



Newsletter

INTERNATIONAL COMMISSION FOR PALYNOLOGY

VOLUME 3 NUMBER 1

JUNE 1980

ICP PRESIDENT'S VALEDICTION

Greetings to all palynologists of all ICP-federated societies!

It seems scarcely possible that my term of office as ICP President is now nearly at an end, but "parting is such sweet sorrow." I look forward with confidence to turning over the reins to my successor, Dr. Caratini, at the conclusion of the Cambridge meeting in July. I also look backward to assuming the burden of this office in early 1977, and it is with some satisfaction that I realize that the intervening years have been years of almost continuous improvement of ICP's status as your representative, international palynological body. We have aided in increasing the number of federated organizations to twenty, and have compiled a World List of Palynologists. We have strengthened our ties with the International Union of Biological Sciences (IUBS), and are at last on the verge of formal, direct links with the International Union of Geological Sciences (IUGS). We have greatly improved our constitution, and have put the *Newsletter* on a sound basis, among many things. In all of this, I share the plaudits, if any, with my predecessor, Norman Hughes, and very obviously also with Geoffrey Norris, our Secretary-Treasurer, and James Canright, the *ICP Newsletter* Editor. All Councillors, and the Vice-Presidents, have given of their time

and counsel whenever asked. I do hope Claude Caratini has the same sort of marvellous help as I have had from Norris and Canright, who have served so well for so little reward! (It is hardly to be hoped that he will have such a splendidly efficient, unpaid "ICP-assistant" as Elizabeth Traverse has been!) Surely you all will agree that ICP deserves your support and has tremendous potential for international cooperation in, and worldwide stimulation of, palynology. See you in Cambridge!

Alfred Traverse
President, ICP

NEW ICP PRESIDENT



Dr. Claude Caratini

"Le roi est mort — vive le roi!"

More than a quarter of a century ago during the course of my first international scientific meeting in Paris, the delegates were entertained one evening at the Versailles Palace by a memorable *Son et Lumière* performance about the reign of Louis XIV. Despite my meager comprehension of the French language, I still remember the above quotation delivered by an actor at the conclusion of the performance. Traditionally, as I understand it, the phrase emphasizes the importance of the unbroken succession of leadership; when one leader "passes on," his successor takes over the reins of office immediately, in order that the government (or organization) can continue without undue disruption or chaos.

This will be the situation at the final plenary session of the Vth IPC at Cambridge on July 6 — as the current ICP President Traverse steps down, his successor, Dr. Claude Caratini (Bordeaux), will take over the responsibility of insuring that the International Commission for Palynology continues to run smoothly for the next 4-5 years. Dr. Caratini has selected Dr. Roger E. Jan du Chêne (Esso Production Research, Beglès) to succeed Geoff Norris in the position of Secretary-Treasurer (subject to confirmation by Council). Jan du Chêne has also agreed to take over the editorship of this newsletter with the next issue (December, 1980). We wish them both well in these endeavours — *bonne chance, mes amis!*



5. INTERNATIONAL
PALYNOLOGICAL
CONFERENCE
CAMBRIDGE 1980

IPC UPDATE

Dependent upon the distance this newsletter had to travel to reach you, it is possible that you will be seeing this item just prior to the Cambridge meetings. If you happen to be one of these "fortunates," as well as one planning to attend the 5th IPC, read on.

Dr. Norman Hughes, Chairman of the Organizing Committee, informs me that (at press time) there have been no significant changes in program or events listed in the *Third Circular*. This circular was mailed early in April to approximately 485 persons who had registered before March 1. Cognizant of the tendency of many scientists to procrastinate, it is still quite possible that the original estimate of more than 600 registrants may be attained by the end of June.

Two pre-Conference (A-1 & A-7) and three post-Conference Excursions (C-8, C-9 and C-11) are operational. If you have registered for any of these excursions, by this time you should have received final instructions from the leaders regarding fees and meeting places.

Since there is no airport near Cambridge, foreign delegates arriving in London during the period June 28-30 are advised to bring their copy of the *Third Circular* with them, in order to utilize the London-Cambridge train schedules published therein.

See you in Cambridge!

GEOBOTANY CONFERENCE REPORT

Under the chairmanship of Dr. Robert C. Romans, on March 1, 1980, the Departments of Geology and Biological Sciences of Bowling Green State University, Bowling Green, Ohio, hosted their second Geobotany Conference.

The topics covered in the majority of the 15 contributed papers were palynological, as were those of the three invited papers, as follows: Dr. Andrew H. Knoll (Oberlin College) — "The Environmental Distribution of Some Late Precambrian Microbial Assemblages"; Dr. James A. Doyle (Univ. Calif. Davis) — "Cretaceous Pollen and Early Angiosperm Evolution"; and Dr. Margaret B. Davis (Univ. Minnesota) — "Mid-Holocene Hemlock Decline: Evidence for a Pathogen or Insect Outbreak."

The Plenum Publishing Company has agreed to publish the proceedings of this conference as a companion volume to *Geobotany*, the proceedings of the previous conference on this topic held at Bowling Green in 1976.

PALYNOLOGY AT THE NORTH ATLANTIC MARGINS

Second Joint Meeting of the Commission Internationale de Microflore du Paléozoïque (CIMP) and the American Association of Stratigraphic Palynologists (AASP).

The following information has been provided by Dr. Bernard Owens, Secretary General of CIMP:

Introduction. The second joint meeting of the CIMP and AASP is to be held in Dublin from 13-15 September 1982, hosted jointly by Trinity College, Dublin and the Geological Survey of Ireland. All palynologists are warmly invited to attend.

Theme. Papers and demonstrations on the theme "The Palynology of the North Atlantic Margins" will be given preference for

inclusion in the programme, but contributions on other topics will also be welcomed. Several working groups will hold meetings during the conference, and some of these will present progress reports. It is anticipated that papers dealing with palynomorphs of all ages from Precambrian to Quaternary will be included in the programme.

Venue. All sessions will be held in Trinity College, Dublin, Eire.

Programme. Registration will begin on Sunday 12 September. Lectures, demonstrations and working group meetings will take place on 13-15 inclusive. Two field excursions will be held immediately after the meeting, one Lower Palaeozoic and the other Upper Palaeozoic. These will each be for either one or three days, depending on preference of participants.

Conference Language. The conference languages will be English and French.

Publication. Abstracts of papers presented will be printed and distributed before the meeting. Papers read at the meeting will be considered for publication in *Palynology*, subject to normal AASP publication procedures.

Registration Fee. It is estimated that the registration fee will not exceed £20 for professional members. A substantially reduced rate is planned for students.

Accommodation. Limited accommodation will be available in Trinity College. Accommodation will also be available in numerous hotels of varying standards close to the College.

First Circular. The first circular will be circulated in mid-1980.

Enquiries. Enquiries and requests for further information should be addressed to either of the local secretaries:

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Trinity College
Dublin 2

Ken Higgs
Geological Survey of Ireland
14 Hume Street
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Cimp

PALYNOLOGY AT THE NORTH ATLANTIC MARGINS



Joint Meeting of

Commission Internationale de Microflore du
Paléozoïque
&
American Association of Stratigraphic
Palynologists

ULTRASONIC SIEVING TO IMPROVE PALYNOLOGICAL PROCESSING OF SEDIMENTS: A NEW DEVICE

by C. Caratini
Centre d'Etudes de
Géographie Tropicale
F. 33405 Talence, France

This device is found to yield clean preparations rich in palynomorphs.

Principle

By filtration, all particles smaller than the size of the palynomorphs chosen to be studied may be eliminated.

The pores of the filters, the diameters of which range between 5 and 100 μm , get blocked very quickly, thereby preventing effective filtration. The ultrasonic sieves operate by inducing movements of the particles and clearing the pores. Furthermore, the organic and mineral aggregates are destroyed and eventually eliminated, thus the enrichment in palynomorphs is assured by the combined effect of: (1) the destruction of aggregates, and (2) the elimination of all the particles smaller than palynomorphs (fines).

Basic Equipment Needed

a) Filter and filtration device

The filtration device, called an "ultrasonic microfilter," is currently used for purposes other than palynology. It is under patent license and hence, cannot be described.¹ The filters are available in different sizes: 5, 10, 15, 20 μm , etc., up to 100 μm . Each filter costs about US \$500.

b) Ultrasonic generator

The filtration device has a diameter of 75 mm, which permits the use of any transducer tank. It is necessary to purchase an ultrasonic generator emitting a minimum frequency of 80 kHz. At lesser frequencies the palynomorphs are more easily broken (Gray, 1965; Marceau, 1969; Hideux, 1972).

¹Further information may be obtained from Labo-Moderne, 37 rue Dombasle, 75015 Paris. This is just a clue to the source of the equipment used. (This does not constitute an endorsement of this company's product; several other companies have developed similar devices. —Ed.)

Specific Equipment Selected After Tests

For a routine palynological analysis of Quaternary sediments, we have obtained optimal results with a 10 μm filter. When this filter is used, practically no pollen is found in the filtrate. (Note that a particle measuring 10 μm cannot pass through a 10 μm hole.)

In order to minimize the loss of pollen, a 5 μm filter is recommended. However, this finer filter not only involves more time for filtration (viz., about three times longer), but also increases the risk of breakage of pollen. Furthermore, the slides are not as clean, due to the retention of particles larger than 5 μm .

For studies of dinoflagellate cysts, the 25 μm filter provides really incredible results (Figs. 1 & 2).

Procedure

Before ultrasonic filtration, it is necessary to carry out the usual chemical maceration procedures for the destruction of the mineral fraction, viz., HCl + HF treatment. The instructions given by the manufacturer include specific instructions for filtration, recovery (of palynomorphs), and filter cleaning. See also the paper by Marceau (1969).

In certain cases, it is possible to improve the results by eliminating the humic components, for instance with 10% KOH.

Advantages of This Method

- (a) Maximum concentration with minimal loss of palynomorphs;
- (b) Clean palynomorphs, free from minute particles;
- (c) Minimum chemical damage;
- (d) Reduced time of preparation of samples
- (e) Excellent recovery, enabling accurate estimation of the absolute

number of palynomorphs per gram of sediment;

(f) Reduction of expenses for chemicals.

Selected References

- Gray, J. 1969. Extraction techniques. Pp. 534-35 in Handbook of paleontological techniques. Kummel, B. & Raup, D. (eds.). W. H. Freeman & Co., London & San Francisco.
- Hideux, M. 1972. Techniques d'étude du pollen au MEB: effets comparés des différents traitements physico-chimiques. *Micron* 3: 1-31.
- Marceau, L. 1969. Effets, sur le pollen, des ultrasons de basse fréquence. *Pollen et Spores* XI: 147-164.

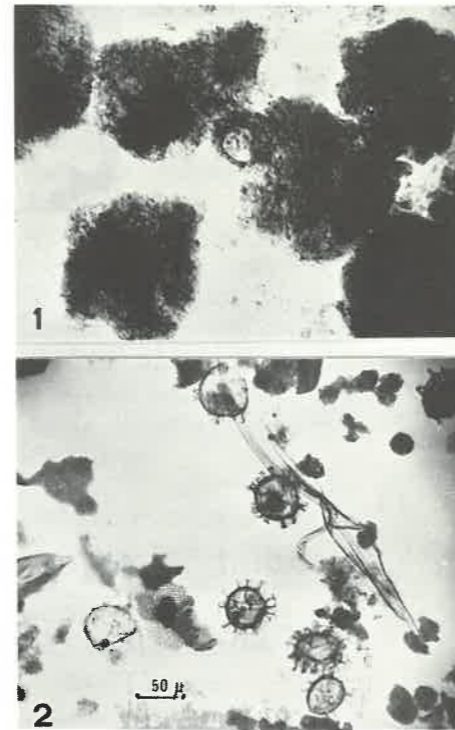


Fig. 1. Without ultrasonic sieving (HCl, HF, ZnCl_2 , HNO_3).

Fig. 2. With HCl + HF treatment, followed by ultrasonic sieving (10 μm).

AASP WORKSHOP ON FOSSIL FUNGI



Participants in the AASP Workshop on Fungal Palynomorphs: Geoff Peterson, Steve Hopkins, Satish Srivastava, Al Traverse. (From an original color transparency taken by Traverse.)

Dr. William C. Elsik, Chairman of the American Association of Stratigraphic Palynologists' Workgroup on Fossil Fungal Palynomorphs has provided the following report of their meeting last Spring.

The AASP Workgroup on Fossil Fungal Palynomorphs met May 9-11, 1979, on the campus of Kent State University, Kent, Ohio, with Dr. Alan K. Graham of the KSU Department of Biological Sciences acting as host. In addition to Dr. Graham, the participants included: William C. Elsik (Exxon Co., Houston), William S. Hopkins (Geol. Surv. of Canada, Calgary), George Host (Kent State Univ.), Karin Hummell (Kent State Univ.), David M. Jarzen (Canadian Museum of Natural Sci., Ottawa), Constance B. McPherson (Kent State Univ.), Geoffrey Norris (Univ. Toronto), Earl T. Peterson (Amoco Prod. Co., Denver), S. K. Srivastava (Chevron Oil Field Res. Co., La Habra),

Arthur R. Sweet (Geol. Surv. of Canada, Calgary), and Alfred Traverse (Pennsylvania State Univ.).

Alan Graham set the tone of the workshop with his introductory remarks on the status of palynological research on fungal spores and related material. He pointed out that although the assembling of reference collections and the understanding of the morphology of modern fungal spores have progressed well, the lack of a descriptive terminology and of a morphologic classification have hindered advancement of the stratigraphic uses of this group of palynomorphs.

Earl Peterson, who had originally suggested this meeting, concentrated on the problems of morphology and classification, presenting a preliminary illustrated glossary of terms. On the subject of classification, he noted that the characteristic shape of 286 artificial taxa is predominantly lenticular (95)

or pyriform (60) out of a total of 20 shape classes. Most septate spores, in a sampling of 205 taxa, are monoseptate (31), disseptate (35) or triseptate (41). Tetriseptate (22) and pentaseptate (22) fungal spores are also common. Eight other categories of polyseptate types are less likely to be seen, partly because these larger spores are often broken during deposition and/or processing.

Bill Elsik then presented an annotated, illustrated glossary of fungal morphology which had been previewed and reviewed by Jan Jansonius (Esso Resources Canada, Calgary). After numerous revisions and additions of terms, the two glossaries were combined and adopted by the participants. Much of the ensuing time was taken in viewing the projected morphologies as embodied in fossil material. Several hundred 35mm transparencies and photomicrographs were on hand, with contributions (please turn to page 6)

FOSSIL FUNGI

(continued from page 5)
from all participants.

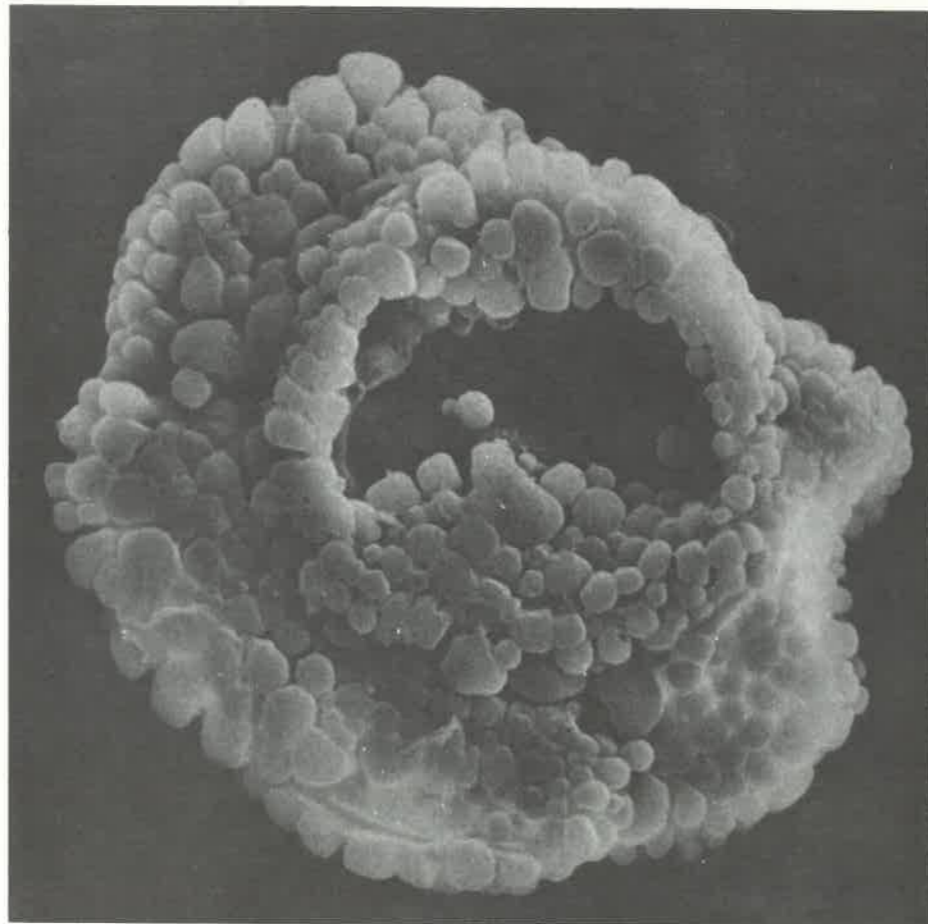
Individual experiences with the stratigraphic utility of fossil fungal spores were related by Dave Jarzen, Geoff Norris, Satish Srivastava and Art Sweet, all of which helped to highlight the timeliness of the meeting. On the last day Elsik handed out copies of a preliminary artificial classification based on concepts of degrees of increasing morphologic complexity of fungal palynomorphs. In this classification the bulk of the fossil taxa are as yet unpublished.

The atmosphere of the meeting was congenial; common endeavor and agreement led to the completion of the desired glossary, *Annotated Glossary of Fungal Palynomorphs*, which is currently undergoing final editing prior to publication.

IS ANYONE OUT THERE?

The December, 1979, issue of the *ICP Newsletter* (Vol. 2, No. 2) included a questionnaire to be completed by palynologists for inclusion in the computerized *World List of Palynologists*. George Fournier (Gulf Research & Development Co., P.O. Box 36506, Houston, TX 77036), who had previously generously volunteered to undertake this computerization project, reports that only 350 palynologists had returned their completed questionnaires to him by May 15. He points out the obvious fact that unless a *minimum* of 50% of the world's palynologists supply data for the *World List*, the project might as well be abandoned. Since we have been mailing out at least 2000 copies of each issue of this newsletter, it would seem that there are some 1650 palynologists in the world who aren't interested in having their names, addresses and research interests computerized in the *World List*. If you won't do it for the sake of international cooperation, do it for George — he collects colorful foreign stamps!

NOTEWORTHY PALYNOMORPH



RICCISPORITES TUBERCULATUS Lundblad, 1954

This tetrad comes from the Westbury Beds of the I.G.S. Owthorpe No. 2 borehole, Nottinghamshire, England. This species occurs over a wide area from Greenland, through Britain, the North Sea, Scandinavia, the Alps and Poland to the Donetz basin, in a restricted, vertical interval corresponding to the upper part of the Rhaetian stage of the Alpine Triassic.

A colpoid aperture is seen on the member of the tetrad at the centre of this photo; the tetrad is approximately 100 μ m across at its widest dimension. The striking "tuberculate" (verrucate to gemmate)

sculpture, with the single, distal colpoid aperture on each member of the tetrad, and the regular adhesion of the members (rather as in the Ericaceae) combine to make a very distinctive type of pollen. Its parent plant is still unknown.

This tetrad was photographed on a Cambridge Stereoscan by Drs. William G. Chaloner and Marjorie Muir at the University of London.

EDITOR: James E. Canright

Published semiannually (June & December). News items should reach the editor at least a month prior to the desired publication date.

BOOK REVIEWS

Evolution of Archeopyle and Tabulation in Rhaetogonyaulacinean Dinoflagellate Cysts by Gunter Dörhöfer and Edward H. Davies. 91 pp., 18 text-figures, and 22 plates (referred to as figures). Life Sciences Miscellaneous Publications, Royal Ontario Museum, Toronto. \$5.50 Canadian.

This well-written and well-illustrated monograph is the first comprehensive attempt to establish evolutionary lineages for the Mesozoic rhaetogonyaulacinean dinoflagellate cysts. The most primitive forms are considered to be the Late Triassic suessoid genera. These are believed to have given rise to the Jurassic pareodinioid forms which in turn are linked to the Early Cretaceous pseudoceratioid cysts. Lucid discussions are presented on archeopyle formation, the "Keystone Principle," and the associated plate overlap scheme. Plate series and plate designations are also discussed. The largest portions of the text are devoted to a stratigraphic review of the cyst characteristics of pertinent genera and to systematic paleontology. Two new families are proposed as are five new species. Three new genera are erected, but balanced against this is the proposed destruction of six previously-existing genera. There are also twenty-five new combinations and numerous emendations.

Without doubt this publication is a must for every serious student of dinocyst morphology and taxonomy. At the outset the authors state that they wish to stir interest in dinoflagellate evolution and I believe that their monograph will succeed in this goal. Areas such as lineages and family groupings are subjective in nature and are therefore bound to generate debate. At the same time, these subjects have always been of great interest, if not fascination, to all students of fossil and living organisms. The arguments of Dörhöfer and Davies appear to be well-reasoned and the discussion is

certainly stimulating. My own views on dinoflagellate evolution have been nebulous at best, but this publication has started me thinking more about the subject. The numerous taxonomic changes will also generate interest. For example, *Mancodinium* is submerged into *Dapcodinium* which, to my mind, is a rather dubious proposal. Another example is the resurrection of *Imbatodinium*, with *Batioladinium* becoming its junior synonym, which may well be true.

In summary, I highly recommend this publication to all dinoflagellate workers interested in phylogeny, plate arrangements, and taxonomy. It also contains a considerable amount of biostratigraphic information for those workers with a more practical turn of mind.

Warren S. Drugg
Chevron Oil Field Research Co.
P.O. Box 446
La Habra, Calif. 90631

Permian Microfossils of the Blair Athol Coal Measures, Baralaba Coal Measures, and Basal Rewan Formation of Queensland by C. B. Foster. Geological Survey of Queensland Publ. 372 (Palaeontol. Paper #45), Brisbane, Australia, 1979. 244 pp., 42 plates, microfiche data. A\$25.

Perhaps it is a harbinger of the future that this handsome, expensively-printed monograph presents in a single sheet of microfiche, in a pocket on the back cover, the tabulated sample data one might expect in an appendix. The material in question is indexed in the main body of the book — it's an interesting technique with great potential.

Foster presents much new information on the Permian generally, but especially on that of economically-significant Permian coals in Queensland. The biostratigraphic highpoint of the work is that Foster shows that the major Permian paleobotanical event in his sections occurs in the late Middle Permian. This is the "Paleophytic"/"Mesophytic"

transition others have also noted. Foster shows that in Gondwanaland this event is marked by transition from a *Dulhuntyispora* palynoflora to a *Protohaploxypinus microcarpus* zone.

There are many very helpful SEM pictures, presented along with excellent light micrographs and TEMs of sectioned spores, in a way that makes the electron pictures supplement the light pictures as they should, without predominating, as is so often the case nowadays. The stratigraphic charts showing ranges of various Permian palynofloras are very useful — indeed, to locate such things as the "Baigendzinian stage" and the "Griesbachian substage," the charts are essential. Foster repeatedly uses a few rather unfamiliar terms, such as "eusaccate," for which definitions are provided. ("Eusaccate" is approximately the same as "saccate," but more extensive explanation, with more diagrams, would have been helpful.) The homologies suggested (p. 80) between *Ephedra*-type pollen and striate Permo-Triassic pollen are very interesting and provocative.

The heart of the work is the systematic section, and anybody interested in Permian palynology will have to get a copy for reference at least, despite the price of \$A25 (\pm \$US27.50). One hundred and seventy spp. of spores/pollen, and 10 species of acritarchs are described. Five new genera of spores/pollen and two new acritarchous genera are instituted. Some rather unusual things happened nomenclaturally; the new generic name, *Interradispora*, is published as Price in Foster. Foster doesn't say who Price is, but apparently it is P. L. Price. *Limatulasporites* gen. nov. is published as Helby & Foster in Foster — again without the desirable categorical identification of (presumably R.?) Helby. *Triplexisporites* is published as a new genus, but in an appendix as a separate report, rather than in the systematic section where it would be

(please turn to page 8)

BOOK REVIEWS

(continued from page 7)
 expected. The type species of the new genus *Phidiaesporites* (for Phidias, the Athenian sculptor!) is *P. fosteri*, which is legal but a little jarring, even though the honor is referred back one generation.

Alfred Traverse
 Pennsylvania State Univ.
 University Park, PA 16802

A Systematic Illustrated Guide to Fossil Organic-Walled Dinoflagellate Genera by Darrah Artzner, Edward H. Davies, Gunter Dörhöfer, Armando Fasola, Geoffrey Norris and Silvana Poplawski. Royal Ontario Museum Life Sciences Miscellaneous Publication, Toronto, Ontario, 1979. 119 pp. and 276 figs. Price not indicated.

Essentially following the 1978 system of classification of Norris, this *Guide* assigns 276 genera of fossil dinoflagellates to the Orders Peridiniales, Dinophysidales and Gymnodiniales. The first-named order is further subdivided into 31 families arranged in the four Suborders Rhaetogonyaulacineae, Gonyaulacystineae, Hystrichosphaeridiineae and Deflandreineae. An alphabetical check list of genera is keyed to detailed line drawings of the type species and holotypes. The authors indicate that these illustrations should be helpful in assigning species to their appropriate generic and suprageneric taxa. Fossil dinoflagellate genera with siliceous or calcareous walls, as well as junior synonyms, are excluded from this *Guide*.

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DINOSAURS VS. PALYNOMORPHS

In an article on the Cretaceous-Tertiary boundary problem written for the IUGS Newsletter, *Episodes* (Dec., 1979, p. 21), Dr. Dale A. Russell, Chief of the Paleobiology Division of the National Museum of Natural Sciences, Ottawa, Canada, and an eminent authority on dinosaurs, makes the following interesting comparison.

"The process of sampling the fossil record can present difficulties of a practical order, and detailed dinosaur collecting programmes have not been initiated to examine faunal trends toward the close of Cretaceous time. *An average dinosaur skeleton is about one-third complete and could be considered to contain the same amount of biostratigraphic information as does one palynomorph*" (italics editorial). "A palynomorph slide preparation,

derived from fine-grained terrestrial sediments of late Cretaceous age, usually contains about 20,000 grains. It can be prepared at a cost of \$100 (Cdn.), including less than a week of a person's time in the laboratory. To collect and prepare 20,000 fragmentary dinosaur skeletons for study, \$260,000,000 (Cdn.) and the equivalent of 15,000 years of one person's time would be required (excluding transportation and storage costs)."

In the light of the above, if you were the head of a company involved in biostratigraphic research which must be cost-effective (to pacify your stockholders) and which should produce relatively rapid results, wouldn't you hire a team of paleopalynologists, rather than a single vertebrate paleontologist??

FUTURE MEETINGS 1980

July 7-17

26th INTERNATIONAL
 GEOLOGICAL CONGRESS, Paris,
 France. (Paul Sangnier, Secrétaire
 Général du 26ème C.G.I., Maison de
 la Géologie, 77-79 rue Claude-Bernard,
 75005 Paris, France).

September 22-23

ASSOCIATION DES
 PALYNOLOGUES DE LANGUE
 FRANCAISE (APLF), Holocene and
 Late Glacial Commission, Toulouse,
 France. The theme of this meeting is
 the Late Glacial in France, chronology,
 limits, characteristic floristics and
 paleoclimatology. (Guy Jalut,
 Laboratoire de Botanique et
 Biogéographie, Université Paul
 Sabatier, 39 allées J. Guesde, 31077
 Toulouse Cedex, France).

October 14-18

AMERICAN ASSOCIATION OF
 STRATIGRAPHIC
 PALYNOLOGISTS (AASP). Thir-
 teenth Annual Meeting, Keystone
 Lodge, Keystone, Colorado. (Dr. G.
 K. Guennel, Marathon Oil Company,
 P.O. Box 269, Littleton, CO 80120).

November 17-20

GEOLOGICAL SOCIETY OF
 AMERICA, (Annual meeting),
 Atlanta, U.S.A. (GSA, 3300 Penrose
 Place, Boulder, CO 80301, U.S.A.).

1981

April 26-30

II CONGRESSO LATINO-
 AMERICANO DE PALEON-
 TOLOGIA, Porto Alegre, Brasil.
 Sponsored by Sociedade Brasileira de
 Geologia e Sociedade Brasileira de
 Paleontologia. (Prof. Drs. Ivone
 Purper, 218 Av. Osvaldo Aranha,
 90.000 - Porto Alegre, RS, Brazil).

August 21-28

XIII INTERNATIONAL BOTANICAL
 CONGRESS, Sydney, Australia.
 Sponsored by the Australian Academy
 of Science and IUBS. (Dr. W. J. Cram,
 Univ. Sydney, NSW 2006, Australia).