudna Formation in the Carnarvon Basin of Western Australia. This study is based upon cored sections of the lower part of the formation as developed typically in the Merlinleigh Sub-basin of the eastern Carnarvon Basin. The acritarch palynoflora is abundant, diverse, and well-preserved; there are fifty-six species, only a small proportion of which are identifiable with previously described species. These latter suggest a Frasnian age for the Gneudna Formation, in agreement with the consolidated faunal evidence. The acritarch species are distributed among thirty-six genera, seven of which are newly instituted herein, viz. Alocomurus, Deltotosoma, Gneudnaella, Histopalla, Lomatolopas, Papulogabata, and Somphophragma. The following species are formally described and named as new: Alocomurus compactus (type species), Cymatiosphaera spicigera, C. subtrita, Deltotosoma intonsum (type species), Dictyotidium confragum, D. granulatum, D. prolatum, D. torosum, Elektoriskos tenuis, Evittia geometrica, Florisphaeridium micidum, Gneudnaella psilata (type species), Gorgonisphaeridium abstrusum, G. carnarvonense, G. condensum, G. discissum, G. vesiculum, Helosphaeridium guttatum, H. microclavatum, Histopalla capillosa (type species), Lomatolopas cellulosa (type species), Lophosphaeridium deminutum, L. segregum, Melikeriopalla venulosa, Navifusa exilis, Papulogabata mmlata (type species), Rugaletes vietus, Saharidia lusca, Solisphaeridium inaffectedum, Somphophragma miscellum (type species), Synsphaeridium catenerium, Tunisphaeridium flaccidum, and Veryhachium colemanii.

78 pages, 19 plates, 10 text-figures. Published February 1981.
Cover price £15 or US \$38.

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VIII. INTERNATIONAL BIBLIOGRAPHY OF PALAEOBOTANY AND PALYNOLOGY

In the last newsletter we made mention of a request that had been received for our cooperation in the compilation of the International Bibliography of Palaeobotany and Palynology for 1981. The following statement is an extract from that newsletter:

"The aim is to compile an annual bibliography of all palaeobotanical and palynological publications based on data submitted to the editors/compiler by regional palynological societies and organisations and then to make the master copy of the bibliography available to the regional organisations for duplication and distribution to their members.

Individual references will be submitted as camera ready-copy, type-written on white paper so as to produce a good quality offset end product. The compilers of this proposed bibliography do not see it as a competitor to the existing regional bibliographies which are produced but instead as a way of making these regional editions more international. They envisage for example that the bibliography for 1981 could run to 100-150 pages."

It would clearly be advantageous for the publications of CIMP members to be included in this bibliography. It is therefore proposed that we will

cooperate by compiling a list of Palaeozoic palynological papers written by our members during 1981.

It would be appreciated therefore if you will send to me (Bernard Owens, see address on page 1) a list of these publications with complete bibliographic citation as soon as possible (by air mail if necessary). The data will be coordinated and forwarded to the editors of the Bibliography. Depending on your response we may consider circulating the details to all our members with the first newsletter in 1982.

Please cooperate by submitting your publication details immediately.

Thank you.

IX. BOOK REVIEW

The Paleobiology of Plant Protists. Helen Tappan

Freeman 1981. 1028 pp. £49.00

Within the last twenty-five years or so, micropalaeontologists have increasingly focussed their attention on groups of plant protists such as the dinoflagellates, acritarchs and coccoliths, in part because of the growing recognition of the usefulness of these organisms for age-determinations, but also because of the information they provide in palaeoecological and palaeo-environmental studies, and studies on the origin and early evolution of life. Further impetus has been provided by the development of new tools, such as the scanning electron microscope, and the availability of abundant material, notably from the Deep Sea Drilling Programme. Many of the groups of plant protists which are of interest to the micropalaeontologist are still extant, and the available information pertaining to these groups may therefore be widely scattered throughout the biological as well as the palaeontological literature. The purpose of this book is to compile and summarize the available knowledge concerning the fossil and living plant protists, and to indicate their value for biostratigraphy, their probable evolutionary relationships, their fluctuations in diversity and abundance through geological time, and their response to environmental change. It is primarily intended to serve the needs of the micropalaeontologist, but should also be of interest to biologists and geologists as well as providing a basis for inter-disciplinary studies.

The organisation of the book into chapters is on a systematic basis, on the grounds that few specialists work with all the groups discussed. The emphasis throughout the book is on those groups or divisions of the plant protists which have a good fossil record. Chapter 1 deals with the procaryotic bacteria and blue-green algae, and concludes with a well-balanced discussion of the alternative theories put forward for the origin of the eucaryotes. Subsequent chapters discuss the rhodophyta, acritarchs, dinoflagellates, ebridians, xanthophyta and chrysophyta, silicoflagellates, diatoms, haptophyta, coccolithophorids and other calcareous nannoplankton, green algae and, finally, the charophytes and umbellinaceans.

The basic organisation of each chapter follows a similar pattern. A discussion of the morphology, physiology and ecology of the living representatives of the group is followed by an account of its fossil record and evolutionary history, and each chapter concludes with a classification scheme and a comprehensive list of references. Naturally, however, since the book deals with several widely different groups of organisms, the treatment of each group varies depending on the nature and amount of information that is available. Thus the chapters on silicoflagellates (chapter 7), diatoms (chapter 8) and

haptophyta (chapter 9) include extensive discussions of the biostratigraphical potential, palaeoecological and palaeoenvironmental implications and evolutionary trends exhibited by these groups, whereas other groups, such as the ebridians (chapter 5) and xanthophyta and chrysophyta (chapter 6) which have a poorly documented fossil record are treated more cursorily.

The longest chapter, and the one which will probably be of most interest to many palynologists is that on dinoflagellates. After a brief introduction placing dinoflagellate studies in a historical perspective, the chapter commences with a discussion of the morphology of the living vegetative cell and the nature of the amphiesma of both naked and armoured dinoflagellates, including a description of tabulation in armoured forms. An account of the dinoflagellate cysts follows, beginning with a historical discussion of the background to cyst studies and continuing with a description of cyst morphology and a discussion of the role of the cyst in the life cycle. A section on the systematic relationships of cysts and thecae, based on the few studies available, leads the author to suggest that the study of present day cysts may be useful in a more detailed discrimination of some modern genera. This account of the morphology of the vegetative cell and the cyst is followed by a long and interesting discussion of dinoflagellate physiology. Topics covered in this section include (i) dinoflagellate movement, (ii) dinoflagellate nutrition, including accounts of parasitism, symbiosis and predation as well as autotrophy, (iii) bioluminescence and the production of toxins, and (iv) reproduction, with a discussion of both asexual and sexual reproduction in dinoflagellates. The section on dinoflagellate ecology is extensive, and is based mainly on the ecology of living vegetative cells, with several case histories cited. A good account of dinoflagellates in the fossil record and their potential for biostratigraphical zonation is included, and the final section on classification contains a discussion of the phylogenetic relationships of dinoflagellates, giving due emphasis to the fossil record as well as other lines of evidence. On the whole, this chapter provides an up to date and comprehensive summary of the state of knowledge concerning fossil and living dinoflagellates.

Other chapters which will most probably be of interest to palynologists are those on acritarchs and green algae. The chapter on acritarchs provides a good general introduction to these organisms, beginning with a definition of the group and a descriptive account of the developments leading to its establishment by Evitt in 1963. The first part of chapter focuses on the morphology of the acritarch vesicle, covering such topics as size, symmetry, wall structure, ultra-structure and composition, and surface sculpture. A discussion of process morphology and a description of the several types of excystment opening to be found in acritarchs follows. A section on the systematic affinities of the acritarchs comprises a concise, comprehensive and well-balanced discussion of the various views held by different workers. A good account of the geological distribution of the acritarchs traces the development of the group from the Pre-Cambrian through to the Cenozoic, but the section on evolutionary trends illustrates the potential for future work within the group. Little evidence for evolutionary trends within a lineage or genus is as yet available and the discussion is limited to evolutionary trends within two genera, Orthosphaeridium and Aremoricanium. The palaeoecology of acritarchs is discussed, starting with an account of their deduced habit and a general consideration of factors which probably affected their distribution. A number of case histories in which variations in the species composition of acritarch assemblages are related to temperature, depth of water and proximity to shore are cited, but no general conclusions can be reached as yet. Other sections include a discussion of preservation, in which it is noted that acritarchs may be stratigraphically useful even in rocks which have been subjected to heat and pressure, and a short section on contamination and reworking. The final section consists of a discussion of the classification of the acritarchs, in which the dichotomy of views held by acritarch workers is clearly expressed. The problems inherent in

an artificial system of classification, such as that proposed by Downie, Ewitt and Sarjeant (1963) for the acritarchs, are discussed, but there is as yet insufficient data for the author's preference of a comprehensive Linnaean classification. The compromise currently adopted by many acritarch workers, which is followed by Helen Tappan in the "Paleobiology of Plant Protists", is to list genera alphabetically, although supra-generic categories are also listed for the sake of reference. The chapter concludes with more than 300 references.

The chapter on the green algae includes a discussion of three divisions, the prasinophyta, chlorophyta and euglenophyta. The section on the prasinophyta is particularly interesting since the cyst stages of many of the extant representatives of this division resemble such important fossil genera as Tasmanites, Pterospermella, Cymatiosphaera and Leiosphaeridia. A fascinating and well-illustrated account of the development of the cyst and its place in the life cycle of prasinophytes, based on recent research and laboratory work on extant material, allows the fossil genera to be seen in the context of the life cycle of the living organism.

The book is not intended to be a systematic treatise but a few taxonomic transfers and name corrections have been made. For the most part these are supra-generic name changes which are clearly indicated in the preface. However, the author citation of the prasinophyte Duvernaysphaera tenuimarginata, which is cited as "D. tenuimarginata (Brito) Tappan n. comb." is incorrect. The correct citation is D. tenuimarginata (Brito) Playford 1977.

On the whole the "Paleobiology of Plant Protists" is a difficult work to criticise. The presentation is excellent and the book is well written, easy to read and lavishly illustrated throughout, with abundant photographs, scanning electron micrographs, transmitted electron micrographs and line drawings. A useful glossary is included, and the references are comprehensive and up to date. The book admirably achieves its intended aim of summarizing the available information on the fossil and living plant protists, and the author is to be congratulated on producing a work of such outstanding scholarship which will surely become an invaluable reference and source book for specialists working in a number of different but related fields. The only reservation I have concerns the binding, which does not look as if it will stand up to much handling, but apart from this I can wholeheartedly recommend the book to anyone interested in or working on fossils or living plant protists. At \$49.00, the book is not cheap, but the price does represent good value for money although it may well be too expensive for many potential purchasers.

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