# NEWSLETTER

Volume 2 Number 2 WINTER 1979

## EXECUTIVE COMMITTEE FOR 1980

By acclamation, the C.A.P. Executive Committee for 1980 consists of Dave Jarzen (President), Jan Jansonius (President-Elect), Jocelyne Legault (Secretary-Treasurer) and Jonathan Bujak (Newsletter-Editor) So send your money to Jocelyne Legault, your news to Jonathan Bujak and your complaints to Dave Jarzen and Jan Jansonius.

## DUES NOTICE

C.A.P. Membership dues for 1980 should be sent to the Secretary-Treasurer, Jocelyne Legault at the Department of Earth Sciences, University of Waterloo, Waterloo, Ontario, N2L 3G1. We have chosen the deadline for dues submission as February 1, 1980, to avoid the Christmas mail rush. Membership dues may be sent for $2 to cover 1980, or for $4 to cover 1980 and 1981.

## PALYNOCENE

GEOLOGICAL SURVEY OF CANADA, OTTAWA
*Paleopalynology Laboratory*
(received from D.C. McGregor)

Colin McGregor is continuing his studies of the Silurian and Devonian palynology of Canada. With Martha Camfield he is preparing a manuscript on the taxonomy and biostratigraphy of miospores from the Upper Devonian Hecla Bay, Beverley Inlet, and Parry Islands Formations of southern Melville Island, including the type sections of the first two formations.

A taxonomic biostratigraphic paper by Camfield and McGregor on miospores of the Cape De Bray, Weatherall, and Hecla Bay Formations of northeastern Melville Island is in the final stages of preparation. Both reports are based on collections made by McGregor in 1968.

Colin McGregor is preparing a paper with John Richardson of the British Museum of Natural History and Walter Riegel of the University of Göttingen on Silurian and Devonian miospore zones of the Old Red Sandstone region. It will be the first intercontinental zonal scheme for the Silurian and the whole Devonian system based on spores. Preliminary results were presented at the International Symposium on the Devonian System (P.A.D.S.) in Bristol in September, 1978.

In June, Colin McGregor spent three weeks in the People's Republic of China as a member of a delegation representing the I.U.G.S. Subcommission on Devonian Stratigraphy (S.D.S.). Details of the visit are given elsewhere in this newsletter. In September he attended S.D.S. field conferences in northern Spain and Brittany, at which recommendations were made concerning the stratigraphic position of intra-Devonian series boundaries.

Papers published in 1979:

McGregor, D.C., Spores in Devonian stratigraphical correlation. Palaeontological Association, Special Paper 23, pp. 163-184.
McGregor, D.C., Devonian spores from the Barrandian region of Czechoslovakia and their significance for interfacies correlation. *In:* Current Research, Part B, Geological Survey of Canada, Paper 79-1B: 189-197.
McGregor, D.C., Devonian miospores of North America. Palynology, vol. 3.
Oliver, W.A., Jr. and McGregor, D.C., Devonian in China. Geotimes, vol. 24, no. 9.

*Quaternary Paleoecology Laboratory*
(received from R.J. Mott and L.D. Farley-Gill)

Field work during the summers of 1977 and 1978 in New Brunswick provided 30 surface samples and 10 cores for palynological study. To date, eight radiocarbon dates have been obtained, mainly on basal organic sediments. Work has begun on two profiles.

A preliminary palynological study has been completed on a lake sediment core from northern Nova Scotia provided by D. Wightman, and a more complete study is anticipated in cooperation with Dalhousie University.

Preliminary work has been completed and more extensive work is in progress on samples obtained from Chalmers Bog near Turner Valley, Alberta, collected in cooperation with L.D. Jackson. A radiocarbon date of 18,500 years B.P. has been obtained on mosses in the basal sediments of this foothills corridor site.

A report on two late Quaternary pollen profiles from Gatineau Park, Quebec, has been submitted for publication. Percentage and influx diagrams from both sites are included.

Leanne Farley-Gill has completed a report on surface pollen spectra from the Hudson Bay Lowlands.

Bob Mott has collaborated with T.W. Anderson and J.V. Matthews on a study of two Champlain Sea sites in Quebec involving pollen, seeds, beetles and other macrofossil remains. A talk was presented at the Quaternary Climatic Change Symposium at York University, Toronto, in May. A paper will be included in the published proceedings.

Work is continuing in several other areas, including an interglacial site in Nova Scotia, and lake sediment cores from the North Bay area, Ontario, northern Saskatchewan and Alberta, and Banks Island, N.W.T.

Thane W. Anderson is commencing a coring program of lake and peat bog sediments in the Ottawa Valley-Lake Ontario-Georgian Bay region in an attempt to relate late Quaternary events in this region with those of the Great Lakes. Special effort will be made to provide independent data on the age and environment of the Champlain Sea, the late Pleistocene marine incursion of the St. Lawrence and Ottawa Valleys. Pollen and plant macrofossil analyses are in progress on lake and bog sediments in Prince Edward Island and British Columbia, on two Champlain Sea sites in the St. Lawrence Lowlands in conjunction with R. Mott and J. Matthews (G.S.C.) and on embayment sites in Lake Ontario, Lake Huron and Georgian Bay. **Manuscripts** have been completed for the Prince Edward Island and Lake Huron studies. **A paper, "Stratigraphy, age, and** environment of a Lake Algonquin embayment site at Kincardine, Ontario" appeared in Current Research, Part 8, Geological Survey of Canada, Paper 79-1B, 1979.

## SIMON FRASER UNIVERSITY
*Department of Biological Sciences*
(received from Rolf W. Mathewes)

Most of the current research in the laboratory is carried out as part of a project entitled, "Paleoecology of postglacial vegetation in coastal and interior biogeoclimatic zones of British Columbia", funded by N.S.E.R.C. Investigations are conducted by R. Mathewes, three graduate students and a technician.

Current and recently completed projects include:

(1) *Donald McLennan* (M.Sc. project). Pollen transport and deposition in the Coastal Western Hemlock Zone.
(2) *Miriam Mulstein* (M.Sc. project). **Postglacial** vegetation history of the Lillooet area (as part of the "Lillooet Archaeological Project").
(3) *James White* (Ph.D. student, Dept. of Archaeology). Palynology of lake sediments in the Peace River District of British Columbia and adjacent Alberta.
(4) *Rolf Mathewes* (Faculty). **Emphasis is on palynology** and paleoecology of postglacial lake sediments and pollen morphology.
(a) Palynology of lakes in the climatic transition between the Coastal Western Hemlock Zone and the Interior Douglas Fir Zone.
(b) Pollen morphological studies of *Myriophyllum* (published), *Polemonium* (in press), and *Arceuthobium* (with F. Hawksworth, U.S.D.A. Forest Service).
(c) Analysis of modern pollen surface samples for British Columbia (with N. Alley).
(d) **Use of "pollen indicators" in paleoecology.**
(e) **Palynological detection of settlement horizons** and cultural indicators in lakes.
(f) Tephrochronology of the Bridge River ash (with J. Westgate).
(g) Pollen analysis of archaeological sites, and analysis of plant macro remains from the Lillooet Archaeological Project (with Larry King).

Recent Publications:


Mathewes, R.W., 1978. Pollen morphology of some western Canadian *Myriophyllum* species in relation to taxonomy. Canadian Journal of Botany. 56 (11): 1372-1380.

Mathewes, R.W., 1978. The environment and biotic resources of the Lillooet area. *In:* Reports of the Lillooet Archaeological Project, No. 1, Introduction and Setting. Archaeological Survey of Canada, Paper No. 73: 68-99.

Mathewes, R.W., 1979. A paleoecological analysis of Quadra Sand at Point Grey, British Columbia, based on indicator pollen. **Canadian Journal** of Earth Science, 16(4): 847-858.

**Mathewes, R.W., in press.** Pollen morphology of Pacific Northwestern *Polemonium* species in relation to paleoecology and taxonomy. Canadian Journal of Botany.

White, J.M., Mathewes, R.W., and Mathews, W.H., in press. Radiocarbon dates from Boone Lake and their relation to the "Ice-free corridor" in the Peace River District of Alberta. Canadian Journal of Earth Science.


## UNIVERSITÉ DE MONTRÉAL
*Département de Géographie*

The following summer activities were carried out by the Laboratoire de paléobiogeographie et palynologie:
1. Sampling of four small lakes in the Lake Delorme area, New Québec (100 km west of Schefferville). Paleophytogeography of the Holocene in conjunction with archeological studies.

2. Sampling of two lakes in the Mont Saint-Pierre area, Gaspé Peninsula. **Late Quaternary paleophyto**geography.

3. Sampling of a lake in the Mont Shefford area, Eastern Townships, Québec. Late Quaternary paleophytogeography.

## UNIVERSITY OF CALGARY
*Department of Geology and Geophysics*
(received from L.V. Hills)

Students who recently completed theses:

(1) *Dr. J.T. Tan.* "Late Triassic-Jurassic dinoflagellate biostratigraphy, western Arctic Canada".
(2) *Mr. H. Speelman* (M.Sc.). **"Megaspore palynology** and paleoecology, Foremost Formation (Upper Cretaceous), southeastern Alberta".

Students with theses in progress:

(1) *Mr. Elliot Burden* (Ph. D.). "Palynology of the McMurray Formation". This thesis involves a detailed palynostratigraphic study of the McMurray Formation. Results of this will be compared to sedimentological

models which have been developed in an attempt to aid in selection and refinement of the final depositional model.

(2) *Mr. D. Braman* (Ph. D.). **"Miospore palynology of** Upper Devonian to Lower Mississippian Strata, Mackenzie and Richardson Mountains, northwest Canada". This project is a detailed examination of miospores recovered from the Imperial Formation and its equivalents. All field work has been completed. The Imperial Formation in the type area ranges from about middle Frasnian to middle Famennian, whereas strata equated with it on the Trail River, Yukon, range from ?early Frasnian to middle Tournaisian. Preliminary results indicate that it will be possible to subdivide the strata into several miospore zones.

L.V. Hills Research:

(1) Megaspore palynology which currently involves Famennian and Tournaisian assemblages.
(2) General paleobotany, palynology and stratigraphy of the Beaufort Formation.
(3) A project on the dinoflagellate biostratigraphy of the Sverdrup Basin is continuing and samples from Upper Triassic strata are being examined with the intention of initiating a major research project on this topic.
(4) Palynology of the Belly River Group, Dinosaur Provincial Park, Alberta. Preliminary joint research is being conducted by the Provincial Museum, National Museums and the University of Calgary on the geology of Dinosaur Provincial Park. The purpose is to undertake detailed and integrated studies on the stratigraphy, sedimentation, palynology, vertebrate, and invertebrate paleontology of the Park. **This will** hopefully provide a more detailed and realistic interpretation of the paleoenvironments.
**(5) Paleoclimates of the last 20,000 years. This** project, which involves an integrated approach to paleoclimatology, is sponsored by the National Museums of Canada. Len Hills' involvement is in the compilation and encouragement of research into this time interval for Western Canada.
(6) Re-examination of Devonian megaspores. **Because of** its widespread occurrence, abundance and diversity, *Hystria-Aporites* promises to be an extremely good palynomorph to subdivide Middle and Upper Devonian strata. Therefore, additional specimens of previously described species are being collected, re-examined and their stratigraphic distribution replotted. This work is being done with the intent of providing a key to the species and a refined stratigraphic distribution chart in the Canadian Arctic.

UNIVERSITY OF TORONTO
*Department of Geology*

The following theses have been completed over the last year in the Department of Geology and are principally or entirely concerned with fossil dinoflagellates:

*1978 - Elliott Burden.* Pollen and algal assemblages in cored sediments from Gignac and Second Lake (Simcoe Co., Ontario): relationships with lacustrine facies, geochemistry, and vegetation. M.Sc. Thesis, 178 pp.

*1979 - Ed Davies.* Jurassic and Lower Cretaceous dinoflagellate cysts of the Sverdrup Basin, Arctic Canada: taxonomy, biostratigraphy, chronostratigaphy. Ph.D. Thesis, 591 pp. (2 vols).

*1979 - Peter Hoyer.* Taxonomy and biostratigaphy of dinoflagellates from the Barremian (Lower Cretaceous) stratotype at Angles, France. M.Sc. Thesis, 171 pp.

Completion of the following theses is anticipated in the near future.

*Darrah Artzner.* Biostratigraphic, paleoecologic and taxonomic study of Upper Cretaceous terrestrial and marine palynomorphs of the western Books Cliffs, east-central Utah. Ph.D. Thesis.

*Armando Fasola.* Biostratigaphy and taxonomy of Albian-Santonian dinoflagellates from southern and central Manitoba. Ph.D. Thesis.

*Silvana Poplawski.* Dinoflagellate stratigraphy and paleoecology in the Maastrichtian-Danian interval, Alabama. Ph.D. Thesis.

UNIVERSITY OF MANITOBA
*Department of Earth Sciences*

Vasu Nambudiri recently accepted a two year teaching contract at the University of Dar-es-Salaam. He left Winnipeg in October and will return to Canada in the spring of 1981. He writes that any members of C.A.P. visiting East Africa are invited to visit him at the University of Dar-es-Salaam. **His address is** the Department of Botany, University of Dar-es-Salaam, P.O. Box 35060, Dar-es-Salaam, Tanzania.

## SOCIETIES

ASSOCIATION DES PALYNOLOGUES DE LANGUE FRANCAISE (A.P.L.F.)

The September 1979 issue of the A.P.L.F. Newsletter was recently circulated. It included details of the Symposium "Palynologie et Climats" held in Paris from October 16-18, 1979. Copies of the newsletter may be obtained from the C.A.P. Newsletter Editor.

ARBEITSKREIS FÜR PALÄOBOTANIK UND PALYNOLOGIE (A.P.P.)
(reprinted from the International Organization of Palaeobotany Newsletter 9)

The eighth annual meeting of the A.P.P. was held on April 6-8, 1978 in Heerlen, South Limburg, The Netherlands, under the guidance of Dr. H.W.J. von Ameron and with the assistance of the Rijks Geologisches Dienst. **The 40 participants came from The** Netherlands, West Germany, Belgium, Denmark, Austria, Norway and Sweden. They met at the historical place where Professor Jongmans worked and arranged the first Carboniferous congresses. A further historical touch was given by a field trip to the former mining area of South Limburg and the adjacent areas in Belgium and Germany, where they are still hoisting. The lectures given at the meeting were concerned with megafossils (e.g., The Problem of *Stigmaria*) and microfossils. The papers will be published in Courier Forschungsinstitut Senckenberg 34, Frankfurt am Main 1978 (18DM).

## BRITISH MICROPALAEONTOLOGICAL SOCIETY

The B.M.S. newsletter, the British Micropalaeontologist, number 11 was circulated in October 1979. It includes details of meetings held, future meetings of the Society, reports from the specialist sections of the B.M.S. (microplankton, conodonts, ostracods and foraminifera) and several book reviews. **Membership** currently stands at 330.

## CANADIAN QUATERNARY ASSOCIATION

Several years ago the NRC Associate Committee on Quaternary Research polled those on its mailing list and found that more than 70% favoured the establishment of a Canadian Quaternary Association (CANQUA). This organization has been established and has the following objectives and proposed activities:

1. Regular regional and national topic- or problem-oriented field meetings.
2. A directory of Quaternarists working in Canada.
3. A compendium of current research.
4. A quarterly newsletter to disseminate information.
5. Liaison with international bodies such as INQUA, IGCP, IUGS.
6. Preparation for an INQUA Congress in Canada.

Application forms are available from the C.A.P. Newsletter Editor or from the interim Chief Executive Officer, Douglas R. Grant, Geological Survey of Canada, 601 Booth Street, Ottawa, K1A 0E8.

## CANADIAN SOCIETY OF PETROLEUM GEOLOGISTS (C.S.P.G.)

*Paleontology Group*
(received from Bert van Helden, Chevron Standard Limited, Calgary)

The following palynological talks were given during luncheon meetings of the C.S.P.G. Paleontology Group:

November 28, 1978: "A comparison of spore and pollen assemblages from the Maastrichian and Paleocene of Saskatchewan with those of the Yukon Territory", by A.R. Sweet.
February 20, 1979: "Stratigraphy of the Upper Paleozoic and Lower Triassic of the southern part of the People's Republic of China", by J. Utting.
March 29, 1979: "Late Triassic-Jurassic dinoflagellate biostratigraphy, western Arctic Islands, Canada", by T. Tan.

Copies of the abstracts can be obtained from the C.A.P. Newsletter Editor with the permission of the authors.

A field trip was also held by the Paleontology Group on September 29, 1979, in the Bassano-Gleichen area to collect rocks of the Upper Cretaceous Edmonton Group and Bearpaw Formation for foraminiferal and palynological study.

## COMMISSION INTERNATIONALE DE MICROFLORE DU PALEOZOIQUE

C.I.M.P. Newsletter 21 was circulated in August and includes details of future meetings relating to Paleozoic palynology and the abstracts of palynological papers presented at the Ninth International Congress of Carboniferous Stratigaphy and Geology, Urbana, 1979. The newsletter was accompanied by a membership directory for the C.I.M.P., compiled by Bernard Owens of the Institute of Geological Sciences in Leeds, which lists the officers for 1978-1980: President Serge Jardiné (Boussens, France), Secretary General Bernard Owens (Leeds, England), Past Secretary General Maurice Streel (Liège, Belgium) and 17 Executive Committee Members.

## INDIAN ASSOCIATION OF PALYNOSTRATIGRAPHERS (I.A.P.)

(reprinted from the I.O.P. Newsletter 9)

Indian palynologists have formed this new association, devoted to the augmentation and dissemination of palynological data as a tool for biostratigraphic studies. **The association will support projects of** general interest to palynostratigraphers, provide a platform for the presentation of research studies before a competent and critical audience, and will furnish avenues for the publication of research studies. The I.A.P. plans to publish a journal of an international standard beginning in January 1980. Enquiries should be made to: Dr. H.K. Maheshwari, Birbal Sahni Institute of Palaeobotany, 53 University Road, Lucknow 226 007, India.

The managing council for 1979 is: President, D.C. Bharadwaj; Vice-President, S.C.D. Sah; Secretary, K.P. Jain; Treasurer, R.S. Tiwari; Business Manager, H.P Gupta; Editor, H.K. Maheshwari; Councillors, S.K. Dutta, H.M. Kapoor, C.G.K. Ramanujam, S.K. Srivastava and B.S. Venkatachala.

The I.A.P. circulated the first issue of their newsletter, Patrika, in April 1979. It includes details of appointments, awards, honours, recent publications, upcoming and recent events relating to Indian palynostratigraphy, as well as a list of the initial 23 I.A.P. members. The next issue of Patrika is expected in December 1979.

## INTERNATIONAL COMMISSION FOR PALYNOLOGY (I.C.P.)

The affiliation of five new national and regional palynological societies with I.C.P. within the past year has increased the number of members on the I.C.P. Council to 26 and the number of affiliated societies to 19. These are:

African Committee for Palynology (A.C.P.)
American Association of Stratigraphic Palynologists (A.A.S.P.)
Arbeitskreis für Paläobotanik und palynologie (A.P.P.)
Asociación Latinoamericana de Paleobotanica y Palinologia (A.L.P.P.)
Asociación de Palinológos de Lengua Española (A.P.L.E.)
Association des Palynologues de Langue Française (A.P.L.F.)
British Micropalaeontology Group, Palynology Section (B.P.S.)
**Canadian Association of Palynologists (C.A.P.)**
Collegium Palynologicum Scandinavicum (C.P.S.)
Commission Internationale de Microflore (Microfossiles Organiques) du Paléozoique (C.I.M.P.)
Grupo di Palinologia della Societa Botanica Italiana (G.P.S.B.I.)
Organization of Czechoslovak Palynologists (O.C.P.)
Palaeobotanical Society, Lucknow (P.S.L.)

Palynological and Paleobotanical Association of Australasia (P.P.A.A.)
Palynological Society of China (P.S.C.)
Palynological Society of India (P.S.I.)
Palynological Society of Japan (P.S.J.)
Palynologische Kring (P.K.)
Soviet Palynological Commission (S.P.C.)

Several working groups are presently operating under the umbrella of I.C.P. These are:

A1 "Pollen affinities between monocotyledons and primitive dicotyledons". Convenor: Dr. S. Chandra, Palynological Section, Bose Research Institute, 93/1 Acharya Prafulla Chandra Road, Calcutta - 700009, India.

A3 "Quaternary palynology of tropical mountains". Convenor: Dr. J.A. Coetzee, Institute for Environmental Sciences, University of the O.F.S., Bloemenfontein 9300, South Africa.

A4 "Terminology of pollen grains and spores". Convenor: Dr. J. Muller, Rijksherbarium, Schelpenkada, 6, Leiden - 2404, Netherlands.

P1 "Sedimentary organic matter: identification and maturation". Convenor: Dr. J. Brooks, Geochemistry Section, Exploration Department, British National Oil Corporation, 150 St. Vincent Street, Glasgow G2 4LT, U.K.

P3 "Palynological correlation close to the Jurassic/Cretaceous boundary". Convenor: Dr. S.A.J. Pocock, Imperial Oil Limited, 339-50th Ave., S.E., Calgary, Alberta, T2G 2B3.

P4 "Fossil pollen records of extant angiosperms". Convenor: Dr. J. Muller, Rijksherbarium, Schelpenkada, 6, Leiden - 2404, Netherlands.

Dr. Siwert Nilsson, I.C.P. Vice-President, suggests that readers may wish to recommend additional topics and convenors for future Working Groups. Dr. Nilsson himself would like to see a new group formed "to explore methodology in actuopalynology".

## INTERNATIONAL ORGANIZATION OF PALEOBOTANY (I.O.P.)

I.O.P. Newsletter 8 was circulated in January 1979 and listed the I.O.P. Executive Committee: T. Delevoryas (U.S.A.), President; E. Boureau (France), S. Archangelsky (Argentina), and S.V. Meyen (U.S.S.R.), Vice-Presidents; M.C. Boulter (U.K.), Secretary; D. Dilcher (U.S.A.), R. Weber (Mexico), S. Zhilin (U.S.S.R.), Members at Large; and J. Douglas (Australia), Congress Member.

I.O.P. Newsletter 9 (May 1979) included details of the recent meetings: "The U.S.S.R. Colloquium on the Systematics of Palaeozoic Plants" (Moscow, February 6-8, 1979), and the Linnean Society of London Palaeobotany Meeting (London, Easter 1979) and several discussion on nomenclature in paleobotany.

## ORGANIZATION OF CZECHOSLOVAK PALYNOLOGISTS (O.C.P.)
(received from Dr. B. Pacltová, Charles University, Praha 2, Czechoslovakia)

Czechoslovakia has about 15 palynologists who are employed in various scientific institutions and enterprises. Many of these palynologists are former students of Dr. Pacltová who are presently engaged in a variety of palynological studies on rocks of Precambrian to Quaternary age. The Czechoslovakian palynologists do not have a separate organization, being members of the Paleontological Working Group of the Czechoslovak Society for Mineralogy and Geology, which is itself part of the Czechoslovak Academy of Sciences. Dr. Pacltová is President of the Paleontological Working Group. At present there is no palynological newsletter in Czechoslovakia, but the palynologists closely cooperate with international organizations and with palynologists, paleontologists and biologists throughout the world. They also work closely with the Soviet Palynological Commission.

## PALYNOLOGICAL SOCIETY OF CHINA (P.S.C.)
(received from Dr. Song Zhi-chen, Nanking Institute of Geology and Palaeontology, Academia Sinica, People's Republic of China)

The Palynological Society of China was formed in March 1979 in Tianjin. It now has a membership of about 200. The Executive of the P.S.C. consists of Prof. Hsu Jen (Chairman), Song Zhi-chen and Xing Yu-sheng (Vice-chairmen), Yang Ji-duan (Secretary), and Sun Xiang-jun and Ouyang Shu (Assistant-Secretaries).

## SOVIET PALYNOLOGICAL COMMISSION (S.P.C.)

The following information is abstracted from a circular of the S.P.C. issued in 1978. An English translation of the circular can be obtained by writing to the C.A.P. Newsletter Editor.

The S.P.C., which celebrated its tenth anniversary in 1978, has an Executive consisting of 28 palynologists. The first three years' work of the Commission coincided with the preparation of the Third International Palynological Conference which took place in Novosibirsk in 1971.

At that time an index to palynologists of the Soviet Union was begun. There are presently over 700 Soviet palynologists of various specializations, working in more than 200 laboratories or institutes affiliated with the Academy of Sciences, the Ministry of Geology, the petroleum and gas industry, higher and secondary education, agriculture and even the Ministry of Justice. The majority of palynologists are engaged in geological survey work.

Each month the Commission holds a meeting in which reports are presented. Some of these meetings are held jointly with the Section of Palynology of the Moscow Branch of the All-Union Botanical Society and they are then generally devoted to the subject of contemporary palynology including the morphology of pollen and spores and the palynology of Neogene-Pleistocene deposits.

The Commission has organized various Palynological Sections within the Soviet Botanical and Paleontological Societies and their branches in Vladivostok, Tbilisi, L'vov, Yakutsk, Tyumen', Novosibirsk, Kiev, Minsk, Krasnoyarsk, Alma-Ata, Leningrad and Moscow. These sections have to a considerable extent united palynologists working in different institutes and have facilitated their contact with the S.P.C.

The Commission constantly initiates colloquia and conferences such as:
(1) Devonian spores from the Russian Platform.
(2) Colloquia on the palynological basis for

defining boundaries of strata have been held at Vilnius, Volgograd, Artemovsk and Perm'.
(3) A conference on "Methods of stratigraphic investigations" held in Volgograd in 1977 raised the question concerning the search for palynological criteria for determining the catagenesis of organic matter.
(4) In the North-Eastern Complex Scientific Research Institute of the Far-Eastern Scientific Centre of the Academy of Sciences, methodological seminars have been held, with particular emphasis on the application of palynological data, stratigraphy, and the morphology of the pollen wall.

Several working groups of the S.P.C. are currently active:
(1) "Palynological correlations of Late Cretaceous-Paleogene deposits", consisting of 12 specialists, holds conferences every two or three years.
(2) "Marine palynology" which includes a group of palynologists carrying out studies on material from deep-sea drilling.
(3) "Palynology of marginal facies", which organized a special symposium at the Fourth International Palynological Conference in Lucknow, 1977.
(4) "Palynological criteria for determining the degree of catagenesis of organic material", which conducts experiments on this problem.
(5) "The stages of the development of the Jurassic-Early Cretaceous flora", whose Executive and working members have not yet been fully selected.

## PALYNOLOGY IN CHINA

Several Canadian palynologists have visited China during the past year and we were pleased to welcome Dr. Ouyang Shu, a palynologist from the Nanking Institute of Geology and Palaeontology on his tour of Canada. **Below are the accounts of visits to China by** Colin McGregor and Geoff Norris and details of Dr. Ouyang Shu's trip written by his guide, John Utting.

### VISIT TO CHINA

(received from D.C. McGregor, Geological Survey of Canada, Ottawa)

I visited the People's Republic of China in June as part of a delegation of the I.U.G.S. Subcommission on Devonian Stratigraphy. The trip was not primarily palynological, but I did have the opportunity of visiting some palynological laboratories, and discussing palynology with people in Beijing (Peking) and Nanjing (Nanking). Reports on visits to China are **very popular these days. My reason for writing yet** another is that I hope I can offer some new bits of useful information. Other reports of a general nature on this same trip may be found in the October 1979 issue of "Geotimes" and in the October 1979 issue of "Episodes". **Names in this report are given in the new** "pinyin" spelling that is now the official system of transcription in China.

In China there may be about 500 professional palynologists, that is those doing palynology full time. **Those whom I asked were not sure of the exact** number. Many are in oil or coal production units, for example in Xian and Kunming. In addition, I was told that a number of workers are doing palynology part-time, along with coal petrology, conodont studies, etc. **The Palynological Society of China, formed** early in 1979, has about 200 members, none of whom are students.

There are palynologists on the staffs of Beijing and Nanjing Universities, and at geological research institutes in Xian, Kunming, Chengdu, Changchun, Tianjin, Urumqui, and several other federal and provincial institutes. The three major centres of palynological research are the Beijing Institute of Botany and the Nanjing Institute of Geology and Palaeontology, both part of Academia Sinica, and the Geological Institute of the Academy of Geological Sciences in Beijing. **The Beijing Institute of Botany, which** the S.D.S. delegation did not visit, concentrates mainly on Precambrian, Cretaceous, and Cenozoic palynology under the leadership of Hsu Jen. **The other** two institutes are also studying the Paleozoic and have begun to publish their results.

The palynological laboratory of the Geological Institute in Beijing is carrying out stratigraphically oriented research on the Precambrian and most of the Phanerozoic systems. There are about 20 palynologists on the staff, headed by Xing Yusheng. A small but active group of five is concerned with the Precambrian and Paleozoic. Xing Yusheng, Liu Kuizhih, and Kao Lianda have obtained leiospherid acritarchs from strata representing most parts of the Sinian "Superathem" ("Sinian" *sensu lato*) in the Yangtse Gorges **and elsewhere. They claim to have made stratigraphic**ally significant correlations with acritarchs from the Precambrian of the Soviet Union, described by B.V. Timofeev. **Liu Kuizhih has manuscripts in preparation** on Early Cambrian and Ordovician (Tremodoc) acritarchs of North China. **Kao Lianda and Hou Jingpeng have** published descriptions of Early and Middle Devonian (Siegenian to Eifelian) spores from marine strata of the Danlin, Shujiaping and Longdongshui Formations of Guizhou (Kweichow) Province, and Early Devonian spores, acritarchs, and chitinozoans from the Nakaoling Formation of Liujing, Guangxi. Hou Jingpeng is preparing a manuscript on some highly carbonized spores from Devonian-Carboniferous boundary beds of South China. **Xing Yusheng has co-authored a paper (Xiang** *et al.*, 1975) in which he described spores from the Yaoji Group of western Sichuan (Szechwan) in beds that contain Pragian graptolites.

At the Nanjing Institute of Geology and Palaeontology, Laboratory I (palynology) does both service reports on samples submitted by field geologists and exploration teams, and palynological research on the Precambrian and the Phanerozoic. **There are 19 pro**fessional palynologists on staff. The head of the laboratory is Song Zhishen and the deputy head is Zhang Lujin. Laboratory I, like the other laboratories of the institute, is concentrating its studies on South China. The palynologist in charge of the Late Paleozoic group of Labratory I, Lu Lichang, is studying Givetian spores of Yunnan and Frasnian spores of Sichuan. His assemblage from Yunnan occurs in the Haikou Formation (=the Haikou Member of the Huaning Formation) in rocks he says are no younger than Givetian, based on the presence of *Protolepidodendron scharyanum* and *Stringocephalus*. The most interesting aspect of this is that the spore assemblage contains *Archaeoperisaccus* and *Nikitinsporites*, neither of which is known in rocks older than Frasnian anywhere else in the world. **I was also shown some photographs** of "Frasnian" spores from near Dukou in southernmost

Sichuan, that look younger than claimed, possibly Famennian. I did not have time to examine either of these assemblages in detail. If the stratigraphic information is correct, and the preparations are not contaminated, these assemblages obviously would have important zonal and paleogeographic implications. Lu Lichang and Ouyang Shu have co-authored papers on Early Devonian miospores from the Xujiachong Formation and Givetian megaspores from the Haikou Formation. Ouyang is also studying Late Carboniferous, Permian, and Triassic spores from North and South China. He is now preparing a manuscript on Permo-Triassic spores of Yunnan.

The Chinese palynologists are still suffering from a shortage of foreign literature, up-to-date equipment and laboratory techniques, but this situation is improving fast. They are anxious to exchange publications, and are not shy about divulging unpublished information. They have a potential advantage commonly lacking in the West, in their tendency to concentrate large groups of paleontologists of similar and diverse specialities, as at the Nanjing and Beijing Institutes. This should be a considerable stimulus to the development of excellence in their biostratigraphy. Their new Palynological Society may be the means of promoting greater communication among palynological laboratories in various parts of China.

The volume of published paleontological (and other) literature in Chinese seems sure to increase sharply in the next few years unless there is a major policy reversal in China. It follows that, as this literature proliferates, scientists outside China will experience a major communication gap with Chinese workers unless they have some way of obtaining translations of the most significant publications. Canadians will certainly feel this deficiency. The Translation Bureau of the Secretary of State Department must rely mainly on free-lance translators to cope with Chinese geological literature. Large volumes of translation would exceed the budgets of most scientists outside the public service.

## CHINESE PALYNOLOGICAL CONFERENCE

Geoff Norris attended the First All-China Palynological Conference in Tianjin (Tientsin), People's Republic of China, from 15-17 March at the invitation of the Academia Sinica and the Ministry of Foreign Affairs, Peking. A total of 230 palynologists registered for the week-long conference representing somewhat less than half the total number of palynologists in China who are distributed amongst approximately 50 research or technical service organizations. Plenary sessions occupied the mornings at which Geoff presented a number of separate papers on Cretaceous and Quaternary topics and general methods in palynostratigraphy. Specialist symposia and working groups split up into Precambrian, Paleozoic, Mesozoic, Cenozoic, Quaternary and methodological themes during the afternoons. Many of the papers are in press awaiting publication delays of several months to several years depending at what point in the Great Proletarian Cultural Revolution they were written. A total of 208 papers were presented at the Conference of which the following are selected as representative of the type of contributions offered:

1. Hsü Jen (Palaeobotanical Laboratory, Institute of Botany, Academia Sinica, Peking) "Recent advance in palynological researches".
2. Sing Yushen (Palaeontology Laboratory, Division of Palaeontology and Stratigraphy, Institute of Geology and Mineral Resources, Chinese Academy of Geological Sciences, Peking) "Sinican-Cambrian microflora of Kunming, Yunnan, and its stratigraphical significance".
3. Gao Ruiqi (Palynology Laboratory, Petroleum Headquarters of Daqing Oil Field) "Evolution of the Cretaceous angiosperm pollen from Songliao Plain and its significance".
4. Sun Xing-jan (Palaeobotanical Laboratory, Institute of Botany, Academia Sinica, Peking) "Palynoflorical provinces of Late Cretaceous-Palaeocene of China".
5. Song Zhishen (Nanking Institute of Geology and Palaeontology, Academia Sinica, Nanking) "Late Cretaceous and Early Tertiary floristical provinces of China".
6. Li Wenyi (Palynology Laboratory, Institute of Geography, Academia Sinica, Peking) "Some problems of the Late Pliocene-Early Quaternary vegetion and palaeogeography of China".
7. Shi Yichen (Palaeobotanical Laboratory, Institute of Botany, Academia Sinica, Peking) "Pollen morphology of Piperales and its systematic position".

Chinese palynologists have a thorough knowledge of the literature but are impeded to some extent by a lack of access to certain techniques and particular items of equipment. The general mood, however, is optimistic that these items will become available in the near future because of the introduction of the "Four Modernizations" program at the National Science Conference held in Peking in March, 1978. Modernizations in agriculture, industry, national defence, and science and technology were identified as key areas for development.

Later in the week, the Palynological Society of China was officially constituted with an initial membership of just under 200. Membership is limited to those considered to have professional qualifications. A large number of palynologists at the Conference were quite young with university training equivalent to the Bachelor's level. University graduate programs are beginning again after the dismantling of universities during the sixties. Graduate programs in geology are anticipated within the next year or two. Meanwhile, professional training is accomplished effectively by apprenticeship in a laboratory after undergraduate training at a university.

Policies over the last decade have also had an effect on the linguistic ability of scientists. Most palynologists who Geoff met under about 40 years of age could not speak a foreign language since this was previously not encouraged, but many of the older scientists, particularly those educated in the west, could speak very good English. However, English is now encouraged in many segments of the population, and English language instruction is broadcast frequently on the radio, being eagerly studied by waiters, shop assistants, and factory workers on the job. Most of the younger palynologists can read English and hence have a good grasp of the literature. Conversation was made possible through excellent interpretors including Duan shuyin, a student in paleobotany at the Botanical Institute of Peking, who accompanied Geoff to the Conference. It was interesting to note, however, that Duan shuyin had almost as much trouble making herself understood using northern dialect Chinese in southern China where she is working on Mesozoic plants as Geoff did in northern China with his very limited mandarin.

Probably the longest five minutes in Geoff's life occurred when he addressed the entire conference with a short speech in Chinese. He was told later that more than half of the speech was intelligible, but it did not seem like it at the time! Greater success was achieved in Latin, which provided easy communication on Quaternary plants. All those years immersed in Caesar's Gallic Wars Book V were not wasted after all.

While in Peking, being Secretary-Treasurer of I.C.P., Geoff met the Vice-President of the Chinese Scientific and Technical Association, Pei Lisheng. Scientific work in the earth sciences in China is ultimately administered by the State Council. The research arm of these efforts is vested in Academia Sinica which has institutes and branches at various locations. The exploration and applied aspects of geological work are undertaken by the State Bureau of Geology which carries out preliminary prospecting. Prospective properties are then handed over to the appropriate state ministry for further development. These include the Ministries of Coal, Petroleum, Base Metals, and Industrial Minerals.

Perhaps the largest paleontological organization in the world is the Nanking Institute of Geology and Paleontology in Nanking. This began in 1950 as the Institute of Paleontology with 25 scientists distributed amongst 3 divisions - paleobotany, invertebrate, and vertebrate fossils. In 1955 it separated into two institutes with the vertebrate division joining anthropology in Peking. The Nanking Institute now employs about 160 scientists and technicians including 22 in the palynology section which is headed by Sung tzechen. The Institute is responsible for several serial publications and managed to continue publishing during the Cultural Revolution but at the price of suppressing names of the authors in favour of pseudonyms. Thus the book on Tertiary dinoflagellates of the Bohai Gulf which appeared last year authored by "Jiabo" is actually the work of three palynologists - Sung tze-chen, He cheng-guan and Qian zeshu. "Jiabo" is a collective name based on the Chinese word for dinoflagellate (jia zau) and a reference to the geographical region investigated. The book on Tertiary spores and pollen of Bohai by "Ke et Shi" was actually the work of five authors - Sung tze-chen, Tsao liu, Zhou he-yi, Guan zue-ting, and Wang ke-de. The collective name was derived by reference to the two scientific institutions involved (Nanking Institute and Shanghai Oil Ministry). According to I.C.B.N. Articles 46 B and 46 C (which seem to be relevant) new taxa should be ascribed to Sung *et al.* for the spore-pollen book and to Sung *et al.* or Jiabo ex Sung *et al.* for the dinoflagellates.

## CHINESE VISIT TO CANADA
(received from John Utting)

Ouyang Shu, a palynologist at the Nanking Institute of Geology and Palaeontology, was in Canada from August 18th to September 15th. His work in China is on the palynology of rocks of Precambrian, Late Paleozoic and Triassic age. Ouyang was a member of a five-man scientific exchange delegation from the People's Republic of China; the visit was in return for one made last year by a Canadian delegation which studied Permian and Triassic biostratigaphy of China and which was organized by W.W. Nassichuk of the Geological Survey of Canada (C.A.P. Newsletter vol. 1, no. 2, 1978).

The Chinese delegation spent the first 10 days in this country on a field excursion led by J.W.H. Monger (G.S.C. Vancouver); they were shown the general stratigaphy and tectonic geology of the region between Victoria and Calgary. The party then stayed several days in Calgary and participated in three one-day field trips to the Rockies led by E.W. Bamber (I.S.P.G., Calgary), R. Thompson (I.S.P.G., Calgary) and A. McGugan (University of Calgary). During the remainder of the time in Calgary they visited various organizations including the Institute of Sedimentary and Petroleum Geology, Petro-Canada, and the Department of Geology, University of Calgary. Ouyang Shu gave a talk at the university entitled, "Palynology in China during the last thirty years".

For the last 10 days of the delegation's visit the group was divided into smaller units. Ouyang Shu, along with Zhou Zuoxia, went on an excursion to eastern Canada (Zhou Zuoxia's speciality is ophiolites and plate tectonics and he works at the Institute of Geology, Peking). The aim of this excursion which was led by J. Utting and G. Tsang of Petro-Canada, was two-fold; firstly, to spend time in the field investigating Paleozoic rocks, and secondly, to visit certain scientific institutions in order that Ouyang Shu and Zhou Zuoxia could establish personal contact with those working on similar aspects of geology as themselves. Field excursions were made to Lower Paleozoic rocks of the Hamilton and Niagara areas of Ontario (led by G. Norris, University of Toronto), to the Quebec City area of Quebec (led by B. Grainger and R. Trempe of SOQUIP), and to Precambrian, Paleozoic and Triassic rocks of Nova Scotia (led by J.D. Keppie and P.S. Giles, Nova Scotia Department of Mines and Energy). Organizations visited included the following:

Ontario Science Centre, Toronto; Department of Geology, University of Toronto, Toronto; Geological Survey of Canada, Ottawa; Earth Physics Branch, Department of Energy, Mines and Resources, Ottawa; Department of Geology, Laval University, Ste. Foy, Québec, Societé Québécoise d' Initiatives Pétrolières, Ste. Foy, Québec; Institut national de la recherche scientifique, Ste. Foy, Québec; Atlantic Geoscience Centre, Geological Survey of Canada, Bedford Institute, Dartmouth; Department of Geology, Dalhousie University, Halifax; Department of Geology, University of Montreal; Department of Geology, McGill University, Montreal.

## CALENDAR OF EVENTS

### 1980

March 1: Geobotany, An Integrated Experience. Conference to be held at Bowling Green University. Details from Dr. Robert C. Romans, Department of Biological Sciences, Bowling Green University, Bowling Green, Ohio 43403, U.S.A.

June 29-July 6: Fifth International Palynological Conference (VI P.C.), Cambridge, England. Details from Mrs. G.E. Drewry, Department of Geology, Sedgwick Museum, Downing Street, Cambridge CB2 3EQ, England.

THOUGHTS ON GEOCHRONOLOGY

by Hal Steacy

"It's that Paleozoic nut. He wants to know if you can extend the precision a little, say to the year."

July 7-12: First International Palaeobotanical Conference, England. This conference, which is scheduled to immediately follow VI.P.C., will be hosted by the Linnean Society. The program will include field excursions and lecture sessions, the latter held in Reading. Details from Peter Crane, Department of Botany, Plant Science Laboratories, University of Reading, Whiteknights, Reading RG6 2AS, England.

July 19-25: British Micropalaeontological Society Symposium on "The Micropalaeontology of Shelf Seas, Fossil and Recent", Hull University, England. Details from Dr. M.D. Brasier, Geology Department, The University, Cottingham Road, Hull HU6 7RX, England.

July: Paleomycological Symposium, Paris, France. This meeting will discuss the fungal affinities of Chitinozoa or Chitinomycetes and other *incertae sedis* chitinous organisms from the Upper Precambrian to the Devonian. Details from the Laboratoire de Micropaleontologie, Ecole Pratique des Hautes Etudes, 8 rue de Buffon, 75005 Paris.

1981

September: Hexrose Conference on Modern and Fossil dinoflagellates, Tübingen, Germany. This conference will follow similar themes to those of the Penrose Conference on dinoflagellates held in Colorado Springs in April 1978. These will include dinoflagellate morphology, biology, morphogenesis, ecology/paleoecology, classification, evolution, and methods and techniques. Details from Dr. Hans Gocht, Institut und Museum für Geologie und Paläontologie, Sigwartstrasse 10, D-7400 Tübingen 1 or Dr. Harald Netzel, Institut für Biologie III der Universität Tübingen, Auf der Morgenstelle 28, D-7400 Tübingen 1.

1982

August: Second International Conference on Aerobiology, Seattle. Details from Dr. R.L. Edmonds, College of Forest Resources, University of Washington, Seattle, Washington 98195, U.S.A.

September: Meeting on the "Palynology of the North Atlantic Margin", at Trinity College, Dublin. This meeting, which will be jointly organized by the American Association of Stratigraphic Palynologists and the Commission Internationale de Microflore du Paléozoique, will include three days of technical meetings followed by one to two days of excursions to the Paleozoic rocks of Eire. Details from either Geof Clayton or Ken Higgs, Trinity College, Dublin, Eire.

## CONFERENCES

FIFTH INTERNATIONAL PALYNOLOGICAL CONVERENCE, CAMBRIDGE, 1980
(reprinted from I.C.P. Newsletter, volume 2, number 1)

The Chairman of the Organizing Committee of the Fifth International Palynological Conference, Dr. Norman F. Hughes, reports that responses received by January 1979 to the First Circular (mailed June 1978) indicate that about 600 palynologists and 150 accompanying members plan to attend the 5th I.P.C. in Cambridge, June 29 to July 6, 1980.

The Second Circular, mailed in April of this year to all who responded to the First Circular prior to October 31, 1978, includes registration, accommodation, excursion and abstract forms. Only those who complete the registration form by December 1, 1979 will be placed on the mailing list for the Third Circular, which will appear in the Spring of 1980 with final details of the Conference.

All inquiries and requests for further information should be addressed to the Secretary of the Organizing Committee of the 5th I.P.C.: Mrs. G.E. Drewry, Department of Geology, Sedgwick Museum, Downing Street, Cambridge, CB2 3EQ, England.

PALYNOSTRATIGRAPHY SYMPOSIUM

Dr. Claude Caratini, Secretary of the A.P.L.F., announces that their Society is interested in organizing a Special Symposium on Palynostratigraphy in conncection with the XXVI International Geological Congress to be held in Paris, July 7-17, 1980. All palynologists wishing to attend this symposium should write as soon as possible to the convenor, Dr. J.J. Chateauneuf, Bureau de Rech. et Min., B.P. 6009, 45018 Orléans Cedex, France.

HARVARD FOREST WORKSHOP, September 1979
(received from Pierre Richard)

From September 20 to September 24, 1979, a workshop was held at the Harvard University Forest (Massachusetts) on northeastern North American Quaternary palynology. Among the 30 invited participants were some members of C.A.P. (Thane Anderson, Jock McAndrews, Bob Mott, Alayn Larouche, Claude Labelle, James Ogden III, Pierre Richard). The purpose of the workshop was to

foster communication about research of mutual interest in northeastern North America. Prominent guests were Bill Watts (Ireland) and Brian Huntley (England), who entertained the participants on the Late Glacial and on Holocene isopoll and isochrone maps from northwestern Europe respectively. Much was gained through discussion, poster sessions and microscopic observations of pollen grains and spores.

## RECENT PUBLICATIONS

A.A.S.P. Contribution Series Number 5B, Volume 2, "Mesozoic Palynology", 1979, 157 pp. This volume contains six papers on various groups of marine and non-marine Mesozoic palynomorphs. Further details of this volume and Palynology, Volume 3 (see below), may be obtained from Robert T. Clarke, Mobil Research and Development Corporation, Field Research Laboratory, P.O. Box 900, Dallas, Texas, 75221, U.S.A.

Anderson, T.W., 1979, "Stratigraphy, Age, and Environment of a Lake Algonquin Embayment Site at Kincardine, Ontario". Current Research Part B, Geological Survey of Canada Paper 79-1B, pp. 147-152.

Cwynar, L.C., Burden, E. and McAndrews, J.H., 1979, "An inexpensive sieving method for concentrating pollen and spores from fine-grained sediments". Canadian Journal of Earth Sciences, 16(5), pp. 1115-1120.

Gillespie, W.H., Clendening, J.A., and Pfefferkon, H.W., 1978, "Plant Fossils of West Virginia and Adjacent Areas", West Virginia Geological Survey, Ed. Series ED-3A, 172 pp. Available from the Publication Section, West Virginia Geological and Economic Survey, P.O. Box 879, Morgantown, West Virginia 26505. Price $3.00 U.S.

Kremp, G.O.W., 1979, "Oligocene to Pliocene Palynological Literature: Fifteen Hundred Implemented References". Publication No. 12 of PALYNODATA, 183 pp. Available from PALYNODATA, 101 N. Avenida Carolina, Tucson, Arizona 85711. Price $18.00 U.S.

Lerbekmo, J.F., Singh, C., Jarzen, D.M. and Russel, D.A., 1979, "The Cretaceous-Tertiary boundary in south-central Alberta - a revision based on additional dinosaurian and microfloral evidence". Canadian Journal of Earth Sciences, 16(9), pp. 1866-1869.

Mathewes, R.W., 1979, "A paleoecological analysis of Quadra Sand at Point Grey, British Columbia". Canadian Journal of Earth Sciences, 16(4), pp. 847-858.

Palaeontological Association Special Paper in Palaeontology No. 23, "The Devonian System", edited by House, M.R., Scrutton, C.T. and Bassett, M.G., 353 pp., 1 pl., 102 text-figs. This publication contains 28 papers including seven on the biostratigraphy of Devonian calcareous algae, macrofloras, spores, acritarchs, Protozoa, ostracods and conodonts. Cover price £30 or $60 U.S. from the Palaeontological Association.

PALYNOLOGY, Volume 3, 1979, 300 pp., published by the American Association of Stratigaphic Palynologists Foundation. This volume contains 14 papers and the abstracts of the Tenth Annual Meeting of the A.A.S.P. held in Tulsa, Oklahoma.

Pirozynski, K.A. and Weresub, L.K., 1979, "The classification and nomenclature of fossil fungi". This paper comprises Chapter 26 (pp. 653-686) in volume 2 of "The Whole Fungus, The Sexual-Asexual Synthesis", edited by Bryce Kendrick, which forms the Proceedings of the Second International Mycological Conference held at the Environmental Sciences Centre of the University of Calgary. The two volumes consist of 793 pp. with numerous line drawings and half-tone plates and cost $18 (including postage) from W.B. Kendrick, Department of Biology, University of Waterloo, Waterloo, Ontario N2L 3G1. They are co-published by the National Museum of Natural Sciences, National Museums of Canada and the Kananaskis Foundation.

Terasmae, J. and Weeks, N.C., 1979, "Natural fires as an index of paleoclimate". Canadian Field-Naturalist, 93(20), pp. 116-125.

Wille, W. and Gocht, H., 1979, "Dinoflagellaten aus dem Lias Südwestdeutschlands". N. Jb. Geol. Paläont. Abh., 158(2), pp. 221-258.

## REVIEWS

*Distribution of Biostratigraphically Diagnostic Dinoflagellate Cysts and Miospores from the Northwest European Continental Shelf and Adjacent Areas*
Ed. Bindra Thusu, Continental Shelf Institute, Trondheim, Norway, 1978.

One of the beneficiaries of the recent upsurge in scientific publications is that least heralded and perhaps least appreciated of all writers, the book reviewer. It is he who theoretically influences the reader into rushing out to purchase the reviewed work or deciding to invest his money in some more profitable enterprise. Such a weighty responsibility must be taken seriously by every reviewer, who otherwise could cause chaos in a country's economy. The survival rate of this breed however is considerably diminished when faced with a tome of several hundred pages which requires several days concentration. Such trepidation is pleasantly dispelled by publications such as the present work edited by Bindra Thusu. This is 111 pages in total with only thirteen pages of text, the rest being devoted primarily to range charts and plates.

The publication results from a symposium held in Léon, Spain, on Mesozoic and Tertiary dinoflagellate cysts from the northwest European continental shelf and adjacent areas. It includes papers by R. Harland (Quaternary and Neogene dinoflagellate cysts), S. Duxbury (Early Cretaceous dinoflagellate cysts), R.J. Davey and L.A. Riley (Late and Middle Jurassic dinoflagellate cysts), S.J. Morbey and R.E. Dunay (Early Jurassic to Late Triassic dinoflagellate cysts and miospores), B. Thusu (Aptian to Toarcian dinoflagellate cysts in arctic Norway), and D.J. Batten (Early Cretaceous to Middle Jurassic miospores and palynofacies of the northwest European continental shelf). The chapters are listed as they appear in the volume with the title taken verbatum from the contents. This to me reflects one of the very few weaknesses of this publication. In the introduction, Bindra Thusu states: "The down-hole treatment followed by the contributing authors for the Early Cretaceous to Late Triassic is an established procedure for routine analysis of well

material, and is retained herein for its practical utility". I can appreciate that wells must be analyzed from top to bottom but remain a firm believer in presenting stratigraphy in order of occurrence. Consequently I would have opted for a reversal in the order of some of the chapters with the Morbey and Dunay contribution coming first. I also prefer inverting the chapter headings so that Harland's would read "Neogene and Quaternary dinoflagellate cysts". This seems desirable especially if the publication is purchased by palynologists of all persuasions.

Each chapter shows a commendable consistency in format. A brief written section precedes the range charts and plates, which are the main justification for the publication. The range chart format is standardized with genera and species being listed alphabetically and reference being given besides the name to any accompanying illustrations. They are a delight to work with and an example to other compilers. To satisfy the purists, an all-encompassing range chart (Table II) presents the species in order of youngest occurrence, extinction, top or first occurrence, according to which phraseology you use. The range charts alone are well worth the cost of this volume.

The plates throughout are superb and specimens are generally X500 magnification; this is invaluable for comparison of size. The only possible improvement would have been to illustrate the species in alphabetical order, but personally being aware of the difficulties of plate composition makes me realize that this was probably impossible. The plate legends vary in degree of detail with some authors giving slide number and coordinates, some slide numbers only, and others not even that. Fortunately all give stratigaphic information although order of presentation is not compatible. These are very minor criticisms of such excellent illustrations and legends.

All authors have endeavored to keep the written work to a minimum. This is laudable in view of the belief that length equates with quality, the more pages, the more significant the contribution. Einstein's theory of relativity took three pages so by today's standards may not even have rated a mention. However I would have appreciated more justification of ranges in most of the chapters similar to that given by Thusu. His chapter was also enhanced by a location map and a table listing stratigraphical and paleontological details of dinoflagellate assemblages. It would have been advantageous for each chapter to feature a location map, so that for instance one would know where well 7/12-4 was located in the North Sea, or even who drilled it. There is some incompatibility between certain chapters so that Harland gives author and date for each species both in the text and plate legends, whereas Duxbury and Davey and Riley do not. Again this is a minor criticism.

The only weaknesses of any import are the failure to provide range charts for the Late Cretaceous-Early Tertiary dinoflagellates, the very secondary role of spores and pollen, and the total reliance on stage terminology. The first omission according to the Introduction is because, "Little attention is given to Tertiary and Late Cretaceous dinoflagellate cysts in routine biostratigaphic analysis as foraminifera and nannofossils offer more economic, rapid and accurate age dating of cores and cuttings". This may be a misconception especially in areas such as the North Sea where flysch-type agglutinated foraminifera may predominate in the Early Tertiary. Studies of similar assemblages from the Labrador Shelf have been fruitful, in part because of the available palynological zonation. It would be surprising to hear that all companies active in the North Sea ignore the palynomorphs in the Late Cretaceous and Early Tertiary. Coverage of this part of the column would have resulted in a more complete publication.

The tendency to omit spores is avoided in the chapter by Morbey and Dunay. Batten to some extent fills the void by discussing spore assemblages but states explicitly that miospores are of secondary importance to dinoflagellate cysts. As an advocate of the usefulness of dinoflagellates in biostratigraphy, this is music to my ears. Over the years however I have mellowed and now grasp at any straw (or palynomorph) when analyzing wells. This has led me to a much greater appreciation of spores and pollen in practicing the art of palynostratigraphy. I would therefore have benefitted from a more comprehensive set of range charts for spores and pollen, which are invaluable for unravelling the mysteries of nonmarine sediments.

The avoidance of biozones is understandable if we consider the potential market for the book. The drawback of this course of action is that too much emphasis is placed on the European stages. If one can be absolutely certain of the overall ranges of individual species this is permissible. Rarely do we have such control if we are running wells so that it is often safer to use biozones. This is purely a personal opinion but may also be helpful to the oil company palynologist. We cannot change the age of the stage but can change the age of the biozone.

The Jurassic-Early Cretaceous dinoflagellate assemblages of the North Sea show some marked differences to those of coeval sediments on the Scotian Shelf of southeastern Canada. This immediately suggests paleoenvironmental control. Locally this may be a factor but regionally can be discounted especially in the Early Cretaceous where we have nonmarine to bathyal deposits on the Scotian Shelf. A more plausible explanation is provincialism. To test this theory I am presently plotting the geographic occurrence of all species which occur coevally in the North Sea and on the Scotian Shelf. This is possible solely because of the present publication which provides a plethora of information and permits meaningful comparison of the two areas for the first time.

The palynologists of the Geological Survey of Canada play a dual role in providing biostratigraphic data and carrying out visual kerogen analyses. The latter are proving invaluable in making predictions of source rock potential and substantiating peripheral studies such as gas chromatography and heat flow. I am therefore gratified to note the discussion of palynofacies by David Batten in this publication. The chapter is informative but does not include definitions of the recognized types of palynofacies or observations on the thermal alteration. Some text figures showing relative percentages of the different types plotted against time, or compared with vitrinite reflectance data, would help to highlight the prospective intervals. Otherwise it is an extremely valuable addition to the publication.

Ultimately I must conclude this review if primarily to avoid the distinction of producing the first

critique with a more verbose text than the book being appraised. I am extremely impressed by the quality and practical applicability of this volume, and unhesitatingly recommend its purchase by all palynologists interested in the Mesozoic and Cenozoic. The editor and all the contributing authors deserve the highest praise for maintaining such high standards in completing their allotted tasks. Reviewing this publication has been very pleasant and very rewarding. Hopefully it will initiate a trend to less verbosity and more concise expression, a much needed respite in today's world.

Graham L. Williams

The following review is reprinted from the I.C.P. Newsletter, volume 2, number 1.

*Pollen Flora of Argentina: Modern Pollen and Spore Types of Pteridophyta, Gymnospermae, and Angiospermae*
by Vera Markgraf and Hector D'Antoni. 208 pp., 10 text-figs., 43 plates (including 374 species). The University of Arizona Press, Tucson, Arizona, 1978. Price $9.50 U.S.

The authors became interested in reconstructing the Quaternary vegetation history of Argentina by pollen analysis. However, due to a paucity of pertinent literature for the region, they found it necessary to first establish a reference collection of the pollen of Argentine plants in order to accomplish their goal. For those who might believe that Calvin Heusser's (1971) excellent "Pollen and Spores of Chile" would serve the needs of Argentine palynologists, it is pointed out that, despite the geographic proximity of Chile, the pollen floras of these two countries share only 20 percent of the genera and 12 percent of the species. Accordingly, the stated purpose of this book is to provide an aid to future paleopalynologic investigations of the southern part of South America, whether they involve paleoecologic, paleoclimatic or archeologic problems. Nevertheless, because of the broad floral range occurring in Argentina, from subtropical to subantarctic taxa, the present work will be of value to palynologists in other parts of the world as well - for example, the similarity of the desert vegetation of northwestern Argentina to that of the southwestern United States (often with identical genera) renders this collection of pollen types of value to palynologists studying the latter region. Similarly, the tropical pollen types of northern Argentina often have a broad neotropical distribution.

An interesting and particularly valuable contribution of the authors in this publication is the subdivision of pollen types into separate keys for the four plant geographic provinces (as defined by Cabrera, 1956): 1) Amazonic (subtropic forests of northern Argentina); 2) Chaqueno (xerophilous, deciduous forest); 3) Andean-Patagonian (open grass or scrub steppes of higher altitudes); and 4) Subantarctic (mixed southern beech forest).

The pollen descriptions and photomicrographs are placed in alphabetical order by Family. All palynologic terms utilized are clearly defined in an 8-page Glossary. The book is in a plastic ring-bound 8½ x 11" format, which facilitates its use in the laboratory when making microscopic identifications of unknown grains in strewn slides. This volume is dedicated to "the pioneers of Southern Hemisphere palynology", Lucy Cranwell-Smith and Vaino Auer. Mrs. Smith provides an historically illuminating Foreword, and the authors have written their Introduction in both English and Spanish.

Although this reviewer has only made a few cursory checks of the pollen keys, they seem to be carefully devised. An index to both descriptions and illustrations of the 374 species is provided, as well as an index to the Spanish common names of these species. The authors are to be congratulated for this contribution to the science of palynology, and in these inflationary times, at a very reasonable price.

The following review is reprinted from the International Organization for Palaeobotany Newsletter 9

*Paläozoische und Mesozoische Floren Eurasiens und die Phytogeographie dieser Zeit*
by V.A. Vakhrameev, I.A. Dobruskina, S.V. Heyen and E.D. Zaklinskaja (revised edition translated from the Russian by R. Daber), 1978. Fischer Verlag, Jena, D.D.R. 300 pp., 30 text-figs., 79M.

Darwin called phytogeography "that grand subject, that almost-keystone to the laws of nature". When we see phytogeography changing in the dimension of time it is bringing us even closer to that keystone. That is perhaps one of the most important aspects of this book, which presents the changing distribution of terrestrial fossil plants of Eurasia through some three hundred million years. The book is by four leading Russian palaeobotanists and was originally published in 1970 as volume 208 of the Transactions of the Geological Institute of the Academy of Science, Moscow. This edition is based on that volume, but its four authors have totally revised and somewhat shortened the original Russian text, and the up-dated version has been translated from Russian into German by Rudolf Daber.

The time span covered is from the close of the Silurian, with the earliest records of terrestrial plants, to the beginning of the Tertiary Period, so that it takes in the early divergence and spread of the angiosperms. The area dealt with may seem a less logical choice. It represents, of course, a land mass centering on Russia, with the adjoining continental areas of Europe, Asia Minor, India and the "Cathaysian" Province including Japan and Malaysia. In palaeofloristic terms this in fact constitutes quite an informative, if rather arbitrary region. It includes for example, representatives of the four major Palaeozoic floristic provinces (Eurameria, Angara, Cathaysia and Gondwana), and by the close of the Mesozoic it is bridging the "angiosperm pollen provinces of *Aquilapollenites* and Normapolles.

The treatment of the subject is much as in the Russian volume. Two introductory chapters are by Vakhrameev and Meyen alone and review the interrelationships of palaeoclimatic regions and past plant distribution. They summarize the history of the recognition of major floristic provinces (phytochorin) in the geological past. These are followed by a series of chapters dealing sequentially with floral distribution. There are 31 maps mostly showing fossil plant localities, with a few giving the distribution of records of individual genera, for the Mesozoic. Such detailed treatment almost inevitably leads to rather crowded cluttered maps (as when a 12 x 12 cm

map of Eurasia gives a key to over 100 named localities of Late Carboniferous age). But the presentation is certainly a vast improvement in clarity on the Russian edition. Most of the floristic data is derived from "compression" floras of megafossils, until we reach the Late Cretaceous and Early Tertiary, when palynological evidence is freely drawn on. Citations to the literature are given for most of the principal sites plotted on the maps, and in many cases floristic lists (at least at generic level) are given. In the final chapter, Vakhrameev and Meyen attempt to integrate the results with broader evolutionary and climatic considerations. Among many interesting themes, they expand on the cyclical, two phase, character of each of the three major palaeobotanical time units - the Palaeophytic, Mesophytic and Cainophytic; each opens with a broad world-wide floristic uniformity, and closes with floral provinces having a strong regional character. It is only six years since the publication of two major reviews, dealing (in part) with palaeo-distribution of plants - Hallam's Atlas of Palaeobiogeography and Hughes' Organisms and Continents Through Time. One might justifiably query what new contribution (other than a German language work) this volume is making. The answer lies in the fact that the reviews in Hallam's and Hughes' compilations were interpretative and pre-digested; their aim was generally to present broad results rather than raw data. The present work gives a much fuller documentation of the factual data; while the limits of floristic provinces are shown on the maps, the reader is presented more fully with the primary information on which they are based. There are over 700 references, and full indices to plant names and authors.

As a palaeobotanical reference source, alone, this work is a most valuable contribution to the literature; but it is also a basis on which to test hypotheses of palaeoclimate and of plate movement. I hope it will be seen and read by a broader readership than palaeobotanists. All biographers owe a debt to its four Russian authors for their vigorous revision of the original, and to Dr. Daber for putting this work into a language more accessible to western readers.

W.G. Chaloner, London

## NORTH AMERICAN DISSERTATIONS RELATING TO CANADIAN PALYNOLOGY, TO 1977

The following list of dissertations is abstracted from "North American Paleobotanical Dissertations 1857-1977" compiled by Arthur Watt of the U.S. Geological Survey, Washington, and published by the Paleobotanical Section of the Botanical Society of America.

*Anderson, Thane Wesley.* **University of Waterloo, 1971.** Postglacial vegetative changes in the Lake Huron-Lake Simcoe district, Ontario, with special reference to glacial Lake Algonquin. Diss. Absts. 32(11):6470-B.

*Berti, Albert Anthony.* University of Western Ontario, 1971. Palynology and stratigraphy of the mid-Wisconsin in eastern Great Lakes region, North America.

*Bihl, Gerhard.* University of British Columbia, 1973. Palynostratigraphic investigation of Upper Maastrichtian and Paleocene strata near Tate Lake, N.W.T. Diss. Absts. 34(11):5513-B, microfilm available from the National Library of Canada at Ottawa.

*Binda, Pier Luigi.* University of Alberta, 1970. Sedimentology and vegetal micropaleontology of the rocks associated with the Cretaceous Kneehills Tuff of Alberta.

*Boneham, Roger Frederick.* University of Michigan, 1968. Palynology of three Tertiary coal basins in south-central British Columbia. Diss. Absts. 29(8): 2769-B, order no. 69-2287, 105 p.

*Bowman, Paul W.* University of Virginia, 1930. Study of a peat bog near the Matamek River, Quebec, by a method of pollen analysis.

*Brideaux, Wayne W.* McMaster University, 1968. Palynology of the Lower Colorado Group (Late Lower Cretaceous) and its lithological equivalents in central and west-central Alberta, Canada.

*Denton, George Henry.* Yale University, 1965. Late Pleistocene glacial chronology, St. Elias Mountains, Canada. Diss. Absts. 26(8):4569, order no. 65-15,029, 100 p.

*Grayson, John Francis.* University of Michigan, 1957. The postglacial history of vegetation and climate in the Labrador-Quebec region as determined by palynology. Diss. Absts. 18(4):1229, order no. 58-921, 278 p.

*Hills, Leonard Vincent.* University of Alberta, 1966. Palynology and age of Early Tertiary basins, interior British Columbia.

*Hopkins, William Stephen.* University of British Columbia, 1966. Palynology of Tertiary rocks of the Whatcom Basin, southwestern British Columbia and northwestern Washington. Diss. Absts. 27(12):4447-B, 184 p.

*Jarzen, David MacArthur.* University of Toronto, 1973. Evolutionary and paleoecological significance of Albian to Campanian angiosperm pollen from the Amoco B-1 Youngstown Borehole, southern Alberta. Diss. Absts. 35(9):4502-B, microfilm available from the National Library of Canada at Ottawa.

*Mathewes, Rolf Walter.* University of British Columbia, 1973. Paleoecology and post glacial sediments in the Fraser Lowland Region of British Columbia. **Diss.** Absts. 34(12/1):5838-B, microfilm available from the National Library of Canada, Ottawa.

*Piel, Kenneth Martin.* University of British Columbia, 1969. **Palynology of Middle and Late Tertiary sediments from the central Interior of British Columbia, Canada. Diss. Absts. 31(1):309-B, microfilm copy** available from the National Library of Canada, Ottawa.

*Rouse, Glenn E.* Ohio State University, 1955. Paleobotanical analysis of fossil plant remains associated with Canadian Cretaceous coal measures.

*Singh, Chaitanya.* University of Alberta, 1964. Palynology of the Manville Group (Lower Cretaceous), central Alberta.

*Snead, Robert Garland.* University of Alberta, 1968. Microfloral diagnosis of the Cretaceous-Tertiary boundary, central Alberta.

*Spachman, William, Jr.* Harvard University, 1949. The flora of the Brandon Lignite: Geological aspects and a comparison of the flora with its modern equivalents. 59 p.

*Srivastava, Satish Kumar.* University of Alberta, 1968. **Angiosperm microflora of the Edmonton Formation, Alberta, Canada.**

## ADVERTISEMENT

RESEARCH SCIENTIST, PALYNOLOGIST
Ref. No.: EMR/AGC/03417
Energy, Mines and Resources, Geological Survey of Canada, Atlantic Geoscience Centre, Eastern Petroleum Geology Subdivision, Dartmouth, Nova Scotia.

The Eastern Petroleum Geology Subdivision is one of the subdivisions of the Atlantic Geoscience Centre, a Division of the Geological Survey of Canada and one of the constituent laboratories of the Bedford Institute of Oceanography. Under the general direction of the Head of the Subdivision and in support of multi-disciplinary basin studies, the incumbent carries out independent and team research on spores, pollen, acritarchs and dinoflagellates from the Mesozoic and Cenozoic rocks of the eastern Canadian offshore region; refines the biostratigraphic and chronostratigraphic framework; reconstructs paleoclimatic and paleoecologic conditions; and determines source rock potential from the type and colouration of dispersed organic matter in sediments.

Qualifications

Candidates must have a doctorate degree or a lesser degree with several years experience as a palynologist. The incumbent must be thoroughly familiar with Mesozoic and Cenozoic biostratigraphic zonations based on palynology, and knowledgeable in subsurface mapping techniques. **Knowledge of English is essential.**

How to Apply

Send your application form and/or resumé to Don Fraser, Science and Technology Program, Public Service Commission, 300 Laurier Ave. W., Ottawa, Ontario, K1A 0M7. Please quote reference number.

## NEW MEMBERS

The following new members were not included in the C.A.P. Membership Directory issued for 1979. C.A.P. membership now stands at 81.

Dobell, Pat,
Department of Geology,
University of Toronto,
TORONTO, ONTARIO, M5W 1A1

Elson, J.A.,
Department of Geological Sciences,
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3450 University Street,
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Fitzgerald, W.D.,
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CALGARY, ALBERTA, T2G 2B3

Jenkins, W.A.M.,
Petro-Canada,
650 Guiness House,
727-7th Ave. S.W.,
CALGARY, ALBERTA, T2P 0Z6

Labelle, C.,
2970 Van Horne, Apt. 4,
MONTREAL, P.Q., H3S 1R1

Larouche, A.,
Lab. de paléobiogéographie et de palynologie,
Département de Géographie,
Université de Montréal,
C.P. 6128,
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MacMillan, W.R.,
Geological Survey of Canada,
Atlantic Geoscience Centre,
Box 1006,
DARTMOUTH, N.S., B2Y 4A2

Mellars, Gillian,
Department of Geography,
Memorial University of Newfoundland,
ST. JOHN'S, NEWFOUNDLAND, A1C 5S7

Perras, Josée,
40 Aberdeen,
SAINT-LAMBERT, P.Q., J4P 1R4

Rouse, G.E.,
Department of Botany,
University of British Columbia,
VANCOUVER 8, B.C., V6T 1W5

## ADDRESS CHANGE

Judi Lentin recently left Dome Petroleum to set up a palynological consulting group in Calgary. Her new address is Lentin International Biostratigaphic Consultants, 3650-21 Street, N.E., CALGARY, ALBERTA, T2E 6V6.

## PALYPUZZLE

First, the answer to the last puzzle was WODEHOUSE. It and the puzzles below were compiled by David Jarzen.

### Palynological Jumbles

Rearrange the letters in each of the four words to spell a word used in spore/pollen descriptions; then using the circled letters, rearrange these to give the final word below.

1. P O C I L
C (O) L P I

A T O F E R
(F) O R A T E

L U V E M
(V) (E) L U M

R A T O E
O R (A) T (E)

CLUE: "IT'S THE PITS" F O V E A

2. P O S S E R
S P O (R) E (S)

T I N E I N
I N T (I) N E

R A P O E T
P (O) (R) A T E

M A D O N
M O (N) A D

CLUE: CANADIAN "GOOD HUMOR MAN" WORKING WITH DINOFLAGELLATES. N E R I S

### Dinoflagellate

There are at least 74 English words beginning with the letter "D" which can be formed by using the letters, only as many times as they occur, in the word DINOFLAGELLATE. The list of words, and the answers to the other puzzle above will be printed in the next C.A.P. Newsletter.

## NIGHTCAP

### HOW YOU CAN SAVE WITH A WOOD STOVE

| | | |
|---|---|---|
| 1. | Stove pipe and installation..... | $ 458.00 |
| 2. | Chain saw - for cutting logs..... | 149.95 |
| 3. | Gas and maintenance - for chain saw.. | 44.60 |
| 4. | 4-Wheel Drive - stripped..... | 8,379.04 |
| 5. | 4-Wheel Drive - maintenance..... | 438.00 |
| 6. | Replace rear window in 4-Wheel Drive - twice..... | 310.00 |
| 7. | Fine - for cutting unmarked trees on Crown land..... | 500.00 |
| 8. | 14 cases Schooner..... | 141.00 |
| 9. | Fine for littering empty bottles..... | 50.00 |
| 10. | Towing charges from creek..... | 50.00 |
| 11. | Doctor's fee - removing splinter from eye..... | 45.00 |
| 12. | Safety glasses..... | 29.00 |
| 13. | Emergency room hospital - broken toe (dropped log)..... | 125.00 |
| 14. | Safety shoes..... | 49.00 |
| 15. | New carpet in living room..... | 800.00 |
| 16. | Painting walls and ceiling..... | 110.00 |
| 17. | Westchester chimney and brush and rods..... | 45.00 |
| 18. | Log splitter..... | 150.00 |
| 19. | 15-acre wood lot..... | 9,000.00 |
| 20. | Unpaid taxes - wood lot..... | 310.00 |
| 21. | Replace coffee table (chopped and burned whilst drunk..... | 75.00 |
| 22. | Divorce settlement..... | 33,678.22 |
| 23. | TOTAL FIRST YEAR'S COST..... | $54,860.04 |
| | SAVINGS ON CONVENTIONAL FUEL - FIRST YEAR..... | 62.77 |
| | TOTAL COST ON FIRST YEAR'S WOOD BURNING..... | $54,860.04 |

## WHAT IS A CANADIAN?

(Ontario Industry and Tourism Minister, John Rhodes, to the Sault St. Marie Lions Club)

"A Canadian is a person who leaves a French movie, climbs into his German car, drives to an Italian restaurant, orders Dutch beer and Danish cheese. Then, when he arrives home, doffs his Korean shirt, Romanian trousers and Polish shoes, dons his Taiwanese pyjamas, turns on his Japanese stereo, picks up an American ball point pen and writes a letter to his Member of Parliament complaining about the unemployment situation."

# PALYNOLOGICAL RESEARCH IN CANADA

The following information is compiled from a questionnaire circulated to Canadian palynologists known to the C.A.P. Executive. If you have details of omitted information, please send them to Jonathan Bujak, Atlantic Geoscience Centre, Box 1006, Dartmouth, N.S., B2Y 4A2.

## TOPIC STUDIED

*Aerobiology and Allergies to pollen and spores*

Bassett, I.J., Masran, T.C., McAndrews, J.H., Richard, P.J.H., Riggins, P.M.D.

*Spore and pollen dissemination*

Anderson, T.W., Gill, L.D., Labelle, C., Mathewes, R.W., McAndrews, J.H., Mott, R.J., Noakes, C.A., Richard, P.J.H., Terasmae, J.

*Biology of pollen and spores*

Anderson, T.W., Bassett, I.J., Richard, P.J.H., Sarjeant, W.A.S.

*Spore and pollen - plant relationships*

Anderson, T.W., Hebda, R.J., Jansonius, J., Jarzen, D.M., Labelle, C., Mathewes, R.W., Pocock, S.A.J., Richard, P.J.H., Sarjeant, W.A.S., Staplin, F.L., Warner, B.G.

*Morphology*

Anderson, T.W., Bassett, I.J., Brideaux, W.W., Bujak, J.P., Gill, L.D., Hebda, R.J., Ioannides, N.S., Jansonius, J., Jarzen, D.M., Lentin, J.K., Mathewes, R.W., McGregor, D.C., Mott, R.J., Norris, G., Pocock, S.A.J., Richard, P.J.H., Sarjeant, W.A.S., Singh, C., Staplin, F.L., Sweet, A.R., Terasmae, J., Varma, C.P., Warner, B.G.

*Terminology and classification*

Bassett, I.J., Brideaux, W.W., Bujak, J.P., Hebda, R.J., Ioannides, N.S., Jansonius, J., Lentin, J.K., McGregor, D.C., Norris, G., Pirozynski, K.A., Pocock, S.A.J., Richard, P.J.H., Riggins, P.M.D., Sarjeant, W.A.S., Singh, C., Staplin, F.L., Sweet, A.R.

*Nomenclature*

Jansonius, J.

*Archeology*

Hebda, R.J., Larouche, A., Mathewes, R.W., McAndrews, J.H., Mott, R.J., Ogden, J.G., Richard, P.J.H., Thompson, R.D., Wilson, M.A.

*Quaternary phytogeography*

Anderson, T.W., Boyko-Diakonow, M., Gill, L.D., Hebda, R.J., Labelle, C., Mathewes, R.W., McAndrews, J.H., Mott, R.J., Nambudiri, E.M.V., Noakes, C.A., Ogden, J.G., Richard, P.J.H., Savoie, L., Terasmae, J., Varma, C.P., Warner, B.G., Wilson, M.A.

*Climatic and vegetation shifts*

Anderson, T.W., Beckett, P.J., Boyko-Diakonow, M., Dobell, P., Elson, J.A., Gill, L.D., Hebda, R.J., Ioannides, N.S., Jansonius, J., Labelle, C., MacPherson, J.B., Mathewes, R.W., McAndrews, J.H., Mellars, G., Mott, R.J., Noakes, C.A., Ogden, J.G., Pocock, S.A.J., Richard, P.J.H., Riggins, P.M.D., Sarjeant, W.A.S., Savoie, L., Staplin, F.L., Sweet, A.R., Terasmae, J., Warner, B.G., Wilson, M.A.

*Glacial geology*

Anderson, T.W., Elson, J.A., Gill, L.D., Hebda, R.J., Labelle, C., MacPherson, J.B., Mathewes, R.W., Noakes, C.A., McAndrews, J.H., Mellars, G., Mott, R.J., Richard, P.J.H., Savoie, L., Terasmae, J., Warner, B.G.

*Post-glacial history*

Beckett, P.J., Fitzgerald, W.D., Noakes, C.A., Terasmae, J.

*Pre-Pleistocene environments*

Audretsch, A.P., Braman, D.R., Bujak, J.P., Fensome, R.A., Jarzen, D.M., Pocock, S.A.J., Richard, P.J.H., Sarjeant, W.A.S., Staplin, F.L., Tan, J.T.

*Paleobiogeography*

Anderson, T.W., Bujak, J.P., Ioannides, N.S., Jarzen, D.M., Jenkins, W.A.M., Labelle, C., Lentin, J.K., McGregor, D.C., Pirozynski, K.A., Pocock, S.A.J., Richard, P.J.H., Savoie, L., Staplin, F.L., Sweet, A.R., Varma, C.P., Warner, B.G.

*Paleobioöceanography*

Bujak, J.P., Fensome, R.A., Legault, J.A., Lentin, J.K., Richard, P.J.H., Tan, J.T.

*Biostratigraphy*

Achab, A., Anderson, T.W., Audretsch, A.P., Awai-Thorne, B., Barss, M.S., Berti, A.A., Braman, D.R., Brideaux, W.W., Bujak, J.P., Chi, B.I., Dobell, P., Earle, J.C., Fensome, R.A., Geurts, M.A., Hills, L.V., Hofmann, H.J., Hopkins, S., Ioannides, N.S., Jansonius, J., Jarzen, D.M., Jenkins, W.A.M., Labelle, C., Legault, J.A., Lentin, J.K., McAndrews, J.H., McGregor, D.C., Noakes, C.A., Norris, G., Pocock, S.A.J., Poeltl, F., Richard, P.J.H., Riggins, P.M.D., Sarjeant, W.A.S., Singh, C., Staplin, F.L., Sweet, A.R., Tan, J.T., Terasmae, J., Utting, J., van Helden, B.G.T., Walton, H.S., Williams, G.L.

*Evolution and phylogeny*

Bujak, J.P., Fensome, R.A., Hebda, R.J., Hofmann, H.J., Ioannides, N.S., Jansonius, J., Jarzen, D.M., Jenkins, W.A.M., Legault, J.A., Lentin, J.K.,

McGregor, D.C., Norris, G., Pirozynski, K.A., Pocock, S.A.J., Richard, P.J.H., Sarjeant, W.A.S., Singh, C., Sweet, A.R.

*History of palynological research*

Jansonius, J., Richard, P.J.H., Sarjeant, W.A.S.

*Methods and techniques*

Achab, A., Anderson, T.W., Barss, M.S., Geurts, M.A., Gill, L.D., Jansonius, J., Labelle, C., MacMillin, W.R., Masran, T.C., Pocock, S.A.J., Richard, P.J.H., Tan, J.T.

*Dispersed organic matter studies*

Achab, A., Barss, M.S., Brideaux, W.W., Bujak, J.P., Gunther, P.R., Masran, T.C., Pocock, S.A.J., Staplin, F.L., Tan, J.T., Walton, H.S., Williams, G.L.

## TYPE OF PALYNOMORPH STUDIED

*Spores and pollen*

Anderson, T.W., Artzner, D.G., Audretsch, A.P., Awai-Thorne, B., Barss, M.S., Bassett, I.J., Beckett, P.J., Berti, A.A., Boyko-Diakonow, M., Braman, D.R., Brideaux, W.W., Bujak, J.P., Camfield, C., Chi, B.I., Crowder, A., Dobell, P., Dreimanis, A., Earle, J.C., Fensome, R.A., Fitzgerald, W.D., Geurts, M.A., Gill, L.D., Hebda, R.J., Hicock, S.R., Hills, L.V., Hopkins, S., Ioannides, N.S., Jansonius, J., Jarzen, D.M., Kearney, M.S., Kroker, S., Labelle, C., Legault, J.A., Lentin, J.K., MacPherson, J.B., Mathewes, R.W., McAndrews, J.H., McGregor, D.C., Mellars, G., Mott, R.J., Mudie, P., Nambudiri, E.M.V., Noakes, C.A., Norris, G., Ogden, J.G., Perras, J., Pocock, S.A.J., Poeltl, F., Richard, P.J.H., Riggins, P.M.D., Savoie, L., Singh, C., Staplin, F.L., Sweet, A.R., Tan, J.T., Terasmae, J., Thompson, R.D., Utting, J., van Helden, B.G.T., Varma, C.P., Walton, H.S., Warner, B.G., Williams, G.L., Wilson, M.A.

*Megaspores*

Dobell, P., Labelle, C., Legault, J.A., McGregor, D.C., Singh, C., Sweet, A.R., Tan, J.T.

*Seeds and fruits*

Anderson, T.W., Larouche, A.

*Plant pigments*

Earle, J.C.

*Fungal spores*

Audretsch, A.P., Dobell, P., Hebda, R.J., Jansonius, J., Jarzen, D.M., Mott, R.J., Norris, G., Pirozynski, K.A., Singh, C., Staplin, F.L., Sweet, A.R., van Helden, B.G.T.

*Dinoflagellates*

Andretsch, A.P., Artzner, D.G., Awai-Thorne, B., Berti, A.A., Brideaux, W.W., Bujak, J.P., Dobell, P., Fensome, R.A., Ioannides, N.S., Jansonius, J., Jarzen, D.M., Lentin, J.K., Norris, G., Pocock, S.A.J., Poplawski, S., Riggins, P.M.D., Sarjeant, W.A.S., Singh, C., Staplin, F.L., Tan, J.T., van Helden, B.G.T., Williams, G.L.

*Acritarchs*

Achab, A., Audretsch, A.P., Brideaux, W.W., Fensome, R.A., Hofmann, H.J., Jansonius, J., Jenkins, W.A.M., Legault, J.A., Lentin, J.K., Pocock, S.A.J., Riggins, P.M.D., Sarjeant, W.A.S., Singh, C., Staplin, F.L., Tan, J.L., van Helden, B.G.T., Walton, H.S.

*Cryptarchs*

Jansonius, J., Jenkins, W.A.M.

*Chitinozoa*

Achab, A., Audretsch, A.P., Brideaux, W.W., Jansonius, J., Jenkins, W.A.M., Legault, J.A., Lentin, J.K., Poplawski, S., Sarjeant, W.A.S., Walton, H.S.

*Scolecodonts*

Audretsch, A.P., Jansonius, J., Walton, H.S.

*Filaments*

Hofmann, H.J.

*Eurypterid fragments*

McGregor, D.C.

## AGE OF MATERIAL STUDIED

*Holocene or Recent*

Anderson, T.W., Bassett, I.J., Beckett, P.J., Boyko-Diakonow, M., Crowder, A., Dreimanis, A., Earle, J.C., Elson, J.A., Fitzgerald, W.D., Geurts, M.A., Gill, L.D., Hebda, R.J., Hicock, S.R., Jarzen, D.M., Kearney, M.S., Kroker, S., Labelle, C., Larouche, A., Lentin, J.K., MacPherson, J.B., Masran, T.C., Mathewes, R.W., McAndrews, J.H., Mellars, G., Mott, R.J., Mudie, P., Nambudiri, E.M.V., Noakes, C.A., Ogden, J.G., Perras, J., Pocock, S.A.J., Richard, P.J.H., Savoie, L., Terasmae, J., Thompson, R.D., Varma, C.P., Warner, B.G., Wilson, M.A.

*Pleistocene*

Anderson, T.W., Bassett, I.J., Dreimanis, A., Elson, J.A., Fitzgerald, W.D., Gill, L.D., Hebda, R.J., Hicock, S.R., Kearney, M.S., Labelle, C., Lentin, J.K., MacPherson, J.B., Mathewes, R.W., McAndrews, J.H., Mellars, G., Mott, R.J., Nambudiri, E.M.V., Norris, G., Ogden, J.G., Perras, J., Richard, P.J.H., Savoie, L., Terasmae, J., van Helden, B.G.T., Warner, B.G.

*Tertiary*

Audretsch, A.P., Awai-Thorne, B., Berti, A.A., Brideaux, W.W., Bujak, J.P., Hopkins, S., Ioannides, N.S., Jansonius, J., Jarzen, D.M., Lentin, J.K., Masran, T.C., Norris, G., Pocock, S.A.J., Poeltl, F., Poplawski, S., Riggins, P.M.D., Singh, C., Sweet, A.R., van Helden, B.G.T., Williams, G.L.

*Cretaceous*

Andretsch, A.P., Artzner, D.G., Awai-Thorne, B., Berti, A.A., Brideaux, W.W., Dobell, P., Bujak, J.P., Fensome, R.A., Hopkins, S., Ioannides, N.S., Jarzen, D.M., Lentin, J.K., Masran, T.C., Norris, G., Pocock, S.A.J., Poeltl, F., Poplawski, S., Riggins, P.M.D., Sarjeant, W.A.S., Singh, C., Sweet, A.R., Tan, J.T., van Helden, B.G.T., Williams, G.L.

*Jurassic*

Audretsch, A.P., Berti, A.A., Brideaux, W.W., Bujak, J.P., Fensome, R.A., Ioannides, N.S., Jarzen, D.M., Lentin, J.K., Norris, G., Pocock, S.A.J., Poeltl, F., Riggins, P.M.D., Sarjeant, W.A.S., Tan, J.T., van Helden, B.G.T., Williams, G.L.

*Triassic*

Bujak, J.P., Jansonius, J., Lentin, J.K., Tan, J.T., Utting, J., van Helden, B.G.T., Walton, H.S.

*Permian*

Audretsch, A.P., Barss, M.S., Jansonius, J., Utting, J., Walton, H.S.

*Pennsylvanian*

Audretsch, A.P., Barss, M.S., Lentin, J.K., Utting, J., Varma, C.P., Walton, H.S.

*Mississippian*

Audretsch, A.P., Barss, M.S., Braman, D.R., Hills, L.V., Lentin, J.K., Tan, J.T., Utting, J., Varma, C.P., Walton, H.S.

*Devonian*

Audretsch, A.P., Braman, D.R., Brideaux, W.W., Camfield, M., Chi, B.I., Jansonius, J., Jenkins, W.A.M., Legault, J.A., Lentin, J.K., McGregor, D.C., Tan, J.T., Varma, C.P., Walton, H.S.

*Silurian*

Achab, A., Jansonius, J., Jenkins, W.A.M., Legault, J.A., Lentin, J.K., McGregor, D.C., Walton, H.S.

*Ordovician*

Achab, A., Jansonius, J., Jenkins, W.A.M., Legault, J.A., Lentin, J.K., Poplawski, S., Walton, H.S.

*Cambrian*

Jansonius, J., Jenkins, W.A.M., Varma, C.P., Walton, H.S.

*Precambrian*

Hofmann, H.J., Jansonius, J., Jenkins, W.A.M., Walton, H.S.

## AREA STUDIED

*Alberta*

Audretsch, A.P., Bassett, I.J., Brideaux, W.W., Chi, B.I., Gill, L.D., Gunther, P.R., Hebda, R.J., Hills, L.V., Jansonius, J., Jarzen, D.M., Kearney, M.S., Lentin, J.K., Mott, R.J., Noakes, C.A., Norris, G., Ogden, J.G., Pocock, S.A.J., Singh, C., Sweet, A.R., Tan, J.T., van Helden, B.G.T., Walton, H.S.

*British Columbia*

Anderson, T.W., Audretsch, A.P., Bassett, I.J., Brideaux, W.W., Chi, B.I., Dobell, P., Hicock, S.R., Hopkins, S., Jansonius, J., Legault, J.A., Mathewes, R.W., McAndrews, J.H., Pocock, S.A.J., Sweet, A.R., Walton, H.S.

*Manitoba*

Bassett, I.J., Elson, J.A., Legault, J.A., Nambudiri, E.M.V., Norris, G., Pocock, S.A.J., Walton, H.S.

*New Brunswick*

Barss, M.S., Bassett, I.J., Gill, L.D., Mott, R.J., Utting, J., Varma, C.P.

*Newfoundland and Labrador*

Audretsch, A.P., Barss, M.S., Bassett, I.J., Hofmann, H.J., Lentin, J.K., MacPherson, J.B., McAndrews, J.H., Mellars, G., Pocock, S.A.J., Poplawski, S., Savoie, L., Utting, J., Walton, H.S.

*Northwest Territories Mainland*

Audretsch, A.P., Barss, M.S., Bassett, I.J., Braman, D.R., Gunther, P.R., Hofmann, H.J., Ioannides, N.S., Jansonius, J., Jarzen, D.M., Lentin, J.K., Pocock, S.A.J., Riggins, P.M.D., Sweet, A.R., Terasmae, J., van Helden, B.G.T., Walton, H.S.

*Nova Scotia*

Barss, M.S., Bassett, I.J., Bujak, J.P., Geurts, M.A., Gill, L.D., Gunther, P.R., Lentin, J.K., Mott, R.J., Mudie, P., Noakes, C.A., Ogden, J.G., Utting, J., Walton, H.S.

*Ontario*

Anderson, T.W., Bassett, I.J., Boyko-Diakonow, M., Crowder, A., Dobell, P., Earle, J.C., Elson, J.A., Fitzgerald, W.D., Geurts, M.A., Gill, L.D., Hebda, R.J., Jarzen, D.M., Legault, J.A., McAndrews, J.H., Mott, R.J., Norris, G., Richard, P.J.H., Terasmae, J., Utting, J., Warner, B.G.

*Prince Edward Island*

Anderson, T.W., Barss, M.S., Bassett, I.J., Utting, J.

*Quebec*

Bassett, I.J., Elson, J.A., Geurts, M.A., Gill, L.D., Labelle, C., Larouche, A., McAndrews, J.H., Mott, R.J., Richard, P.J.H., Savoie, L., Terasmae, J., Utting, J.

*Saskatchewan*

Achab, A., Audretsch, A.P., Bassett, I.J., Elson, J.A., Jarzen, D.M., Mott, R.J., Pocock, S.A.J., Sweet, A.R., Utting, J., Wilson, M.A.

*Yukon*

Barss, M.S., Braman, D.R., Brideaux, W.W., Elson, J.A., Geurts, M.A., Jarzen, D.M., Legault, J.A., Pocock, S.A.J., Sweet, A.R., Utting, J., van Helden, B.G.T., Walton, H.S.

*Arctic Islands*

Achab, A., Barss, M.S., Berti, A.A., Brideaux, W.W., Gunther, P.R., Hopkins, S., Ioannides, N.S., Labelle, C., Lentin, J.K., Mott, R.J., Norris, G., Pocock, S.A.J., Riggins, P.M.D., Sweet, A.R., Tan, J.T., Thompson, R.D., Utting, J., van Helden, B.G.T., Walton, H.S.

*East coast offshore*

Audretsch, A.P., Awai-Thorne, B., Barss, M.S., Bassett, I.J., Bujak, J.P., Dobell, P., Gunther, P.R., Jenkins, W.A.M., Labelle, C., Lentin, J.K., Mudie, P., Noakes, C.A., Pocock, S.A.J., Riggins, P.M.D., Utting, J., van Helden, B.G.T., Walton, H.S., Williams, G.L.

*Great Lakes*

Anderson, T.W., Bassett, I.J., Boyko-Diakonow, M., Hebda, R.J., Labelle, C., Terasmae, J., Warner, B.G.

*Hudson Bay*

Gill, L.D., Lentin, J.K.

*Mackenzie Delta and Beaufort Sea*

Audretsch, A.P., Brideaux, W.W., Dobell, P., Fensome, R.A., Gunther, P.R., Ioannides, N.S., Jansonius, J., Lentin, J.K., McAndrews, J.H., Norris, G., Pocock, S.A.J., Thompson, R.D., van Helden, B.G.T.

*Non-Canadian areas*

Audretsch, A.P., Bujak, J.P., Elson, J.A., Fensome, R.A., Gunther, P.R., Hebda, R.J., Ioannides, N.S., Jarzen, D.M., Jenkins, W.A.M., Lentin, J.R., MacPherson, J.B., Masran, T.C., McGregor, D.C., Norris, G., Pocock, S.A.J., Poplawski, S., Richard, P.J.H., Sarjeant, W.A.S., Utting, J., van Helden, B.G.T., Walton, H.S., Williams, G.L.