April, 1992
Volume 25, Number 2

AASP NEWSLETTER
AMOCO PRODUCTION COMPANY
P.O. BOX 3092
HOUSTON, TEXAS 77253

A.A.S.P. NEWSLETTER

Published Quarterly by the American Association of Stratigraphic Palynologists Inc.

April 1992 Volume 25, Number 2
I.S.S.N. 0732-6041 J.K. Lentin, Editor

AASP 25th ANNIVERSARY YEAR

AASP NEWSLETTER EDITOR:

Dr. J.K. Lentin
L.I.B. Consultants
Suite 700 - Dominion House
665 - 8th Street S.W.
Calgary, Alberta
Canada T2P 3K7

The AASP NEWSLETTER is published 4 times annually. Members are ENCOURAGED to submit articles, "letters to the editor", technical notes, information about "members in the news" and information about job openings in the industry. Every effort will be made to publish all information received from our membership.

Deadline for the next newsletter, the third in 1992, is July 15. Please send all information on computer disk in ASCII or Word Perfect format, if possible, if not - send a typed manuscript. 1992 is our Silver Jubilee - celebrating our 25th anniversary as an organization. We look forward to contributions from our membership.

MESSAGE FROM THE PRESIDENT

The 1992 Mid-Year Meeting of the AASP Board of Directors was held on April 10th, at the Hampton Inn in Denver, Colorado. Of those issues dealt with at the meeting, there are a number that the Board would like the help of the Membership in addressing.

First, the Board is seeking two individuals to serve as representatives to the International Federation of Palynological Societies (IFPS) for a term of five years. Duties of the office require that they represent the AASP and the Board of Directors at IFPS schedules meetings. These are held at the International Palynological Congress, every four years. Consequently, this may require a not insignificant financial commitment on the part of the representatives, as the AASP does not have funds to send the representatives to the IPC. If you are interested in serving AASP in this important representative capacity, please contact either Sarah Damassa (Chairman of the IFPS Representative Search Committee) or Art Sweet.

Second, the Board of Directors is seeking proposals to host the 1995 AASP Annual Meeting. Please contact me if you are interested in submitting a meeting

proposal.

Similarly, we are seeking a site in the United States for a joint AASP Annual Meeting and International Palynological Congress (IPC) in 1996. The first IPC was held in the United States in 1966 and it would be good to celebrate the thirty-year anniversary here. To do this, it will be necessary to submit a proposal to host the 1996 IPC to the IFPS Council this Fall, at the 1992 IPC in Aix-en-Provance, France. Obviously, it is not easy to plan that far ahead in today's economic climate. But if it is possible for you to do so, and you wish to organize and host these meetings, please contact Doug Nichols for additional details on the IPC. Please contact me concerning proposals for 1995 AASP Annual Meeting.

GREAT PALYNOLOGISTS SHOULD RECEIVE GREAT RECOGNITION

Another issue that all members can help with is that of recognizing the important contributions of their peers. Every year hundreds of awards are sponsored worldwide by professional organizations, governments, private endowments, etc. whose sole aim is to recognize the significant scientific or humanitarian endeavour of worthy individuals. It is important to palynology to place more palynologists before screening committees for consideration of such awards.

Consequently, I have asked the Awards Committee (Lucy Edwards, Chairman; Barbara Whitney, Owen Davis and Merrell Miller) to compile a file of awards that palynologists can be considered for. The committee will need your help in assembling this file, because no one is aware of all of the awards given in every country.

Your help on this matter will greatly facilitate the building of this file. Please provide them with all the information you, including the:

name of the award
requirements for consideration, and,
name and address of the organization offering the award

If you can obtain a descriptive flyer on the award from the sponsoring organization, so much the better. That will save time and effort for the committee.

When awards have been identified, details will be advertised through the Newsletter. AASP members can then nominate candidates for consideration by the AASP Award Committee. With an organized, concerted effort, I think that we can increase the recognition within the scientific community of the contributions palynologists have made to science and humanity. This is a worthy cause that we can all contribute to with very little effort, and little or no expense. Please help.

Mike Boulter brought to the attention of the Board of Directors the "Sponsor-a-subscription-for-a-Russian-Scientist" program that Nature is conducting. He suggested that the Board might consider such a program f membership in AASP. The Board agreed that this was good idea. And in fact, some AASP members already sponsor and pay the membership dues of fellow palynologists, and have for many years.

This is a valuable service that is greatly appreciated by the recipients. The Board encourages all AASP members to consider sponsoring a needy palynologist for membership in AASP, regardless of their country of origin. If you do so, be sure to clearly note on the application form the name of the person you are sponsoring and their address. The Secretary-Treasurer will notify them of your kindness when he sends them their membership package.

The Board-of-Directors voted to accept the recommendation of the 1991 Annual Meeting Local Organizing committee to place $1000 of the profit from the San Diego annual meeting in the Student Scholarship Fund. These funds will allow both of the awards to be increase to $500 each. This unusual profit from an Annual Meeting is the result of the Organizing Committee successfully beating the bushes for industrial contributions to help run the meeting. AASP is grateful for the strong industrial support, and to the organizing Committee for the superior job they did on the meeting.

The Board received an interesting proposal concerning the gathering of Oral History from Jerom Ward, of Auburn University. He noted that this would a good time to sit down with the pioneers of palynology who are in our midst and record their recollections of the development of palynology in the 20th century. The Board supports this idea, but at the moment does not have the people or time to take on this project, extremely worthy through it is.

We encourage the members to pursue such efforts on an ad hoc basis. Or if there are a few individuals out there who wish to form an Oral History Committee to pursue and coordinate this in a more organized fashion, please contact me.

The Mid-Year Meeting was a very good, very productive conference, due to efforts of the members of the Boards, the AASP Foundation representative (Bob Clarke), and Doug Nichols. They have my thanks for making it a good meeting. And I thank Bob Cushman for dropping in to visit the meeting and for his interest in the proceedings.

John H. Wrenn
AASP President

Amoco Production Company
501 WestLake Park Boulevard
Houston, Texas 77253
Telephone: (713) 556-2297
FAX: (713) 556-2139

LETTER TO THE EDITOR

Judith Lentin, AASP NEWSLETTER Editor

Dear editor,

I had the great opportunity of learning the business of palynology from Dr. James B. Urban at the University of Texas at Dallas in the early 1970's. I went from there to Phillips Petroleum in 1974 where I got a double dose of the Urban clan by working for his little brother Logan. Those were exciting times. Logan was part scientist, part motivator, part innovator, part salesman and most important...part fighter. Under his direction we worked hard and effectively. We never started a project without learning everything we could about the geologic problem that needed to be solved, the time frame of when the answer needed to be provided and the need to present our results in the context of the regional and prospect level geology. We always presented the dry facts, followed by our interpretation about how these facts might influence the business decision at hand.

Perhaps our greatest contribution was our on-site palynological and visual source rock studies. For a mere few hundred dollars a day an exploration manager could have one of us sit a 40,000 dollar-a-day well and provide him with daily data on the age, gross source rock characteristics and thermal maturity of the section. We were wildly successful! Our families barely saw us, regular long-term projects languished, and Logan's boss said that this had to stop. It was the end of an era. Logan went on to be chief geologist for the company. The fun and excitement died, and in 1978 I went off to the North Sea as an exploration geologist.

In 1987 I found myself working the emerging Paleozoic oil play in Saudi Arabia, on loan to Aramco from Exxon. That year Aramco was "in-between" palynologists, and I was badly in need of one. My supervisor let me put a beautiful Zeiss photomicroscope in my office and I fell in love all over again with the science of palynology. Soon I was doing service work for other groups, chasing the age of the productive section under the big Permian "cutter". What fun to sort out what could not be sorted out based just on lithology!

In 1988 I returned to Houston to work again as an exploration geologist for Exxon. I am continually amazed at how few explorationists fully use biostratigraphic and other palynologic data in their evaluations at both the regional and prospect level. We need to be better salesmen and better geologists if our work is to be understood and used by our colleagues in the exploration and production departments.

One aspect of palynology that seems to have been lost in the shuffle of rapidly advancing geochemical techniques is the science of visual source rock analysis. I will be the first to admit that, yes it is subjective, and yes it is not quantifiable..but dammit it works. A well that is first age dated, then worked for kerogen type, TAI and then vitrinite reflectance is a well worked well. Some of the biggest knock-down-drag-out-fights I was involved in were

WE NEED TO BE BETTER SALESMEN AND BETTER GEOLOGISTS IF OUR WORK IS TO BE UNDERSTOOD AND USED BY OUR COLLEAGUES IN THE EXPLORATION AND PRODUCTION DEPARTMENTS.

with geochemists over "their" data vs. "our" data. The real advantage of palynological examination of the entire well is the understanding that comes from knowing where down-hole contamination is a significant problem in the cuttings and where, in cores and side wall cores, there is a well preserved reworked palynological assemblage. Geochemists are stuck with doing whole rock analyses, and if we don't tell them about organically contaminated samples they will come up with the wrong conclusions. Communication is at the core of any good, successful marriage!

We, as working palynologists, or "retired" palynologists, must continue to both learn and educate...and we must fight to have our voices heard at the exploration managers level. Right on Jim and Logan!

Leonard V. Moore
Senior Exploration Geologist
Global Studies
Exxon Exploration Company
P.O. Box 4778
Houston, Texas 77210-4778

Dear Editor,

FIRST PALYNOLOGY CONFERENCE

The substantial accounts by Traverse (1974) of the rise of paleopalynology earlier in this century and by Traverse and Sullivan (1983) of the historical setting and initial years of the AASP (reprinted in the January 1992 AASP Newsletter to commemorate the 25 years since the founding in 1967) curiously contain an error in fact with regard to the organization of the First Palynology Conference. Osborn Zoological Laboratory at Yale University was on 21 February 1953 the venue of the conference (Heusser, 1953).

Following publication of the 1983 account, D.A. Livingstone of Duke University called the error to the attention of Alfred Traverse in a letter dated 17 November 1983, which the latter acknowledged but without rectification. Now that the error has again surfaced with the appearance of the latest AASP Newsletter, it would seem incumbent upon me, because of my role in arranging the conference while a postdoctoral Theresa Seessel Fellow at Yale in 1952-53, to contribute this note containing some relevant background.

The First Palynology Conference was not organized by Stanley A. Cain of the University of Michigan, as has been erroneously stated. Cain attended but had little, if anything, to do with the organization. The conference materialized as an outcome of a visit during early winter of 1953 by members of the palynology community at Yale University to the laboratory of L.R. Wilson, then at the University of Massachusetts. Our views in Amherst, at the time of the Yale-Massachusetts visit, centered on the growing need to plan a meeting among colleagues to provide on a larger scale an opportunity for the exchange of information and for discussion of topics of mutual interest.

Yale was a most likely place for the First Palynology Conference because of circumstances surrounding the unusual assemblage of workers in palynology. The university numbered among its faculty two noted palynologists, Paul B. Sears and Edward S. Deevey, Jr., both of whom have figured prominently in American paleoecology. Besides, there were three graduate students preparing doctoral dissertations in residence at the time, D.A. Livingstone, Estella Leopold, and Heikki Ignatius, each of whom in later life has enjoyed a distinguished career in palynology. Yale, in addition, housed the Geochronometric Laboratory with its new radiocarbon dating facility, which provided New Haven, as the locus for the conference, with an added attraction.

Seventeen papers making up the program reveal the focus at mid-century of research topics and the composition of those who attended the conference: Stanley A. Cain, University of Michigan, "The Use of Size-Frequency in the Determination of Species of Pollen;" John F. Grayson, University of Michigan, "A Size-Frequency Study of Fossil *Pinus* Pollen from Lake Bottom Sediments of the George Reserve, Southeastern Michigan;" Eilif Dahl, University of Oslo, Norway, "Climatological Interpretation of Postglacial Pollen and Microfossil Records;" David G. Frey, Indiana University, "Wisconsin and Post-Wisconsin Palynology of Eastern North Carolina;" Patrick Butler, Harvard, "Pollen Studies of Small's Swamp, Cape Cod, and of Barnstable Marsh, Cape Cod;" Alan C. Donaldson, University of Massachusetts, "A Microfossil Analysis of a Cape Cod Peat Bog;" Heikki Ignatius, Yale, "Late-Glacial and Postglacial History in North-Central Quebec - Ontario, Canada;" L.R. Wilson, University of Massachusetts, "Peat Pollen Studies in the Region of Eastern Ontario, Canada;" Estella Leopold, Yale, "Current Pollen Studies in Certain River Terraces of Northeast Wyoming;" William S. Benninghoff, U.S. Geological Survey, "Some Applications of Palynology to the Earth Sciences in Alaska;" Daniel Livingstone, Yale, "Some Pollen Diagrams from Northern Alaska;" Calvin J. Heusser, Yale, "Additional Pollen Diagrams from Southeastern Alaska;" Margaret K. Wolfe and E.S. Barghoorn, Harvard, "Fossil Maize from the Valley of Mexico;" K.H. Clisby, F. Foreman, and J. Zeevaert, Oberlin College and Mexico City, "Fossil Pollen and Stratigraphy from Two Deep Cores Under the City of Mexico;" Richard P. Hamilton, University of Massachusetts, "Plant Microfossils in the Lower Wilcox of Arkansas;" Arthur E. LeBlanc, University of Massachusetts, "Microfossil Studies of Sediments from Rockport, Texas;" Elso S. Barghoorn, Harvard, "Pollen and Spores of the Brandon Lignite and Their Paleoecological Significance."

> The focus of palynological research in the 1950's is shown by the topics of the 17 scientific papers presented at the first palynological meeting in the U.S.A.

Apparent from the program's content are the extensiveness of geographic coverage of studies in North America (a trend away from traditionally studied regions of the East and Midwest) and the concentration placed on Quaternary research. It was clear that Quaternary stratigraphic palynology of the millennia since the last glacial maximum was being revolutionized by radiocarbon dating, following elaboration of the technique in 1949. Also evident is an increasing trend toward the taking into account of nonarboreal pollen, following two previous decades when almost total consideration was given over to pollen of trees. This opened the pathway that since has led to greater comprehension of the composition and structure of late-glacial and full-glacial vegetation and to the utilization of palynology in a greater dimension.

Calvin J. Heusser, Professor Emeritus
New York University
Clinton Woods
Tuxedo, NY 10987

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Traverse, A., 1974
Paleopalynology 1947-1972. Annals of the Missouri Botanical Garden 61: p.203-236.

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The background, origin, and early history of the American Association of Stratigraphic Palynologists. Palynology 7: p.7-17.

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The following article was recommended by Martin Farley as an important variation on a theme!

HOW JELL-O KILLED THE DINOSAURS

We believe that Jell-O may have played a role in the mass extinction of the dinosaurs.

Background: The Collision

In 1979, geologist Walter Alvarez discovered unexpectedly large amounts of the metal iridium in sediments that date from the time of the dinosaur extinction. Alvarez and others have taken this to be evidence that a large object struck the earth and, directly or indirectly, killed off the dinosaurs.

The Presence of Jell-O

Trace metal analysis performed with atomic absorption spectroscopy revealed that some flavours of Jell-O contain small but significant levels of iridium. The comet that collided with the earth, causing the dinosaur extinction, may not have been a dirty snowball or a big rock; rather, this body perhaps represents a previously unidentified class of comets called Jell-O -roids, which consist of lumpy, improperly mixed Jell-O.

A ball of Jell-O 10 to 12 miles in diameter (a Jell-O -rite) impacting on the earth would likely have altered the environment, shifted the orbit of the planet, and left a worldwide trace layer of Jell-O -borne iridium similar to that which has been detected.

Jell-O's Role

everal possible mechanisms could account, singly or in combination, for the mass extinction of the dinosaurs. Those related to climate change have been discussed extensively in the popular press.

The impact itself would have had an effect, as would the environmental changes brought about by the widespread surface distribution of the Jell-O.

We believe, however, that the most important factor may have been the nutritional impact of Jell-O on animals whose digestive and circulatory systems were unprepared for it.

How Much Jell-O Would an Apatosaurus Eat if an Apatosaurus Could Eat Jell-O?

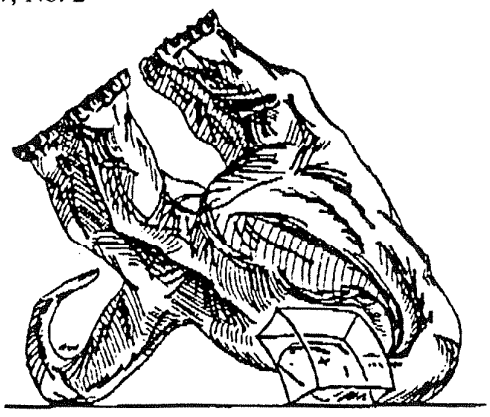
How much Jell-O would an apatosaurus eat if an apatosaurus could eat Jell-O? Jell-O contains 420 mg of sodium per 1/2 cup serving (the recommended serving size for humans). The apatosaurus is estimated to have had a typical weight of 60,000 lb. Simple calculation leads to the estimate that an apatosaurus-size serving of Jell-O would be 187.5 cups, or 43.1 liters, and would contain 472 g of salt.

An apatosaurus, drawn by the natural and artificial flavorings (especially chocolate), would daily consume 20 apatosaurus-size servings for breakfast, lunch, and dinner.

Eating this much Jell-O, with its 9.4 kg of salt daily, would have tended to cause high blood pressure and heart disease. An apatosaurus in a sugar-induced stupor would also have been easy prey for a carnivorous allosaurus or a roaming pack of deinonychus.

The low nutritional value of Jell-O (which contains less than 2% of U.S. recommended daily allowances of vitamins A and C for humans and, by extrapolation, for apatosauruses) suggests that overconsumption of Jell-O would have led the dinosaurs to death by malnutrition. Indeed, apatosaurus bones often show evidence of osteoporosis, indicating calcium deficiency. Following the demise of the large herbivores, which would have been most strongly attracted to eat Jell-O, the entire dinosaur ecosystem would have collapsed.

by
Frank Wu and Ben Lethbridge
Madison, Wisconsin
Reprinted from the *Journal of Irreproducible Results*, Vol. 37, No. 2



NOTICE

A COURSE ON PALEOGENE DINOFLAGELLATE CYSTS

Directly following the DINO V Conference, Graham Williams, Lew Stover, Sarah Damassa and Henk Brinkhuis will jointly present a 5-day course on Paleogene dinoflagellate cysts. The course will be held at the University of Utrecht.

Course dates are **Monday April 27 to Friday May 1, 1993.** The course will concentrate on stratigraphy and paleoecology. A well-documented manual, including e.g., line drawings and range charts, will be available for the participants.

The fee for the course is set at US $550 - exclusive of accommodation and evening meals, with a minimum of 15 participants. The maximum number of participants os 24.

You can obtain more information and/or ensure your participation by sending a letter or fax to:

Henk Brinkhuis
LPP Foundation
Lab. Palaeobot. Palynol.
University of Utrecht
Heidelberglaan 2, 3584 CS Utrecht
The Netherlands
Fax: +31.30.535096

You can submit an international money order to ABN-AMRO Bankaccount no. 46.50.04.512 of the LPP Foundation, indication: "Paleogene Course 1993", or pay at arrival. Henk Brinkhuis can make hotel reservations (in Utrecht) if wished for.

NOTICE

The 25 annual AASP Meeting will be held this year at the International Palynological Congress in Aix-en-Provence, September, 1992.

NOTICE

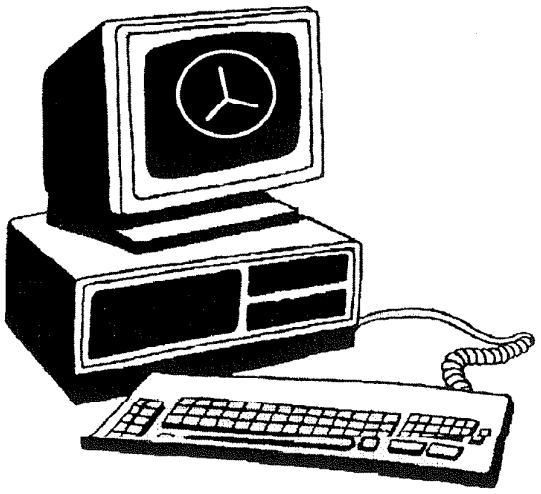
The AASP Board of Directors wishes to announce the possibility of support for limited travel to the 25th Annual Meeting and 8th IPC, September 6-12, 1992, Aix-en-Provence, France. Students and other disadvantaged members of AASP are encouraged to apply in hopes that funding may become available.

The 25th Annual Meeting of AASP will be co-convened with the 8th IPC in France. The AASP annual business meeting at the Rol Rene Hotel, noon, Thursday, September 10. Talks and other functions of the Annual AASP Meeting will be part of the IPC. The price for the business luncheon, 170 French Francs ($23.50), is to be paid with the registration for IPC8. Registration before March 31 was 1450 FF ($263), before July 1, it will be 1650 FF, afterward 1800 FF. Pre- and post-conference field trips range from 1500-3300 FF. If you have lost yo registration form, contact: Jean-Pierre Suc, Secretary IPC 8, Laboratoire de Palynologie (case 061), Universite de Montpellier II, F-34095 Montpellier CEDEX 5 FRANCE.

The awards are announced at this time because the award to $6750 was not made until April 14, 1992. Our first proposal was rejected on October 2, 1991, and a second proposal was submitted on November 22, 1991. Our evaluation was better the second time, but the Geology and Paleontology section of NSF had received $13 million in requests, but had been given only $2 million to award. Dr. P. Kelly, program director, has notified us that $6750 has been awarded to AASP. The funds are only available to U.S.A. citizens travelling to France from the U.S.A. The primary basis for award of travel funds is the IPC/AASP abstract(s), see the criterion shown on the application form. The Selection Committee will make special effort to fund the travel of students and other disadvantaged members of AASP.

NOTE: (1) Members in good standing of AASP, who are U.S.A. citizens travelling from the U.S.A. to IPC8, are invited to apply. (2) The DUE DATE for receipt of applications is July 1, 1992, at the office of Dr. Elliott T. Burden, Dept. of Earth Sciences, Memorial Univ. of Newfoundland, St. Johns, Newfoundland, CANADA A1B 3X5. Applications received after that date will not be considered.

APPLICATIONS ARE ATTACHED



COMPUTERS IN PALYNOLOGY

CABBY TALK!

The idea of forming a committee on Computer Applications in Biostratigraphy (CAB) should be righteously credited to our president, John Wrenn, who felt a need to disseminate this sort of information among the AASP membership. We announced the inception of the committee in the January 1992 issue of the Newsletter, and now we are pleased to welcome Dr. Michael Farabee (Estrella Mountain Community College) to the committee. Other members who are interested in serving in this committee are welcome to do so.

We received an extensive communication from John Athersuch (British Petroleum) on biostratigraphic computing at BP which is in the works for our next review. Please feel fee to contact any of the committee members (Farabee, Jameossanaie, Lentin, Zippi) if you have information to share.

In this issue of the Newsletter, we are featuring a review of GraphCor (version 2.2), a PC-based utility developed by Kenneth Hood to facilitate the application of Shaw's technique of correlation.

GraphCor 2.2

GraphCor 2.2 is an interactive computer program designed to bring the power of graphic correlation to serious and casual biostratigraphers alike. Graphic correlation is a method of correlating wells or stratigraphic sections based on pairwise comparison of data. The technique has been applied mostly to biostratigraphic data, utilizing the bases and tops of species ranges as potentially correlative horizons, but can be used on any data that represent discrete horizons of temporal significance which can be uniquely identified between sections (e.g., sequence boundaries, oxygen-isotope events, bentonite beds and other lithologic markers, and microtectite layers). GraphCor is an interactive software package which provides the capability to establish pairwise correlations between many wells and stratigraphic sections and to integrate the resulting information into a single chronostratigraphic model. Results can be output as range charts, tables, and publication-quality graphs.

Product description: The GraphCor software package consists of a primary graphic correlation program and several accessory programs. The primary program is used to establish correlations between sections and to build a chronostratigraphic model. The accessory programs are used to produce range charts and publication-quality graphs, to produce tables of original or modeled species occurrences, and to help correct data files for the effects of faulting. All of the programs are integrated into a single package using a menu program from which the various options can be selected. Two example datasets from the literature, each consisting of 4 wells or stratigraphic sections, are included with the package for demonstration purposes. A 150 page manual describes the use of the software, including a tutorial that details a walk-through of the program based on one of the included datasets.

The user-interface of GraphCor is designed for maximum flexibility in the graphic correlation analyses. Options can be selected using pull-down menus or function keys, eliminating the need to remember a large number of commands. A line of correlation (LOC) can be positioned between two sections graphically by moving it with a mouse or cursor keys, manually by entering end-point coordinates, or mathematically using PCA or least-squares regression. Each LOC can include multiple segments of different lengths and slopes, and stratigraphic gaps such as faults or unconformities can be represented by offsets between segments. Data from a number of stratigraphic sections can be used to build a chronostratigraphic model based on the LOC's chosen. Modifications to the model can be listed in advance to help evaluate the LOC for a particular section, and events in the model based on a section can be removed to enable later modification to the LOC. The program also includes the option to build a chronostratigraphic model based on either maximum or average ranges of taxa. The stratigraphic position of any event can be projected into the model, and the modeled position of any event can be projected back onto an original stratigraphic section. Options are provided for focusing on important areas of the graph and identifying key stratigraphic events. An optional two-character morphologic code can be included for each species to provide by-group control of display and mode of analysis. A variety of symbol types and sizes are available in the graph output program.

GraphCor uses ASCII format data files which can be created using almost any text editor or word processor, or generated automatically from data stored in a database such as Paradox. Each data file contains information from

a single stratigraphic section, consisting of a list of events (species) and the base and top for each event. Two example datasets from the literature are included with the package for demonstration.

The example output (Figure 1) shows a publication-quality graph generated using a Postscript printer. Nearly every aspect of the graph (e.g., line thickness, text sizes, and tick appearance) are under user control. Different symbols and sizes can be used to represent the base and top of each user-defined group of taxa. The range chart (Figure 2) was produced from the stratigraphic data file listed below on a Hewlett-Packard Laserjet printer. Different sort options are available.

* Example ASCII file used as input for GraphCor. Text is free format.

The two values for each taxon are the base and the top.

Sulcocephalus cereus	67	67
Elvinia roemeri	70	140
Plataspella anatina	113	127
Pterocephalia sanctisabae	117	140
Pseudagnostus communis	117	210
Morosa? bothra	134	140
Parabolinoides contractus	142	147
Orgymaspis llanoensis	150	183
Taenicephalus gouldi	150	153
Idahoia lirae	187	217
Conaspis cf C. tumida	193	199

System requirements: IBM PC, PS/2, or compatible with graphics capabilities; 512K RAM or more; DOS 2.0 or higher; 5.25 or 3.5 inch drive. A hard disk and Microsoft mouse are recommended. A version of GraphCor that will run under Microsoft Windows is currently being developed.

Output can be produced on Epson FX, LQ, or compatible dot-matrix, Hewlett-Packard Laserjet, and Postscript printers.

Price: $495 US

For orders or information, call or write:

Kenneth C. Hood
9707 Arrowgrass Dr.
Houston, TX 77064 USA
(713) 469-5832

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* Editor's Note: The following information is about another computer program used in Palynology was sent in by Stan Duxbury:

STRATS

STRATS was designed some six years ago, mainly to enable biostratigraphers to rapidly produce charts of species abundance data in scaled depth order in wel sections. To do this, the data capture mechanism of STRATS was designed to mimic all the operations previously carried out by a biostratigrapher using logging/tick sheets, blank drafting grids and an overstretched drafting department.

The system contains a taxonomic database of micropalaeontological, (including nannofossils) and palynological species in which each taxon is assigned a unique code number. Paper overlays containing grids of up to 256 cells can then be created which and placed over a touch-sensitive, A3-sized keypad.

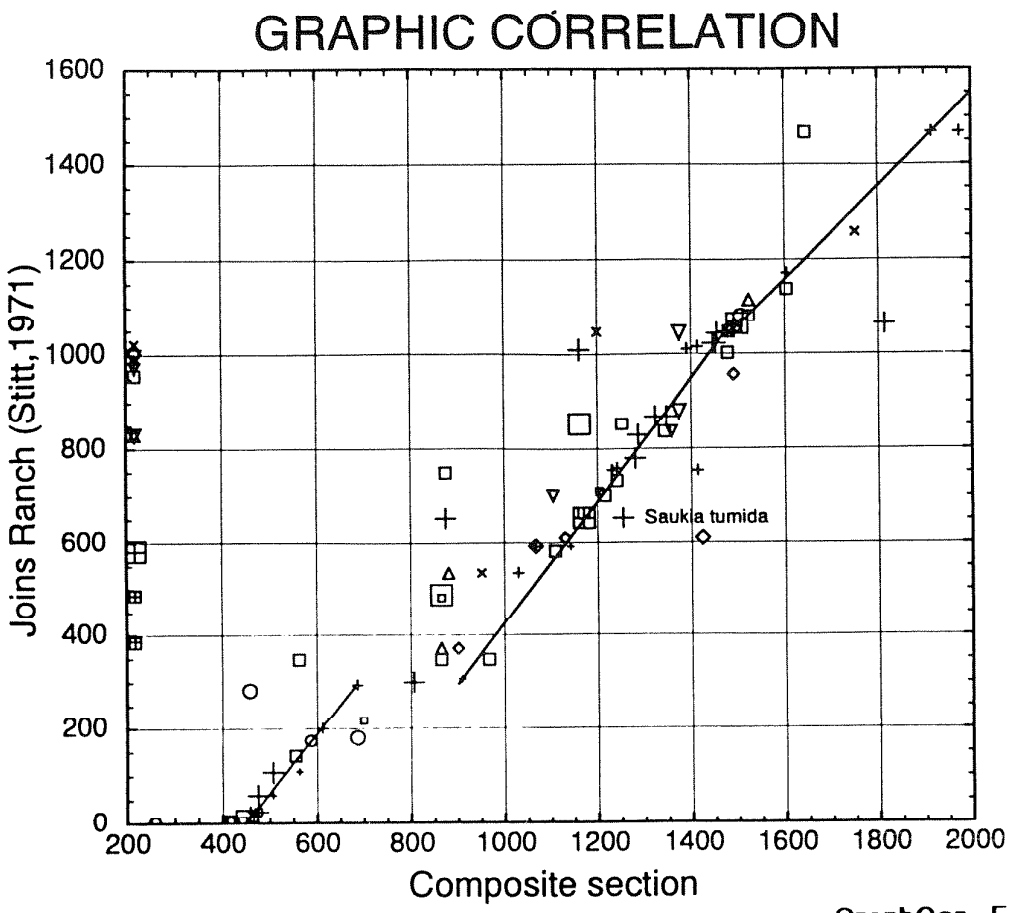
As the biostratigrapher sits at the microscope logging a slide, a series of keypad strokes will allow him or her to enter all data pertinent to that sample including sample depth, type (cuttings, core, SWC etc), free-form comments, processing/accounting details and, last but not least, the raw biostratigraphic species data. These data can be of objective or subjective abundance counts and three levels of species identification confidence (positive, "?" and "aff.") can be assigned. Species can also be flagged as caved or reworked in a sample if interpreted as such. Any species not on an overlay can be entered using its unique code number.

A library of overlays can be created to cover specific intervals of geologic time and/or geograph locality.

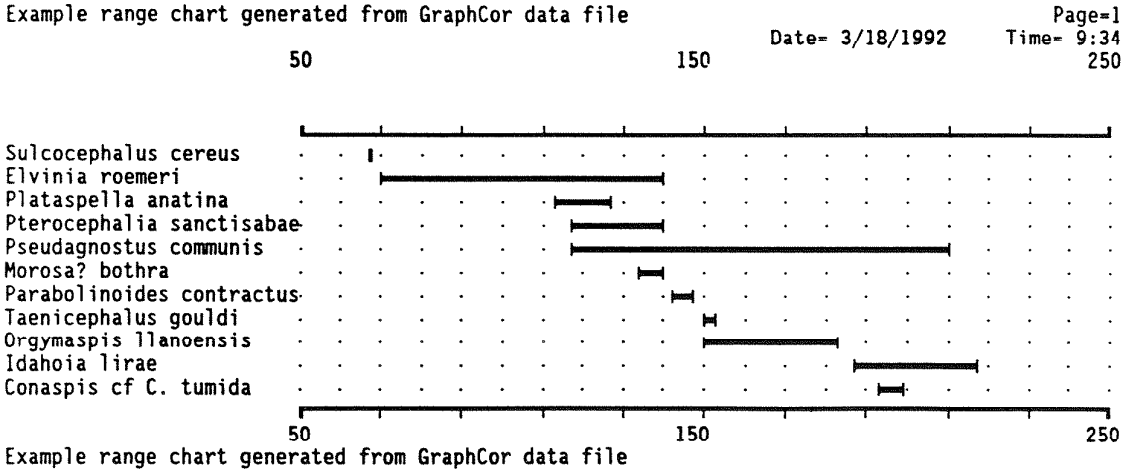
STRATS is also used in a true database mode as data from individual samples are held under unique well-directories and all these directories can be searched horizontally and vertically using the comprehensive search functions of the STRATS program. For instance, STRATS will search its database to provide the highest occurrence of a particular species across a whole basin (or worldwide come to that). Alternatively it will provide a list of matching bug datums vertically over 2 or more wells.

Once the interpreted geology (chrono-, bio, and lithostratigraphy, palaeoenvironments etc.) has been interpreted by the user, these units too can be entered into the database and will be output on the charts alongside the raw palaeontological data. These "IGD" (Interpreted Geological Data) terms can also be used in the search functions.

Figure 1 illustrates some sample output from a demonstration well set-up on our system. Output is in the form of scaled Ad-size high quality charts produced on a suitable pen plotter (laserjet type printers are also presently being accommodated into the system). Species abundance data is displayed vertically using appropriate symbols. Interpreted Geological Data (chrono-, bio-, litho-stratigraphy, palaeoenvironments etc.) can also be entered into the charts and will appear alongside ra palaeontological data. An upgrade to larger sized charts



GraphCor, Fig.1



GraphCor, Fig.2

WELL DEMONSTRATION WELL

LOCATION PC STRATS DATABASE SYSTEM

OPERATOR HALLIBURTON

INTERVAL 7000' 0" - 8000' 0"

DATE JANUARY 1990

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STRATIGRAPHERS A.JK, L.E, NACH

CHART NUMBER 3

MICROPALAEONTOLOGICAL DISTRIBUTION CHART

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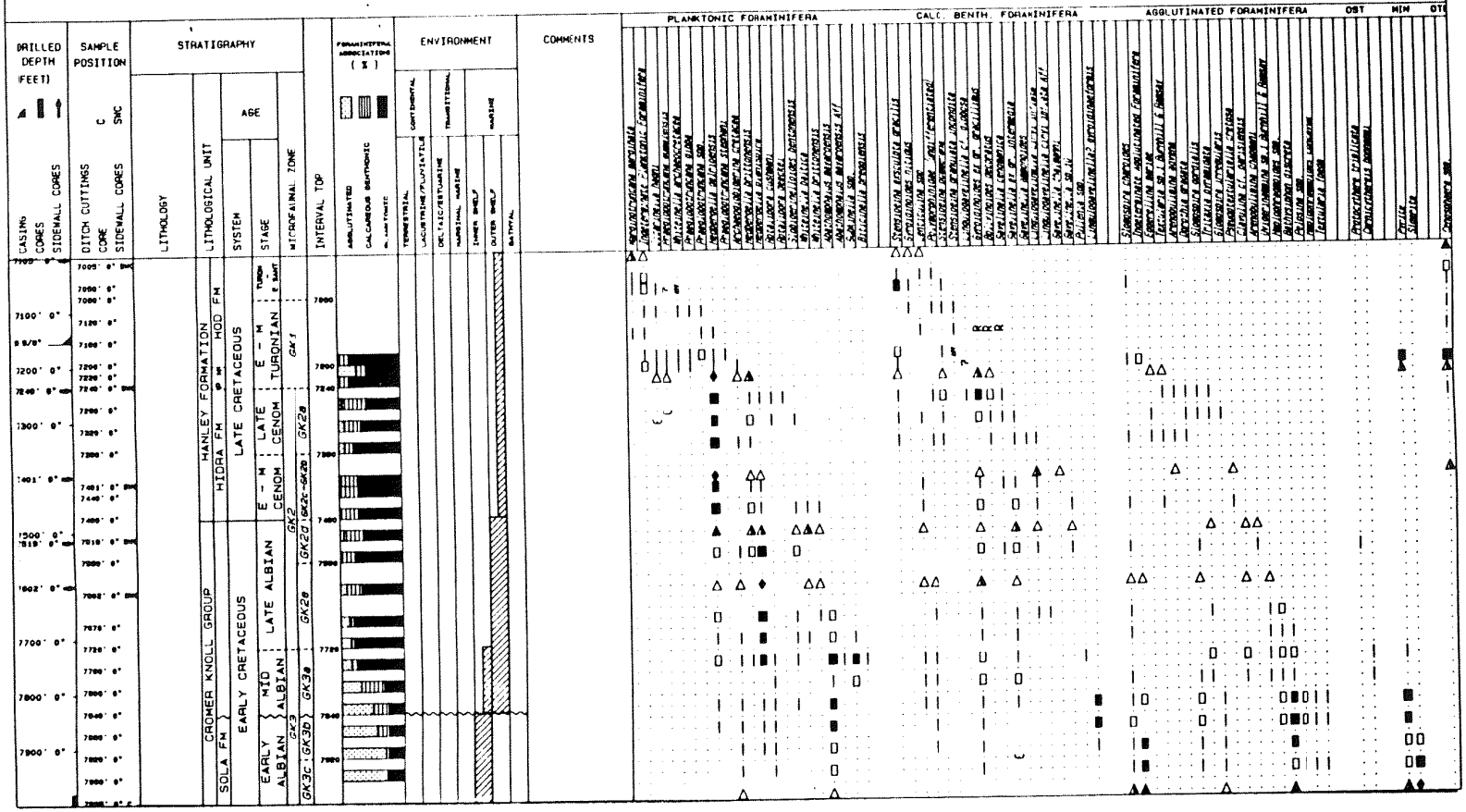


(AO or continuous length, roller-type) will be available in the near future.

STRATS also has extensive search functions in order to provide printed reports on species distributions through time and space. Export of the data to other (e.g. statistical) packages is possible.

STRATS runs on the VAX minicomputer platform under VMS or on an IBM compatible PC under DOS. Preparation of an enhanced version to run under IBM PC's and workstations under UNIX is in progress.

As a good-neighbor gesture, Halliburton Geo Consultants now offers the PC version of STRATS (including a printed manual) to bona fide academic institutions at a nominal rate of US$1000.00 (or £500.00 sterling). Prices for the VAX version are available on request.

Hardware required is an IBM-PC with 5 1/4" or 3 1/2" floppy drivers, large capacity hard disc (min. 30 MB recommended), 640 RAM (min), 1 (preferably 2) serial and 1 parallel I/O ports, DOS operating system (version 2/0 or above). Also required is a pen-plotter configured to HPGL files and an A3 touch-sensitive keypad (manufactured by the Concept Keypad Company, U.K.).

For further details and information, contact Mike Bidgood or Stan Duxbury at:

Halliburton Geo Consultants
PO Box 37
Aberdeen
AB9 8DA
U.K.

Tel: (0224) 770355
Fax: (0224) 771438
Tlx: 739496 GO ABN G

PROFESSOR BIRBAL SAHNI BIRTH CENTENARY CELEBRATION - A REPORT

Professor Birbal Sahni, one of the foremost scientists of India, was the first Indian to have taken to palaeobotany as his research interest. Born on 14 November 1891, Birbal Sahni had his palaeobotanical orientation in the laboratory of Professor Sir Albert Charles Seward at Cambridge. He revived the study of fossil plants from India, and put palaeobotanical researches on an organized basis in the country. The Birbal Sahni Institute of Palaeobotany - the academic successor, proudly celebrates the birth centenary of this great man. A large number of programmes has been chalked out for the occasion by a National Organizing Committee.

The Birth Centenary Celebrations commenced in the forenoon of 14 November 1991 with Pushpanjali at the Samadhi of Birbal Sahni, followed by planting of a sampling of the Scholar's tree (Alstonia scholaris) in the campus of the Birbal Sahni Institute. This was followed by unveiling of a tablet commemorating the foundation of the Institute of Palaeobotany in the Department of Botany, University of Lucknow by Professor T.S. Sadasivan.

Early in the afternoon, an exhibition on "**Birbal Sahni, and Past of the Green World**" was inaugurated by the eminent scientist Dr. A.P. Mitra, in the Regional Science Centre, Lucknow.

The Centenary Celebrations were formally inaugurated by Professor S.Z. Qasim, Member of the Planning Commission. His Excellency Sir Satyanarayan Reddy, Governor of Uttar Pradesh was the Chief Guest. Professor T.S. Sadasivan, one of the oldest students of Birbal Sahni, delivered a memorial lecture on "Professor Birbal Sahni's contribution to Indian Botany and its impact on the scientific scenario". Tributes to Birbal Sahni were paid by Dr. A.P. Mitra, President of National Academy of Sciences, and Dr. B.P. Radhakrishna, Editor of the Geological Society of India. Dr. Harsh K. Gupta, Advisor, Department of Science and Technology, released the Birbal Sahni Memorial Volume on the "Indian Gondwana" published by the Geological Society of India.

On 15 November 1991, in the forenoon, a Group Discussion on "**Relevance of Palaeobotany in modern context**" was held. Mr. C.P. Vohra, Director-General of the Geological Survey of India presided over the discussion which was moderated by Professor H.Y. Mohan Ram. In the afternoon, Professor David Leonard Dilcher, University of Florida, delivered 21st Professor Birbal Sahni Memorial Lecture on "**The importance of plant/animal interactions in the origin and subsequent evolution of flowering plants**". Mr. C.P. Vohra released two special publications, one of "**Extinct plants, evolution and earth's history**" published by the Current Science Association, and the other "**Catalogue of plant fossils from India**" published in 11 fascicules by the Birbal Sahni Institute of Palaeobotany.

The scientific programmes that took place during the following week included (i) Symposium on "**Evolutionary Plant Biology**, 16-17 November 1991, inaugurated by Professor Alfred Traverse of the Pennsylvania State University; (ii) Symposium on "**Four Decades of Indian Palaeobotany,** 18-19 November 1991, inaugurated by Professor C.G.K. Ramanujam of Osmania University; and (iii) **Birbal Sahni Birth Centenary**

Palaeobotanical Conference, 20-22 November 1991, inaugurated by Professor D.L. Dilcher.

During the week four special lectures were also delivered. These were (i) 36th Sir A.C. Seward Memorial Lecture - **"History of International co-operation in Palynology"** by Professor James E. Canright of Arizona State University which was presided by Professor R.N. Kapil; (ii) 37th Sir A.C. Seward Memorial Lecture - **"Links with the past in the plant world: cuticles as recorders of diversity, kerogen formation and palaeoatmospheric CO_2 level"** by Professor Henk Visscher of University of Utrecht which was presided by Dr. B.D. Sharma; (iii) The Palaeobotanical Society International Medal Award Lecture for 1989 - **"The early history of land plants - revisited"** by Professor Harlan P. Banks of Cornell University (read by Professor Alfred Traverse); and (iv) The Palaeobotanical Society International Medal Award Lecture for 1991 - **"Sporopollenin and chitin-- 'non-biodegradable plastics' trace major biochemical events of the geological past"** by Professor Alfred Traverse of The Pennsylvania State University.

CANDIDATES - 1992 ELECTIONS

Dr. Loretta Satchell, Chairman of the 1992 nominating committee submitted the names of the following candidates to the Board of directors for approval. The Board of Directors approved the list at the mid-year meeting and now submit the names to the membership for consideration before the ballots are mailed out.

PRESIDENT:

Owen K. Davis
Lucy E. Edwards

SECRETARY-TREASURER:

Gordon D. Wood

MANAGING EDITOR:

David K. Goodman

DIRECTOR-AT-LARGE:

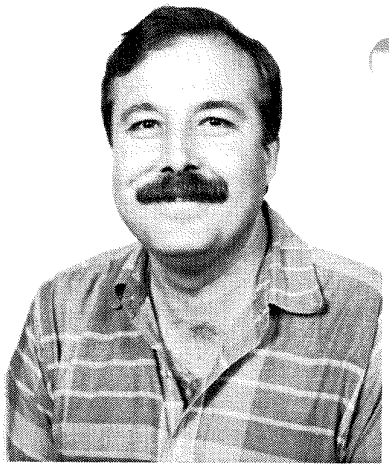
Dennis R. Braman
Martin B. Farley
Martin J. Head
Gary G. Thompson

Members of the nominating committee were: Loretta Satchell (Chair), Rosemary Askin, Peter Griggs, Paul Strother, and John Utting. The submitted biographies of the candidates are as follows:

OWEN K. DAVIS

[President]

Owen is an Associate Professor in the Department of Geosciences and Director of the Palynology Laboratory at the University of Arizona. He was born March 13, 1949 in Nampa, Idaho, received his B.Sc. in Biology in 1971, M.Sc. in Botany in 1974 and his Ph.D in Ecology in 1981. He is married with two children.



He joined AASP in 1976. His service to the organizationincludes Director-at large 1988-1990; Chair of the Awards Committee, 1989; Awards Post Card Committee,1989-present: Chair of the Nominating Committee 1990; Chair of the Data Committee 1988-present; and Chair of the 25th Annual Meeting Committee. He organized the "Global Change" symposium at the 24th Annual Meeting, chaired technical sessions at the 21st and 19th annual meetings, organized the "Southwestern" symposium at IPC 6, and edited with Bonnie Jacobs and Pat Fall, AASP Contribution Series 13. He was also the North American coordinator for IGCP 252, "Past and Future Evolution of Deserts", and is a member of the Numerical Methods working group of INQUA.

His research interests include climatic change (43 publ.), historic palynology (33 publ.), archeological palynology (32 publ.), pollen in packrat middens, dung ar honey (8 publ.), fungal spores (2 publ.) and pollinatio ecology (2 publ.).

LUCY E. EDWARDS
[President]

Lucy E. Edwards is a palynologist in the paleontology and Stratigraphy Branch of the U.S. Geological Survey in Reston Virginia.

She has been an AASP member since 1975. She has served on the Awards Committee since 1986 and is currently its chair. She has served on the ballot committee and nominating committee twice each and has judged student papers and posters at annual meetings a number of times. She was one of the instructors for the First AASP Palynologic Short Course in 1989. In 1984 and again in 1986 she was program chair for the AASP Annual Meetings in Arlington and New York. She was an AASP Director-at-large from 1983-1985 She also serves on the Board of Advisors for Micropaleontology Press and is the 1992 chair of the North American Commission on Stratigraphic Nomenclature.

Lucy's B.A. is from the University of Oregon and her Ph.D. is from the University of California at Riverside. Her areas of interest include dinoflagellate biostratigraphy, paleoecology, morphology and evolution. She also works on quantitative methods in biostratigraphy and paleoecology.

GORDON WOOD
[Secretary-Treasurer]

Gordon received his Ph.D. from Michigan State University. He joined AASP in 1969 and is the incumbent Secretary-Treasurer.A position he has held since 1986. He was Chair of the 1985 Nominating Committee and has been Chair of the Ballot Committee. He was Chair of the Palaeozoic Symposium at the 1988 Annual Meeting. Gordon is a member of the Society for Organic Petrology, Paleontological Society, Society of Economic Paleontologists and Mineralogists and the American Association of Petroleum Geologists

Gordon is a palynologist with Amoco Production Company in Houston, Texas. He stands unopposed for the position of Secretary-Treasurer.

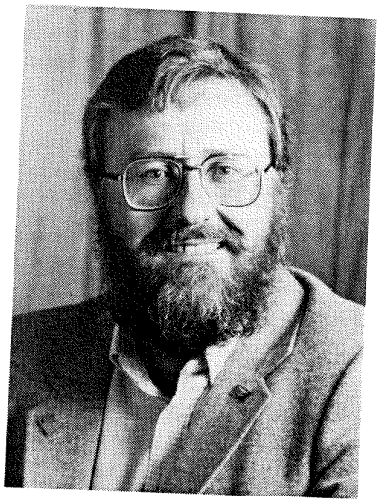
DAVID K. GOODMAN
[Managing Editor]

David became a member of AASP in 1975 and is the incumbent Managing Editor. He has served as Assistant Editor of PALYNOLOGY (1985-1986) and Editor of PALYNOLOGY (1986-present). David was Director-at-Large (1986-1987). He has also served several times on the L.R. Wilson Outstanding Student Paper Committee.

David is a member of numerous societies and was the Chair of the Fourth International Conference on Modern and Fossil Dinoflagellates at Woods Hole. He has recently transferred from Dallas to Midland, Texas where he works as a stratigraphic palynologist for Arco Oil and Gas Company.

David stands unopposed for the position of Managing Editor.

DENNIS R. BRAMAN
[Director-at-Large]



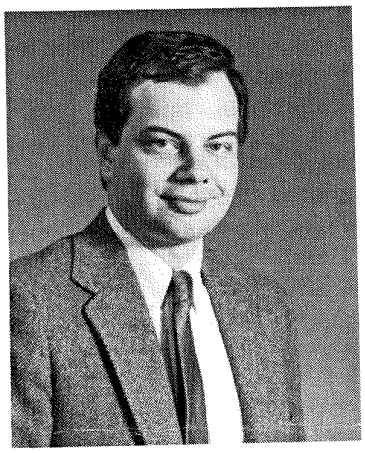
Dennis has been a member of AASP since 1974. He was a member of the organizing committee for the 6th IPC held in Calgary and was a field trip leader for the conference. He has been on the organizing committees for Dinosaur Systematics and Mesozoic Terrestrial Ecosystems conferences and a leader for a large number of field run during these and a number of other conferences.

Dennis received his Ph.D. from the University of Calgary in 1981 and has been with the Royal Tyrrell Museum of Paleontology since 1983. His research interests

have included Devonian-Carboniferous palynomorphs and Cretaceous-Paleocene biostratigraphy, taxonomy and paleoecology based on terrestrial floras of the Western Interior Plains area of Canada and the northern United States. Examination of sequence boundaries and floral changes around the Cretaceous - Tertiary boundaries are an important part of his research. He has spent three months in the field in northwest China looking at Jurassic and Cretaceous units as part of the Canada-China Dinosaur Project.

MARTIN B. FARLEY

[Director-at-Large]



Martin is currently a senior research geologist at Exxon Production Research in Houston, Texas. He received B.Sc. and Ph.D. degrees in Geology from Penn State in 1980 and 1987 respectively, and in between received a M.A. in Geology from Indiana University (Bloomington) in 1982. He has been a member of AASP since 1981. He is currently chair of the Short Course/Workshop Committee of AASP and organized the recent short course on Fungal Palynomorphs given by Bill Elsik.

His interests include modern sporomorph taphonomy, Paleogene palynofloras of the Rocky Mountains and their relation to megafloras, sedimentology, and paleoclimate, and Upper Cretaceous palynomorph occurrence in a sequence stratigraphic context.

MARTIN J. HEAD

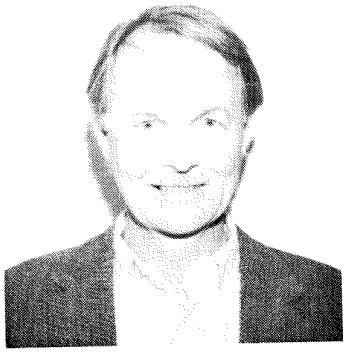
[Director-at-Large]

Martin J. Head, a Research Associate at the University of Toronto and an AASP member since 1981, was first introduced to palynology by Mavis Butterworth during undergraduate days at Aston (England). This was followed by research on Paleogene palynomorphs at Aberdeen University under the guidance of David Batten (now at Aberystwyth) and subsequent award of a Ph.D. Martin joined the staff of the University of Toronto in 1985 as a Post-doctoral Research Associate (with Geoff Norris), becoming lecturer in paleontology in 1990/91.

Martin became interested in Neogene dinoflagellates as a shipboard palynologist on ODP Leg 105 in 1985. He went on to co-organize the First Neogene Dinoflagellate Workshop in New York (1986), co-organize the Second Neogene Dinoflagellate symposium and Workshop (with John Wrenn) at Dino-5 in 1989, organize the first AASP sponsored Short Course in Tulsa in 1989, instruct at the recent Nordic Council of Ministers Short Course in Denmark (1991) and co-edit (with John Wrenn) a two-volume compilation of papers on Neogene-Recent dinoflagellates soon to be published by the AASP Foundation.

GARY G. THOMPSON

[Director-at-Large]



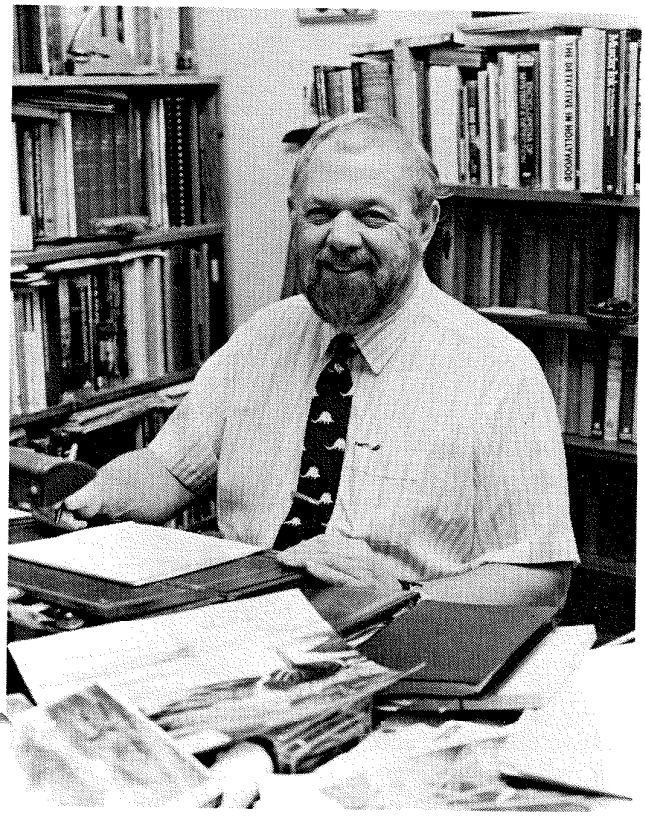
Gary G. Thompson is currently Seager Professor of Geology at Rocky Mountain College in Billings, Montana. He has been a member of AASP since 1969. He received his B.Sc. (1962) in Geology from the University of North Dakota and his Ph.D. (1969) in Geology from Michigan State University. His current research interests in palynology include Cretaceous ecostratigraphy, biostratigraphy, sequence stratigraphy and thermal maturity.

WHERE ARE THEY NOW

25 YEARS LATER

Many members of the AASP recognize the names of most of the founding members of AASP from the literature and may be curious about what they are doing

now and what they look like now. Each of the founding members of the AASP has been invited to send a photograph and write a short discourse on their current life styles - 25 years post-Tulsa. During our 25 year celebration - the "Where are they now" column features the founding members.



Professor Bill Sarjeant

WILLIAM ANTHONY SWITHIN SARJEANT was Visiting Professor in the School of Geology & Geophysics, University of Oklahoma, and 33 years old at the time of formation of the American Association of Stratigraphic Palynologists. After a motor tour into the American west and a brief visit to the northeastern States during the summer of 1968, he, his wife Peggy and (at that time) only daughter Nicola returned to Nottingham, at whose University Bill was then a Lecturer in Geology.

However, after the comforts and opportunities of the United States, the lower salaries and harsher living conditions of England offered little appeal. Moreover, three experiences -- a major fire in the Geology building, in which Bill lost all his research samples and many geological papers; a visit to Paris at the time when de Gaulle's crumbling rule was being propped up much too visibly by the police and the military; and an all-too-brief participation in the International Geological Congress in Prague, prematurely terminated by the Russian invasion - made this side of the Atlantic seem even more attractive. Consequently, Bill and family - by then augmented by a second daughter, Rachel - came back across the ocean in 1972 to enjoy the spaciousness and year-long sunshine, and endure the winter cold, of Saskatoon.

Since the Department of Geological Sciences of the University of Saskatchewan was by then in run-down and overcrowded quarters, Bill was "temporarily" assigned office space in the prefabricated General Purpose Building, his offices being sandwiched between Feed Testing and Printing Services. The Palynology Laboratory was a converted trailer with serious heating and air-flow problems. Persons working in it in winter had to wear fur-lined boots but virtually strip to the waist; moreover, they had to deal with such unusual problems as frozen hydrofluoric acid! In summer, in contrast, the trailer overheated to the point where it became too hot to inhabit. This was at first considered entirely inexplicable by University engineers, till they recognized that the air intake of the trailer was receiving the hot-air outflow from the General Purpose building!

Even so, this was a productive time, as the theses and papers of Martin Bradford, Stuart Harker, Malcom Wilson, Jim Wheeler and Duncan Wall and the voluminous productions of Bill himself demonstrate. Most demanding among those last was Bill's (initially) five-volume bibliography of Geologists and the History of Geology, the checking of whose 4,526 pages drove him almost to a nervous breakdown! Much greater fun has been his work on fossil vertebrate footprints, a form of scientific detective work that he finds perennially fascinating.

The long-promised and too-often-delayed move to ampler, and infinitely better designed, quarters in the new Geology-Biology building came in 1986. (Bill's technician, Mrs. Choo, found it quite astonishing to be in a laboratory where she could actually turn around without colliding against something or someone!) Visitors from India and Switzerland, Brazil and Argentina have come and gone, but palynologists in Calgary don't often venture east of the Saskatchewan frontier, especially now that Divine rule has ended.

Bill and his family, now augmented by a third daughter Juliet, settled happily into a large house--too full of books, records and musical instruments t be called "spacious"--on a tree-lined street in Saskatoon, just one block from the South Saskatchewan River's east bank. In due course, eldest daughter Nicola graduated in Law from the University of Toronto and was admitted to the Ontario Bar; second daughter Rachel gained High Honours in her History B.A. of the University of Saskatchewan and is presently "bumming around" in Europe; and youngest daughter Juliet is now in the first year of a University of Saskatchewan course, leading to who knows what degree?

Peggy and Bill have both been involved in campaigns to preserve the environment and architectural heritage of their city and Province. Both have co-authored books on Saskatoon's history (though not with each other!) and Bill edits the annual Saskatoon History Review. Both are prominent members of the Casebook of Saskatoon, a group of detective-fiction enthusiasts; Bill is also a member of DRAMS (Drinkers of Rare and Ancient Malts in

Saskatchewan), a group meeting to socialize and sample whiskies during the winter months. He had belatedly learned to swim, after a near-drowning off the San Juan Islands, and plays badminton regularly, if not very well. He has been long singing and playing in the folk singing group The Prairie Higglers and has served for an exhausting two years as President of the Canadian Folk Music Society (now the Canadian Society for Musical Traditions).

Since Oklahoma, Bill's geological travels have taken him to many parts of Europe, to Tunisia, Algeria and Iran; to Brazil, Argentina and Paraguay; and to new Zealand and Australia. He feels he needs such "wild goose flights" to stay sane! Another form a escape is into his own imaginary world of Rockall, about which he has written a series of seven novels (loosely classed as "historical science-fantasy", but basically adventure stories) set in the 15th Century. (He uses as pen-name his two middle names, to distinguish these undoubted fictions from the alleged facts of his scientific writings!) Three have been published, a fourth is in press and the three others are currently under consideration by Harper Collins.

As for AASP, Bill has been able to participate in only a few meetings since the beginning; but then, North America is a big place, travel funds never as ample as might be desired and the locations not always very exciting. (If forced to choose between, say, London and Paris or Tulsa and Dallas, where would **you** elect to go?) Moreover, his life is always extremely busy; but, since it's so varied and fulfilling, he's happy to have it that way!

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DR. RICHARD A. HEDLUND

At the time of the organizational meeting of AASP, Dick was employed by Atlantic-Richfield Co. as a research palynologist in Plano, Texas. His chief responsibility was as project supervisor for the southern Alaska Basins project. In 1971, he left Texas and returned to Oklahoma where he worked for Amoco Production Company as a staff research scientist, research group supervisor and Special Research Associate until he elected to take early retirement this year. His research for Amoco included mainly Mesozoic and Cenozoic biostratigraphic applications on a world-wide basis.

Dick was a member of the original Constitution Committee, was elected Councillor in 1968, originated the Membership Directory in the same year, served four years as Editor, and was elected President of the Association for the 1973-1974 term. He served in several other capacities and was Co-Chairman of the 1977 Annual Meeting in Tulsa. He has served as Trustee of the AASP Foundation from its inception in 1977 to the present and is the Editor of the "Contributions Series". He was a recipient of the Association's Distinguished Service Award in 1983. In addition, Dick has authored numerous technical papers for publication in various journals.

Dr. Dick Hedlund, "peek-a-boo" !

Dick and his wife Donita still live at 6923 South Knoxville Ave, in Tulsa, where he plans to continue doing research. Their three sons have left the nest (almost): Richard Jr. is a dentist in Oklahoma, Phillips is employed in marketing in Houston, and Karl Eric is finishing his sophomore year at Westminster College. Dick continues to pursue his "hobby" as organist/choirmaster in their parish church and he and his wife plan to spend some time travelling in the future.

Dick's palynologic interests are wide-ranging and include Mesozoic/Cenozoic pollen and dinoflagellate cysts and their applications in solving chronostratigraphic problems. He is available for consulting in these areas and plans to remain active in the scientific community.

PLEASE NOTE MY CHANGE OF ADDRESS: Please send all manuscripts for the AASP Foundation Contribution Series to Dr. Richard Hedlund, 6923 South Knoxville Ave., Tulsa, Oklahoma 74136. Tele: (918) 492-3302.

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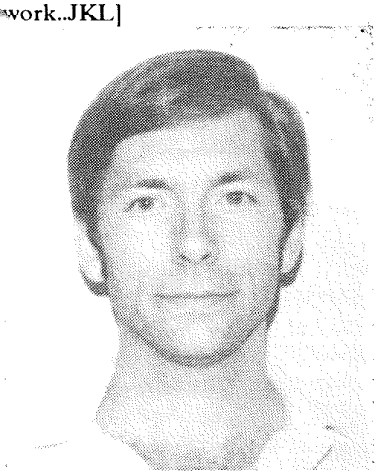
EDITORS NOTE: All founding members have been asked to send a photograph and a short article to describe their various current positions. I urge all founding members t get this information to me as soon as possible...JKL

THESIS ABSTRACTS

High Resolution Palynostratigraphy across a Marine Cretaceous-Tertiary Boundary Interval, Falls County, Texas

by Dale C. Beeson

I have appreciated the support of the AASP and many of its members during my palynological research which I pursued for partial fulfilment of the Ph.D. at Penn State with Alfred Traverse. I would like to share with the membership some of the results of my research as they appear in my dissertation dated May, 1992. [Dale was awarded the AASP 1991 Student Scholarship for this work..JKL]



Dale Beeson

This investigation was conducted within the Tertiary Kincaid Formation and Cretaceous Corsicana Formation at the Brazos River locality, Falls County, Texas, one of the more stratigraphically complete and well documented marine K/T boundary sequences in the world. The results of this study represent the most detailed quantitative analyses of terrestrial palynomorphs across a marine K/T boundary to date. Additionally, the palynological results are directly correlated to marine biostratigraphy as well as to recently established chronostratigraphy.

One hundred and nine channel samples ranging over 1-10 cm in thickness and representing four section (516 cm of strata) were processed in the laboratory for palynological examination. The microscopic analyses of these processed samples were designed to 1) produce a form-generic taxonomy compatible with previous North American K/T studies, 2) classify the palynoflora at the lowest taxonomic level capable of recording changes in diversity given the relatively fair to poor degree of fossil preservation, and 3) develop a data base for quantitative analysis. Approximately 78,000 terrestrial palynomorphs were counted. These fossil counts represented 300 to 1000 specimens per sample for 146 different palynomorph taxa. In addition to raw counts, the following numerical data were generated: 1) terrestrial/marine palynomorph ratios based on marine microplankton counted along with the 300 count terrestrial palynomorphs, 2) percentages based on 300 specimen counts per sample, 3) terrestrial palynomorph concentrations (palynomorphs per gram), by sample and by taxon, and 4) number of terrestrial palynomorph species per sample (i.e., measure of diversity changes). These data were all manipulated graphically to highlight patterns in the data. Additionally, cluster analysis and principal components analysis were applied to the percentage data. The results of these analyses were integrated for an explanation of events across a "best fit" palynologically determined K/T boundary.

The four Brazos sections represent about 450,000 years of depositional and erosional history across the K/T boundary. The palynological K/T boundary in all four sections is marked by 1) primary separation of dendrogram clusters produced by Spearman ranking of log ratio transformed percentage data and application of unweighted pair group mean clustering, 2) the first significant increase in abundance of *Cercidiphyllites* followed by a continuous record and increasing abundance of that palynomorph taxon up-section, and 3) the simultaneous occurrence of factors 1 and 2 above directly up-section from a significant marine regressive maximum as indicated by palynomorph concentrations, quality of preservation, and terrestrial/marine palynomorph ratios. In section 1, the palynological K/T boundary occurs 3.5 cm up-section from the micropalaeontological K/T boundary.

The palynological K/T boundary is not marked by extinctions. Increased fern spore abundance (i.e., fern spikes = 17-23% of palynomorph counts or about 2 to 3 times background abundance) only occurs at the K/T boundary in 1 of the 4 sections. Although the fern spike is found to be helpful for locating the palynological K/T boundary in continental sections of North America, it is not a robust indicator of that boundary in the Brazos sections.

A sea-level regressive maximum occurred about 12,000 years before the palynological K/T boundary when the Brazos River locality was in water ≡ 6 meters deep only a few kilometers offshore. A transgressive maximum 10-15,000 years after the time of the K/T boundary placed the Brazos locality in ≡ 64 waters of water and as much as 130 kilometers offshore. The initial phase of this rapid rise in global sea-level immediately proceed the K/T boundary and represented an average sea-level flux of 4-6 meters per thousand years which closely corresponds in magnitude to glacio-eustatic rises in the Pleistocene. Only minor regressive maxima in a dominantly transgressive interval

followed the K/T boundary for at least the next 55-60,000 years. A regressive maximum lasting a few thousand years occurred in the lower part of foraminiferal zone Pla-b about 60,000 years after K/T boundary time. Changes in palynomorph species diversity due to actual losses of plant taxa can be distinguished from taphonomic noise due to sea-level fluctuation by noting changes in diversity (i.e., species richness) which are out-of-phase with the sea-level curve (generated from terrestrial palynomorph concentration and terrestrial/marine palynomorph ratios).

Losses of palynomorph taxa from the fossil record include: 1) $\leq$ 20% of taxa starting about 310,000 years before the K/T boundary; 2) 19-29% of taxa starting at the K/T boundary, and; 3) $\leq$ 22% of taxa starting about 50,000 years following K/T boundary time. The two earliest losses of taxa (including the K/T boundary loss) recover 100% within 5-20,000 years. The earliest interval is associated with a foraminiferal extinction. The latest loss occurs coincident with foraminiferal extinctions near the PO/Pla zonal boundary and is only recovered to about 90% after 22,000 years. This loss correlative to PO/Pla includes probable extinctions of *Proteacidites retusus, P. thalmannii,* and 4 or 5 species of *Aquilapollenites.* A fern spike (16-25% of palynomorph counts or about 2 to 4 times background abundance) is correlated in 3 sections at the beginning of this zonal boundary. This palynomorph signature, which represents changes starting approximately 50,000 years after K/T boundary time, is similar to the palynological K/T boundary signature determined for most continental sections in the western interior of North America. Similarly, the taxa most affected during the palynomorph species losses are dicot angiosperms. Gymnosperms are relatively little affected and filicalean spores are least affected. The angiosperm pollen *Cercidiphyllites* and *Caryophyllidites* increase significantly during these intervals of increased palynomorph species loss.

"There may well have been a bolide impact at the time of the K/T boundary, but it was not responsible for mass extinctions."

In general, the terrestrial palynomorph signature across the K/T boundary interval shows a series of palynomorph losses before and after the boundary with periods of recovery lasting 5-22,000 years or more. The changes in palynofloral diversity are more protracted after the K/T boundary than they are before the boundary. These changes are sometimes contemporaneous with biotic changes in the marine realm. This suggests environmental changes, such as significant climatic and sea-level fluctuations, which operate to alter community dynamics in both terrestrial and marine biota at the same time. The concept of a single catastrophic event as the operative mechanism for these types of changes is probably too simplistic. There may well have been a bolide impact at the time of the K/T boundary, but it was not responsible for mass extinctions. Global biota, especially terrestrial flora, can be very resilient to short-term environment changes. It is more reasonable to expect that events such as bolide impacts only represent a relatively small contribution to the more significant intrinsic terrestrial forces acting on biotic change.

Any comments, suggestions, or questions would be appreciated and can be directed to me at:

Chevron U.S.A.
935 Gravier Street
New Orleans, LA 70112

EDITOR'S NOTE: Recent graduates of either M.Sc. or Ph.D. programs are urged to submit their abstracts for publication in the AASP NEWSLETTER. Professors are urged to urge their students to submit abstracts for publication in the AASP NEWSLETTER.

TECHNICAL NOTE

APPLYING PALYNOLOGY

A.J. Powell

SUMMARY

The key to exploration success depends upon accurate assessment of depositional systems within a sequence stratigraphic (allostratigraphic) framework. A complete understanding of temporal and spatial relationships within and between depositional systems tracts is essential to the development of evaluation of play fairway concepts. Palynological biostratigraphy in combination with seismic stratigraphy provides a powerful means for subsurface correlation which is beyond the resolution of either discipline alone. The full potential of palynological results can only be fully realized when they are integrated with seismic data and when the pitfalls are fully appreciated. Wireline logs, lithofacies, palynofacies, microplankton biofacies and seismic data can be calibrated in terms of an evaluated time framework through the correct application of palynological data. As a consequence, the relationships between depositional systems within a systems tract may be predictively modelled.

INTRODUCTION

The purpose of this article is to stimulate palynologists into

thinking about their subject - about what it is, about its applications, and about how it can flourish. In particular, my aim is to assess how applied palynological biostratigraphy is adapting to the new demands of allostratigraphic analysis. By this, I refer to analysis of the palynological stratigraphic record, at any scale appropriate to the objectives of the study, within the confines of discontinuity-bounded units of strata.

I am not going to deal here with the principles of sequence or basin analysis, nor do I intend to offer any opinion about the feasibility of recognizing eustasy in the stratigraphic record, nor do I intend championing any particular school of sequence definition that might be fashionable today. What I do have in mind is more pragmatic, that is to try and explain the contributions that palynology can make to sequence recognition, what the major palynological pitfalls are (and how they may be best avoided), how palynological data may be used to characterize the internal character of sequences, and ultimately how palynology may be used as a predictive methodology, particularly through palynological facies modelling. In other words - how to apply palynology.

An earlier version of this article appeared in the February/March 1992 issue of "Geoscientist" (Volume 2, No.1, pp. 12-16), published by The Geological Society of London. It was my original intention to alert the geological community to the considerable contributions that applied biostratigraphy, and implicitly palynostratigraphy, can make to depositional sequence analysis. I chose not to stress the role of palynology because I believe that if palynology is to survive as a discipline it cannot afford to retain the arrogance of the isolationist's stance. Palynology is a part of micropalaeontology; there is no longer a "Senior Service" because we are all applied biostratigraphers now! Stories of palynologists and other micropalaeontologists at each others throats arguing the toss of an age determination, are now just tales, albeit colourful ones. It is much easier to recognize and avoid pitfalls if all biostratigraphers work, and apply their data, together. The biostratigraphical contribution of palynology is most effective when it is considered in association with other micropalaeontological disciplines.

Having said that, however, the common perception of palynology as the poor relation of micropalaeontology does need redressing. To this end, and at risk of preaching to the converted, I have adapted the original article in such a way as to emphasize the role of palynology in depositional sequence analysis - biozones are palynozones, biofacies are palynological facies, etc. If micropalaeontology in the widest sense, and palynology specifically, is to be supported, it has to be promoted to the correct people; it's a product which we will have to sell effectively. At the end of the day, our actions will have to speak louder than our words.

APPLIED ALLOSTRATIGRAPHIC PRINCIPLES

Modern eclectic methods of basin analysis have been prompted dually by developments in seismic stratigraphic interpretation and models of extension within continental plates. This has enabled a set of principles to be developed which may be applied to any stratigraphic situation.

Many of these principles have been appreciated by palynologists for many decades. Even so, applied palynology has failed to make much of an impact; we were happy (and highly successful) age dating sediments, deducing hiatuses and correlating, without much appreciation of the implications on a basin scale. More significantly, palynologists had not become very involved in stratigraphic modelling and the goals of prediction. In more recent years palynologists have tended to be content standing on the sidelines feeding data to explorers at half time. The situation had reached a point that palynology was often considered to be either inaccurate or inapplicable at large scale, and thus ultimately dispensable.

Methods of sequence analysis have allowed explorers to look at basin-fill successions from a distance where previously palynologists had been looking, perhaps too closely, at the detail. The key for the palynologist is largely a question of knowing the objectives of the analysis and adopting the most appropriate methods for the scale of inquiry under consideration. The new impetus has, however, made palynologists take a fresh look at their discipline; either modify working methods or face a gradual decline towards a Last Appearance Datum.

Palynology has much to offer sequence and basin analysis, but it is up to us as applied palynologists to make that impact and contribution. There is an increasing need for palynologists to be more than just data generators and to get fully immersed in the modelling process, for the good of all.

PARASEQUENCES, SYSTEMS TRACTS AND OTHER SUCH JARGON

Before going any further, I should make clear what I understand by the multifarious words and expressions that are currently banded about in depositional sequence circles, and causing much confusion elsewhere. Many of the terms are illustrated in Figure 1.

Let's for arguments sake accept that unconformities are the bounding features of depositional sequences (and regional unconformities for megasequences). They can be used to subdivide a basin-fill succession into a number of tectonically controlled phases of basin evolution which reflect variable conditions of tectonic subsidence, sediment supply and eustacy (often in that order).

Sequences are composed of systems tracts, that is three-dimensional contemporaneous facies associations which reflect a particular process or environment. Seismically, Lowstand, Transgressive, Highstand and Shelf Margin systems tracts are recognizable (even though facies associations are sometimes only assumed). Internally, systems tracts comprise relatively conformable strata arranged in progradational, aggradational or retrogradational parasequence sets (stacked packages of

related prograding sediment interspersed by marine flooding surfaces and capped by a more significant marine flooding surface).

The most critical seismic surfaces from a palynological point of view are downlap surfaces. These comprise condensed sections which are composed of hemipelagic or pelagic sediment deposited during time of poor terrigenous sedimentary influx. It is important to appreciate that these are condensed sections from a seismic perspective. At sub-seismic resolution, so-called condensed sections may be seen to attain some thickness and could therefore be considered not to be condensed sections in more literal senses; their development will depend upon the nature of the basin configuration and the locality with respect to the depocentre and distance from the shore.

Two major types of condensed section are recognizable: primary condensed sections which are manifest as downlap surfaces between the top of a Transgressive Systems Tract and the base of a Highstand Systems Tract, and secondary condensed sections which occur as downlap surfaces within Lowstand Systems Tracts (at the base of submarine fan complexes and at the base of the prograding lowstand wedges) and at the base of Shelf Margin Systems Tracts. Condensed sections are also present as proximal marine flooding surfaces between parasequences, and as hemipelagic drapes between lobes within submarine fan complexes. Condensed sections are often identifiable on well logs by gamma peaks and sonic troughs (so-called hot shales).

Palynological abundance events or acmes (derived from the greek word aekmi meaning the highest point, the point of perfection - so they must be good!) are often developed within condensed sections. Condensed sections are sometimes also characterized by increased species richness. They are often interpreted misleadingly in the seismic stratigraphic record as "marine hiatuses" (but succession is only apparently missing). Except in very exceptional circumstances (e.g. bottom-water current effects), it is difficult to invoke submarine erosion on a regional scale similar to the effects of subaerial exposure. Although condensed sections are frequently characterized by abundance events, they also may (particularly in truly oceanic setting) contain no palynomorphs at all let alone abundance events, so care must be taken. It is thus important to characterize the abundance event (and the accompanying gamma peak) and to differentiate the primary and secondary condensed sections from others.

Apart from containing concentrations of palynozonal indices, condensed sections are also important for the palynologist because they allow easy integration with other disciplines and they are laterally extensive; events on the shelf may be traced down the slope towards the depocentre by following a condensed section. Thus, a chronostratigraphically accurate palynozonation in the basin may be extrapolated in a proximal direction where palynological ranges become progressively truncated as the time represented in the downlap surface become progressively less.

The fullest areal development of a primary condensed section (its apex) on seismic terms is referred to as the maximum flooding surface (palynologically, a condensed section is rarely a surface). This represents a moment in time when the marine influence has encroached th greatest distance proximally beyond the shelf margin - th maximum point of transgression. The apex of the primary condensed section represents a variable interval of time stratigraphically along its length and is usually diachronous between proximal and distal extremes. There can be a big difference calculating the time represented by a primary condensed section between the shelf, slope and basin floor. Dating the apex of the primary condensed section (the moment of maximum transgression) in the marine realm is difficult, if no impossible. Towards the depocentre the moment may be manifest in the palynological facies by a subtle shallowing upwards shift.

There are many pitfalls associated with attempts at correlating condensed sections palynologically, particularly primary ones. I have alluded to some of these already and I will consider them in greater detail below.

DATING UNCONFORMITIES

Unconformities are often relatively easy to pick on seismic sections, in well logs, and palynologically. An unconformity is a stratal surface representing a variable amount of missing time (the hiatus) which cuts across facies boundaries. The amount of unrepresented time varies and generally becomes progressively less on moving from the shelf to basin centre as the unconformity changes to a conformity.

Although the hiatus of an unconformity is variable, a maximum amount of time must have passed during its formation. From a palynological perspective the duration of the hiatus may be deduced from knowledge of the palynozones on either side of the unconformity. Due to usual sampling regimes the tops of units are more readily identifiable than their bases in applied palynology; some precision may be lost in assigning the overlying strata (that is the timing of the onset of sedimentation) to a palynozone in any one location. It is therefore ideal to have conventional core cut across an unconformity, or failing that accurately positioned sidewall cores.

The amount of missing succession comprises three elements which the palynologist must be aware of. First, material eroded subaerially from the previously deposited sequences; second, the delay in time before sedimentary conditions are re-established; third, material eroded under marine conditions immediately prior to the onset of sedimentation along the shelfal transgressive surface. The added complications of reworking associated with transgressive surfaces often make it difficult to assign particular palynozones to strata deposited at the resumption of sedimentation after a hiatus.

Once the missing palynozones have been established, the total amount of missing time may b calculated as long as the palynozonation scheme has been calibrated accurately against a chronostratigraphic scale.

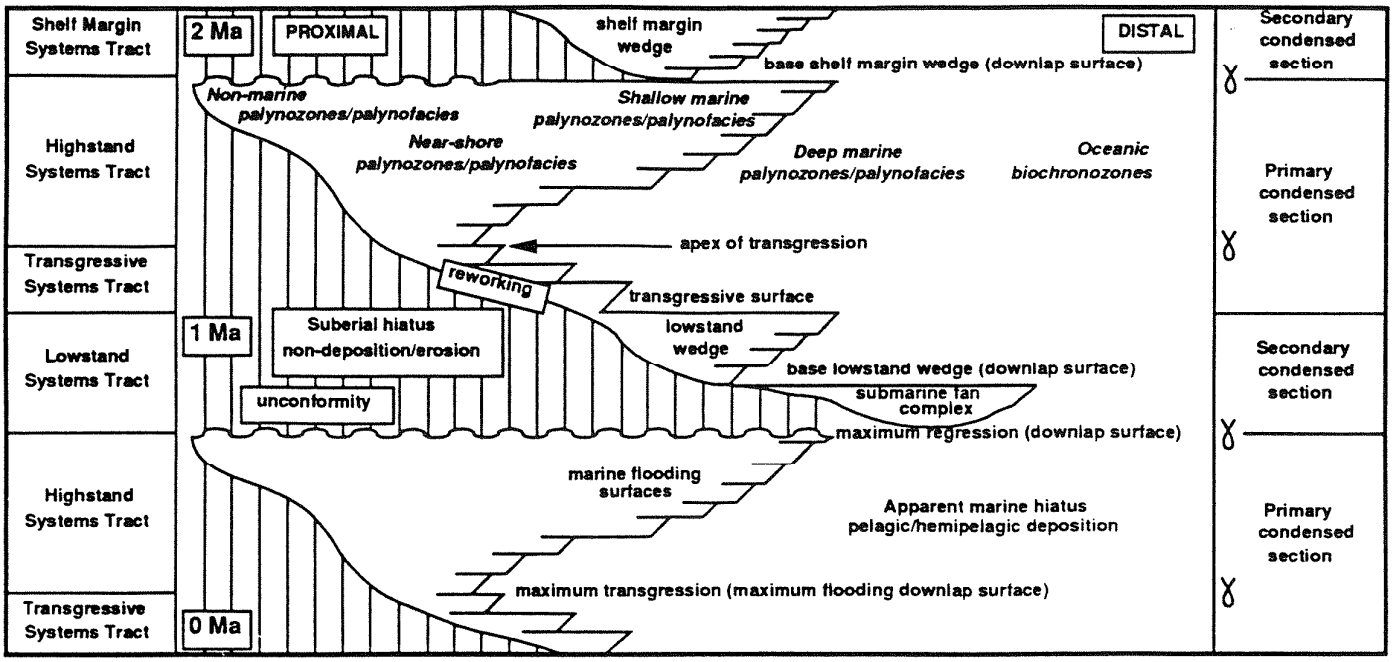


Figure 1 Depositional sequence terms and where to use them

ɣ = gamma peak

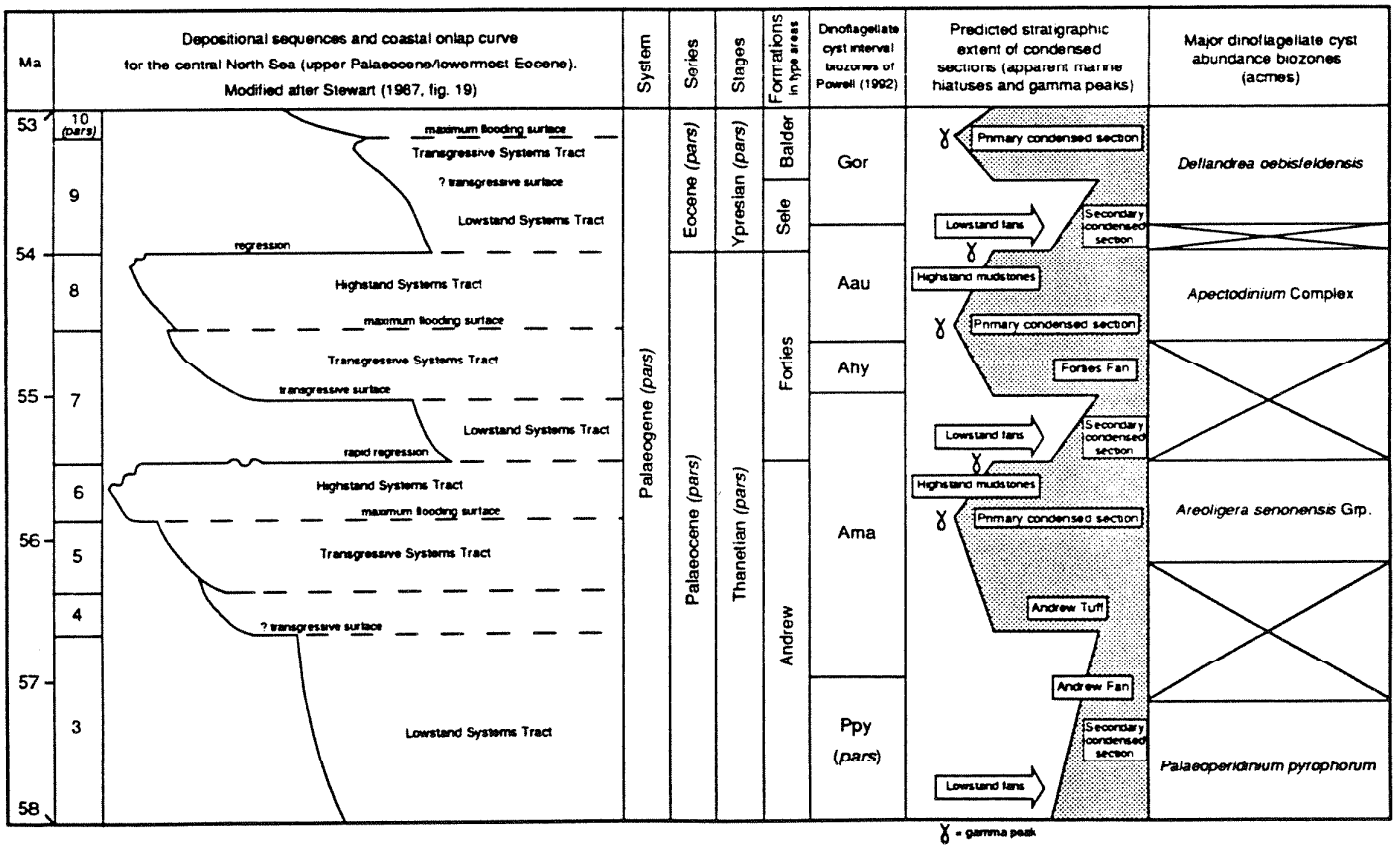


Figure 2 Stewart's 1987 central North Sea upper Palaeocene/lower Eocene sequence stratigraphy model

During periods of subacrial exposure, and as long as the basin has not been completely drained, sedimentation will continue towards the basin centre in the form of hemipelagic sedimentation. So the amount of missing time in the subaerial hiatus will be represented in continuous sedimentation towards the depocentre (the secondary condensed section).

The top of the secondary condensed section represents the so-called Transgressive Surface, but it is difficult to position in the basin centre as it merges with the overlying primary condensed section. However, it is predictable that a deepening upwards palynological facies response will be evident as retrogradation follows progradation at the base of the Transgressive Systems Tract. If such a palynological facies response is not apparent, the secondary and primary condensed sections in more distal locations will be indistinguishable. Integration with other disciplines is crucial and especially if at a scale below seismic resolution. In more proximal localities, the palynozonal indices available tend both to occur in lower numbers (e.g. dilution in coarser clastics) and to be less reliable due to a greater facies dependency (there are, however, notable exceptions).

Fan systems deposited during times of subaerial hiatus will enter the marine realm during deposition of the secondary condensed section. The condensed hemipelagic drape between lobes comprising submarine fan complexes will be preserved. They provide the main means of palynozonal control on a fan complex with implications for the timing of lobe switching. Drapes are thus of crucial importance in providing a palynological framework for reservoir sections in such settings.

Because a variable amount of time is represented by any one hiatus, it is likely that there will be an abrupt change in palynological facies across an unconformity as well as a number of missing palynozones. Together, these make unconformities relatively easy for the palynologist to recognize. However, where the duration of the hiatus is lessened and approaches a conformity, the missing succession will eventual fall within a single palynozone; the missing time will be difficult, if not impossible, to prove unequivocally with the given limitations of palynological resolution and the sample interval.

DATING DOWNLAP SURFACES

It is becoming increasingly fashionable to use downlap surfaces (maximum flooding surfaces) as the sole, or an additional, means of defining depositional sequences. This is because, particularly in prograding clastic depositional systems, they extend seismically from proximal, shelfal areas into more distal, basinal locations (apparent marine hiatuses). Furthermore, they tend to contain concentrations of palynozonal indices and other useful palynological markers (notably abundance events), and they have a characteristic well log expression (gamma peaks/sonic troughs). These surfaces are the primary condensed sections.

Primary condensed sections in more distal localities will be represented by continuous hemipelagic or pelagic sedimentation and will only be interrupted by the possible introduction of a base slope fan complex caused by slope failure. In shelfal settings the primary condensed section will become interdigitated with other facies and mor characteristically as a number of marine flooding surfac between parasequences and parasequence sets; they may be traced distally where they will coalesce. Similarly, during progradation of the Highstand Systems Tract, marine incursions of the primary condensed section will be present. By their very nature the base and top of condensed sections will be diachronous, so particular care should be taken to characterize them palynologically; misguided palynological correlations are a real pitfall particularly over long distances. On moving in a proximal direction, range bases of specific taxa (which taxa depends on the facies present) become elevated in a Transgressive Systems Tract, while range tops are depressed in a Highstand Systems Tract.

Using gamma peaks and palynological abundance events or acmes to recognize condensed sections is all well and good, but they may not necessarily represent the primary condensed section. Furthermore, primary condensed sections may be very thin and beyond the resolution of the sampling regime involved, they may be subject to bioturbation and palynozonal mixing, they may fail to yield palynomorphs due to redox conditions, and they may be difficult to pick in more proximal locations, particularly in none-marine settings.

The problems associated with differentiating primary from secondary condensed sections are illustrated in Figure 2. The central North Sea upp Palaeocene/lower Eocene sequence stratigraphic model of Steward (1987, in Illing, L.V. & Hobson, D.G., eds., Petroleum Geology of the Continental Shelf of North-West Europe, 557-576) predicts the development of three primary condensed sections associated with transgressive and highstand systems tracts. The apex (i.c. gamma peaks) of the primary condensed sections lie predictably at the 5/6, 7/8 and 9/10 sequence boundaries. Each apex lies within a different dinoflagellate cyst interval palynozone; they are therefore readily distinguishable. The model also predicts a number of secondary condensed sections (lowstand systems tracts). The associated gamma peaks will lie at the 6/7 and 8/9 sequence boundaries. However, the dinoflagellate cyst acmes associated with each primary condensed section can be seen to be non-exclusive. Thus, the secondary condensed section at the 8/9 boundary is characterized by the same acme (Apectodinium Complex) as the primary condensed section at the 7/8 boundary. Similarly, the secondary condensed section at the 6/7 boundary is characterized by the same acme (Areoligera senonensis Group) as at the 5/6 boundary (primary condensed section). Therefore, great care must be taken, both when characterizing condensed sections (hot shales) by means of abundance events, and when correlating them.

PALYNOLOGICAL FACIES ANALYSIS OF SYSTEMS TRACTS

The major controls on palynoclast (including palynomorph) distribution in basin-fill successions are the rate of sediment input, basin subsidence, eustasy; these factors exert influence on particular palaeoecological conditions that may have existed during any moment in time of evolution.

It is clear that palynology has been successful at recognizing depositional sequences boundaries, and assessing time-space relationships in particular. Palynozones present within systems tracts will allow internal palynological correlation to be possible on quite a fine scale. Palynology has had less impact on deciphering the internal facies characteristic of individual sequences. Nevertheless, applies palynological facies analysis (palynofacies s. s. and microplankton biofacies) have great potential for contributing to the complete development of predictive geological modelling and thus to the development of play concepts. The major draw back to palynological facies analysis is the fact that the data pertain to a sample-based discipline.

The most obvious palynological feature of the internal characteristics of a systems tract will be the palynological facies expression bounding parasequences and parasequences sets (the bounding marine flooding surfaces). Shallowing upwards or deepening upward trends within parasequence sets will assist in retrogradational conditions prevailed.

The concept of palynological facies, and the implications of Walther's Law of Facies to their interpretation, have been appreciated for many years: the vertical succession of palynological facies may be used to predict their lateral distribution. The methodology of facies-cycle wedge analysis relies heavily upon the recognition of the implications of Walther's Law. From a palynological perspective, the critical question is: Can palynological facies-cycle wedges be defined and recognized, and their three-dimensional distribution be predicted?

In some ways palynological data lend themselves more readily to facies-cycle wedge analysis than to integration with seismic sequence stratigraphy, primarily due to the finer scale at which palynologists usually operate. In theory palynological systems tracts should be recognizable, and some so-called ecostratigraphic units may be thought of in these terms. Application of palynological facies-cycle wedge analysis, in conjunction with modern methods of seismic sequence analysis, provides the most meaningful way of applying palynological data to predictive depositional sequence analysis>

Applied palynological facies can only be recognized with any acceptable confidence from the collection and analysis of data from conventionally cored sections. Under specific circumstances, the distribution of palynological facies may be inferred in uncored sections, and predicted in undrilled successions. Palynological facies analysis should never be carried out in isolation; being sample-based, palynological facies analysis cannot be used unequivocally to determine the whole body of strata between spot samples. No matter how finely spaced the samples are, the precise nature of the contacts between palynological facies cannot be easily established within acceptable confidence limits (unless one or more palynozonal units are demonstrably missing).

The reliability of a palynological facies model depends upon the nature and quality of the palynological facies analysis and the accuracy of its calibration with the lithofacies model. The development of a palynological facies model will also depend to some extent upon its integration with log facies models. Due to the difference of scale, seismic data will have little input to the development of palynological facies modes, although they may be used to predict the distribution of palynological facies elsewhere. The degree of confidence in predicting the distribution of palynological facies in undrilled successions depends solely upon the accuracy of the calibration between the seismic facies model and the palynological facies model.

OPERATIONAL PITFALLS AND WHAT TO DO ABOUT THEM

On the surface, palynological data often appear fairly straight forward (for example, as a series of "tops", "bases" and other events) and there is a real danger of explorers accepting data sets at face value. However, palynological information is never as black and white as it may appear on a stratigraphic summary or distribution chart with a neatly labelled chronostratigraphic breakdown. The shift towards a palynozonal approach has helped sort out many problems of chronostratigraphic interpretation (misguided chronocorrelation).

When failure of mismatching occurs with other lines of evidence, palynological data are often the firs to be dismissed. If the pitfalls are appreciated the reasons for "failure" may be understood and alternative means of palynological correlation may be considered (event stratigraphy and palynostratigraphy are not mutually exclusive; all other things being equal, the two can be usefully reconciled). So the advice of an enlightened palynologist should be consulted - that is, one who is aware of the pitfalls and areas of danger, and who can advise on the limitations accordingly. If avoiding the pitfalls is possible, the data may still have good correlative value in other respects but as long as the margins or error are acceptable to the scale of the modelling process and the objectives.

Another operational pitfall is the over sophisticated palynological biozonation. Palynozonal schemes with apparently ultra-fine resolution are almost impossible to apply, even locally. Over confident palynozonal schemes are liable to push the data to unrealistic limits; the temporal significance of palynozones become obscure, and when individual palynozonal units are apparently missing from a succession (due to an impossibly fine sample requirement) the temptation is to invoke an unconformity. A palynozonal scheme should be developed and defined in a manner appropriate to the sampling regime (cuttings,

sidewall core, conventional core) and the sample interval.

There is a great temptation to fit palynological data sets into seismic models. Such an approach is rarely wise, quite apart from the dangers of circular arguments. Seismic stratigraphic analysis employs vastly different methodologies to palynology. Furthermore, the scale at which a palynologist usually works is below seismic resolution; hiatuses which are recognizable palynologically may not be apparent in seismic sections. Major seismic stratal surfaces are very difficult (if not impossible) to recognize at outcrop palynologically, without seismic information. Even with lithological and well logs, palynological facies sequences may be recognizable and predictable in a section, but not necessarily seismic stratal surfaces which, by definition, cut across facies boundaries. It is largely a case of distinguishing the wood from the trees and the pitfalls associated with the scale of inquiry. In this sense, use of the phrase allostratigraphy is more appropriate than sequence stratigraphy, because it implies applicability at any scale of resolution.

APPLIED PALYNOLOGY

So you want to make better use of applied palynological data! It is of prime importance that you, the palynologist, appreciates the objectives and scale (both vertically and laterally) of any study. If you don't understand the objectives or scale, the commissioned work may well supply insufficient data for longer term realistic predicative modelling. Applied palynology can also assist in reservoir zonation and may be critical in building an integrated reservoir model. Palynological analysis is often appropriate throughout the field appraisal phase, to support evaluation of development strategies, and during field development where monitoring progress is essential. Success in equity re-determination and field unitization is also often dependent upon a reliable palynological framework. Whatever the nature of the study, in order to minimize the risks of pitfalls, it is important that you should have access to as much information as confidentiality will allow.

So you don't want to make better use of applied palynology! I wish you luck in avoiding the pitfalls and I predict your predictions won't yield meaningful results.

James Powell is a director of stratigraphic consultants Millennia Ltd. Based in Alton, Hampshire, UK.

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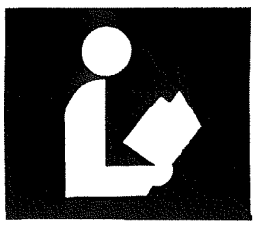
Dr. Charles Felix has retired from teaching at Abilene Christian University. He may be reached at:

Charles Felix
1850 Echo Ct.
Abilene, Texas 79602
Tel.: (915) 672-4509



BOOK REVIEWS

Book Review Editor - Reed Wicander
Department of Geology
Central Michigan University
Mt. Pleasant, Michigan 48859

The Eisenack Catalog of Fossil Dinoflagellates, New Series, Volume 1.

Robert A. Fensome, Hans Gocht, Lewis E. Stover and Graham L. Williams.

E. Schweitzerbart'sche Verlagsbuchhandlung (Nagele u. Obermiller), Stuttgart, 1991, 828 pages, 69 figures. US $130.

This volume (Volume 1) is the first of a **New Series** which has evolved from the "**Katalog der fossilen Dinoflagellaten, Hystrichosphaeren und verwandte Mikrofossilien**" produced by Alfred Eisenack and his co workers from 1964 to 1981. It includes entries for all genera of fossil dinoflagellates cited in the Lentin & Williams, 1989 Index, which were not included in the **Original Series** of the Eisenack Catalog, as well as all new taxa introduced by Below (1981a) and Yun Hye-su (1981).

The introductory part of Volume 1 begins with an explanation of the changes in format between this and the Original Series, and continues with brief, but informative, sections on dinoflagellate classification, rules of nomenclature and an associated glossary.

The first main section of the catalog is then devoted to the information on genera cited in Lentin and Williams 1989 Index (but not included in the Original Series). This section is arranged in alphabetical order and, where appropriate, includes data on citation, synonymy, classification, type species, original diagnosis (including an English translation where necessary), original description (ditto), etymology, and editors remarks. The information is clearly laid out and very useful, particularly with respect to the English translations, and the (often extensive) editors remarks.

The second main section deals with the species cited by Below (1981a) and Yun Hye-su (1981). Here, the information covered includes (where appropriate) the basionym citation, holotype (and/or paratype) location, original diagnosis (including English translation where

appropriate), original description (ditto), size, type occurrence, etymology, and editors remarks. Also included in this section are photographs and/or line drawings of holotype or paratype material. In most cases, the information provided is detailed and relatively up-to-date. However, there are problems when, for example, the original descriptions are dated (e.g., *Xenascus ceratioides*). In these cases, in addition to the translation of the original description, a more modern diagnosis/description would also be useful.

The authors have chosen to arrange the taxa in this latter section in the alphabetic order of their final (or lowest ranking) epithet, instead of being arranged in alphabetic order within each genus. The reasons given for doing this are perfectly valid, however, I personally found this arrangement a little confusing at the outset. The problem can be overcome easily enough by consulting the index at the back of the catalog. However, in any loose-leaved volume such as this, constant reference to the index results in a rapid deterioration of the volume (pages torn/detached etc.). In order to prevent this, I have moved the index section of my copy to the front of the catalog, and placed a colour card between the different sections. Ultimately, it may be worth while to take this a step further and insert alphabetic file dividers into the catalog.

In general terms, the New Series, is an excellent source of information. With the exception of the remarks made above, it is clearly set out, and the quality of the photographs and line drawings is usually good. The authors have not attempted to provide detailed stratigraphic information for each taxa, but do give details of the type locality. Given the present state of knowledge of the full stratigraphic ranges of many of the species illustrated, I think this is a very wise choice.

In conclusion, I have no doubt that the New Series will prove to be extremely useful, and will ultimately become an essential part of every dinoflagellate worker's library.

Reviewed by Dr. Bruce Tocher

DINO 5
APRIL 19-25, 1993
ZEIST, THE NETHERLANDS

DINO 5

The fifth International Conference on Modern and Fossil Dinoflagellates will focus on all aspects of dinoflagellate research, including life-cycles, ecology, morphology, biology, chemistry, stratigraphy and the significance of dinoflagellates in recent and ancient environments. The conference will be held April 19-25, 1993 in Zeist near Utrecht. The meeting is being organized under the auspices of the Netherlands School for Sedimentary Geology, Laboratory of Palaeobotany and Palynology, Utrecht, The Netherlands.

LOCATION

The Conference will be held near the City of Zeist at "Conferentiecentrum Woudschoten", Woudenbergseweg54, 3707 HX Zeist, The Netherlands, some 20 km southeast of the City of Utrecht. Two classes of lodging are available, single rooms with shower and more "economic" double rooms. You can secure your housing by filling-in the enclosed forms. **Deadline for receiving accommodation forms is December 31, 1992.** Please note that forms for housing will be handled in chronological order. If the accommodation on-site is fully occupied at the date of arrival of your application form, it will be attempted to arrange housing in the immediate surroundings. In this case the mentioned prices (see registration form) can not be guaranteed.

The Conference-Center can be reached by car directly or by bus via Zeist and/or Utrecht. If you are travelling by airplane, regular trains can be taken, with a change-over in Amsterdam, to Utrecht Central Station. A DINO 5 minibus-service will be available for transportation to the Conference Center. Participants shall receive detailed information.

Several camping sites can be found in the neighbourhood of the Conference-Center.

CONFERENCE FEES

A registration form mentioning all options and prices is included with this circular. Please note that the conference

fee (Hfl. 800,-; see registration form) is inclusive of Ice Breaker on Sunday, dinners on Sunday, Monday, Tuesday and the conference dinner on Thursday, lunches on Monday to Friday, two times a day coffee/tea, registration, abstract book, etc. Please also note that International Money Orders will be accepted only. Payment should be directed to the bank account of the treasurer of DINO 5, No. 41.87.90.345, ABN-AMRO Bank, Zeist, The Netherlands. **Deadline for receiving registration forms is December 31, 1992.** All your payments to the DINO 5 account are due before March 1, 1993. After this date the "on-site registration prices" will be applied (= price + 15%).

ORAL PRESENTATIONS

For oral presentations, twin-overhead and twin-"carousel" slide projectors will be available in the lecture-hall. Contributions will be limited to 20 minutes, including direct questions. A forum discussion will close all sessions.

POSTER PRESENTATIONS

For poster presentations, panels with a width of 1.0m and a height of 1.4m will be available. Posters will be on display during the entire Conference. Authors will be asked to attach a passport photograph to their poster.

MID-CONFERENCE EXCURSION, April 22, 1993 (optional)

A "mid-conference excursion" will be held on Wednesday, April 22, 1993. The organizing committee will attempt to arrange an entertaining programme for all participants and a dinner. participation is optional (see registration form).

EXCURSION TO THE TYPE-MAASTRICHTIAN, April 25, 1993 (optional)

An excursion to the type-Maastrichtian will be arranged for interested parties on Saturday, April 25, 1993. The excursion will involve a visit to several outcrops in the South of Holland. The excursion-fee includes lunch and dinner.

FINANCIAL SUPPORT

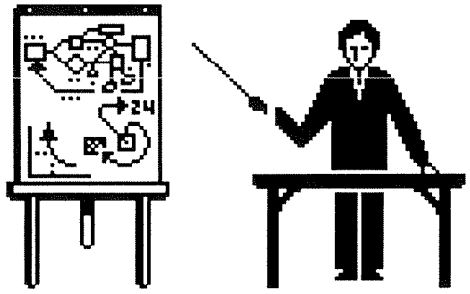
Some of you may be eager to participate actively but might have difficulties with the financing of travel-, and registration fees (e.g., students, researchers from Eastern Europe, etc.). The DINO 5-organizing committee has therefore placed in operation, a comprehensive sponsoring-program. You can apply for sponsoring of your participation by; (1) filling-in the application form, (2) enclosing a letter of recommendation of authority(ies), and (3) submitting your budget requirements and letter of exploration, and (4) an abstract for an oral or poster-presentation. The organizing committee will try to obtain sufficient resources for your needs. For further information, contact the DINO 5-secretary.

DEADLINES

All your forms are to be received before December 31, 1992; send them to:

DINO 5 secretariat:
Karin Zonneveld
Laboratory of Palaeobotany and Palynology
University of Utrecht
Heidelberglaan 2, 3584 CS Utrecht, The Netherlands

Tel: xx31-30-532638
Fax: xx31-30-535096



AASP SHORT COURSES

The first AASP Short course on Fungal Palynomorphs was held at the Adam's Mark Hotel in Houston February 26-28, 1992. The short course was presented to 12 participants by Dr. W.C. Elsik under the auspices of the AASP Short course Committee (Martin Farley, Chair). The participants included David Vork, Steve Dittrich, John Wrenn, John Shane, Ogbonnaya Ulu, Martin Farley, Abolfazl Jameossanaie, Gordon Wood, David Pocknall, Omar Colmenares, Norm Norton and Ramakant Kalgutkar.

A limited number of copies of the course notes are available for $90.00. For more information please contact Martin Farley.

HELP WANTED

The AASP Short Course/Workshop Committee would like to receive comments from the membership about possible short courses and workshops which may be held in conjunction with either the Baton Rouge (1993) or College Station (1994) Annual Meetings. We have received some suggestions for courses: Repeat of Bill Elsik's Fungal Palynomorph Course, Processing Techniques, Chitinozoans, Cenozoic pollen, Cenozoic dinoflagellates, Acritarchs, and Statistical Techniques. This list has been suggested by those who would like to take the courses, so instructors have not been identified. We would

appreciate suggestions for other courses or volunteers or suggestions for instructors. We would also like to know what length is considered reasonable for short courses/workshops and whether formal short courses or more informal workshops are preferred.

Please address comments to:

Dr. Martin Farley
Exxon Production Research Co.
P.O. Box 2189
Houston, Texas 77252

THE LAST WORDS.....

Dr. Charles Felix has celebrated his retirement by donating his modern pollen reference collection, some 3,000 slides, to the Palynology Laboratory of Texas A & M University. Most of his extensive literature collection will go to the AASP Foundation, after he has had time to write a few papers sort through the stacks of publications collected during his 40 years as a palynologist.

****

I came across the following article in a magazine called "alive" which was given away (yes, Free!) at my local drug store. I have quoted much of the text of the article which was written by Dalton Moore, CH. It is great to know that we study such an important ingredient of life. In addition to the article, there were a number of advertisements for various pollen products. One product advertises that the "outer pollen husk is completely removed for total nutrient assimilation like the shell around a nut" while regular "microscopic pollen grains are coated with an extremely hard shell that allows for only 3% assimilation". [I have often wondered how the human gut could digest pollen exine.] The advertisement goes on to say that after 25 years of experimentation the manufacturer "duplicated the pollination between male pollen and female pistils in a controlled environment. This fusion of energy results in the most potent release of SOD (Super Oxide Dismutase) in the entire plant kingdom to protect the plant's cells from free radicals at the moment of pollination."

I'm not sure what it all means, but it sounds so... scientific. It must be good!

POLLEN POWER

"Pollen is the giver of life. Without pollen to fertilize blossoms to create seeds, life as we know it would cease to exist. Pollen has been part of us since the beginning of time. As a matter of fact, in order for us to enjoy all of nature's bounty, pollen had to be here before we were in order to ensure there were growing plants to sustain us!"

"It is a recognized fact, world-wide, that an enzyme, super oxide dismutase (SOD) has high anti-aging properties. SOD occurs naturally in a variety of foods and processes, but none is higher in naturally produced SOD than pollen."

"If this were the only benefit derived from pollen, people all over the world would be wise to consume tons of pollen in their quest for their own personal fountain of youth. But the anti-aging properties are only the tip of the iceberg when describing the benefits to the human race of flower pollen. It is the most perfect food in the world."

"All too often, nutritionists, researchers, manufacturers and, of course, writers, make blanket statements such as "The only food you'll ever need!", or "The most perfect and complete protein." These statements are not only misleading, they could be dangerous. While pollen is the most complete and perfect 'natural supplement' - it contains 16 vitamins, 16 minerals, 19 enzymes and co-enzymes, 18 proteins and amino acids, as well as 28 other elements, including essential fatty acids, flavonoids and aminos- it must still be recognized for what it is: a 'supplement', not a replacement. Pollen is an excellent addition to your own personal, carefully balanced diet."

"Former US president Ronald Reagan has taken pollen for over 25 years to maintain good health and increase stamina. We're told that it helped him cope with the stress and physical demands of a 24 hour a day job."

"Muhammed Ali, world champion heavyweight boxer, attributes his extra energy to taking pollen supplementation daily and the Queen and members of the royal family depend on pollen supplements, as well as other natural and healthy foods."

"Pollen is available in many forms and in various potencies, depending on location, type of blossoms, growing conditions and season. Pollen granules are harvested predominately by bees who spend over 700 hours collecting a teaspoonful. They travel continuously from blossom to blossom adding nectar to the grains of pollen, which allows them to attach the pollen granules to their back legs for transport to the hive. The beekeeper in turn covers the opening to the hive with a trap that forces the bees to share about 60 percent of their load. They take the balance into the hive, and thus ensure the survival and good health of the colony."

"Unless the pollen is carefully cleaned and meticulously processed it could contain a variety of pollutants so a clean environment, as well as a drying

process that ensures quality and freshness are two important considerations."

"There is another harvesting process perfected and patented in Sweden by Gosta Carlsson, who originated the term "Pollenology". His method involves harvesting the pollen by machine and the flower pistils by hand. And harvesting is not finished once the pollen is gathered. Instead, this is only the beginning of the process. Once harvested, the pollen is pollinated to release the natural SOD. The fragile enzyme SOD is protected from damage through a special patented process involving specific protein. An extract is then made that is pollutant-free, stable and extremely potent. It will also make pollen more affordable for the consumer."

"So, whatever your personal problems, be they infertility, premature aging, tension, stamina or a desire to keep a healthy body inside and out, a daily supplement of pollen power will help you make your life better through better health."

[From "alive" Canadian Journal of Health and Nutrition, issue #118, April 1992.]

Our NEWSLETTER is an important method of communication within the palynological community. Please send all news and articles to me at the address given on page 1 of this NEWSLETTER. All copy for Vol.25, no.2 must be in my office by April 15. I look forward to hearing from all AASP Members.

Write soon!

Please note that although our new membership list was sent our recently, some of the addresses in the directory have not been up-dated. The address of Dick Hedlund, Editor of the AASP Foundation Contribution Series is as follows:

Dr. Richard Hedlund
6923 South Knoxville Ave.
Tulsa, Oklahoma 74136
TEL: (918) 492-3302

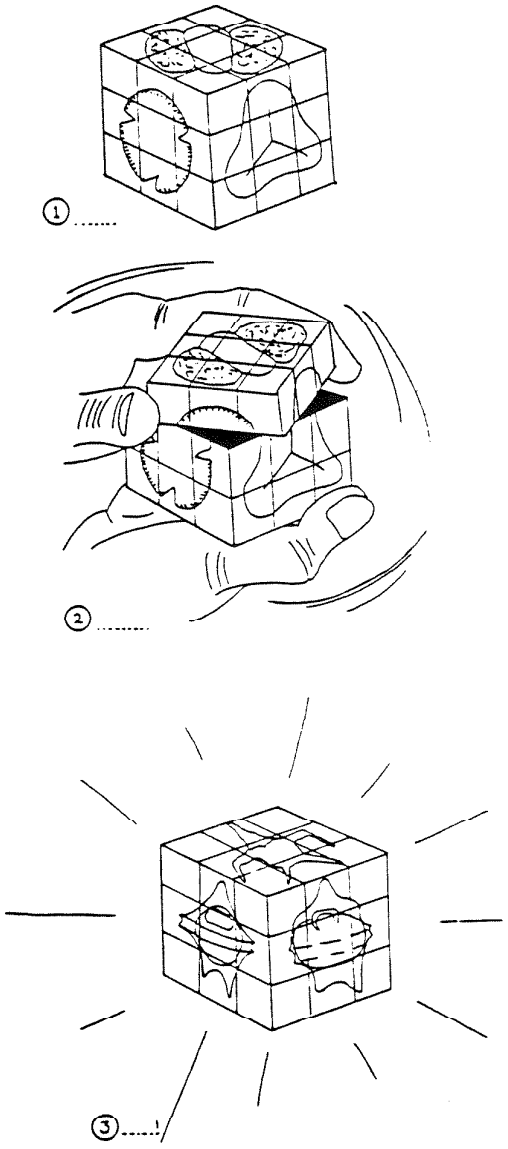
The address of your AASP NEWSLETTER editor is:

Judith Lentin
Suite 700 - Dominion House
665 - 8th Street SW
Calgary, Alberta
Canada T2P 3K7
TEL: (403) 264-0173
FAX: (403) 262-1629

DEADLINE FOR NEXT NEWSLETTER:

July 15,1992

The following cartoon comes from the hand of Bert Van Helden, via the CAP NEWSLETTER.



For the solution to this puzzle, please send $2000.00 to Bert Van Helden in a stamped, self-addressed envelope.

Use the attached MEMBERSHIP FORM to sponsor a scientist for membership in the AASP - see the President's message on Page 1 of this NEWSLETTER.

AASP TRAVEL GRANTS FOR IPC 8: SEPT. 6-12 1992, FRANCE
DUE: JULY 1, 1992

To apply, complete the following information and attach the requested documentation.

1. Have 1992 AASP dues have been paid: yes / no (circle one)? /_/

2. NAME: _____
ORGANIZATION: _____
ADDRESS: _____
CITY/STATE/CODE: _____
COUNTRY: _____
TELEPHONE: _____

3. Cost of round-trip airline ticket from your point of origin to Marseille, France (U.S.A. dollars). This award can be used only for travel to and from IPC 8.
$_____.___
$_____.___ Subtract any non-AASP funding for this travel
$_____.___ TOTAL requested from AASP /_/

4. A primary goal of the travel funds is to permit ***under-represented groups*** to attend IPC 8. Indicate your status as a student, woman, or minority below. The total possible is 15 points toward receipt of the travel grant if one or more of these categories apply. /_/

____ Student (ATTACH letter of support from your academic advisor) /_/
____ Woman
____ Minority (indicate type of minority) _____

5. I certify that the above information is correct. _____ /_/
signature / date

DOCUMENTATION:

6. Attach a copy of the your ***abstract*** form(s) submitted to IPC 8. Evaluation of the title and content of your abstract is the primary basis for award of travel funds on the following basis. If more than one abstract is submitted, indicate which one is to be judged.

title clarity: what, where, when	3 pts
statement of problem	2 pts
description of methods	2 pts
conclusions	3 pts
significance	5 pts
	(total 15 points)

/_/

7. If you are a convener, attach a copy of the ***IPC program*** and encircle your session or workshop. If you are presenting an invited paper, attach a copy of your ***letter of invitation***. Applicants who are session conveners or are presenting invited paper receive 10 points. Only 10 points are possible toward receipt of the travel grant, if you are both a convener and presenting an invited paper, or are presenting more than one invited paper. /_/

8. Attach a self-addressed envelope to receive notification of the committee's decision. /_/

MAIL TO: Dr. Elliott T. Burden, Dept. of Earth Sciences, Memorial Univ. of Newfoundland, St. Johns, Newfoundland, CANADA A1B 3X5. Applications recieved after July 1, 1992, will not be considered.

Membership Application Form

Please type or clearly print information. The AASP directory file is limited to 5 lines @ 29 characters.

Date:_____

Name:

(First) (Middle) (Last)

Address:

Telephone:

Fax:

Nature of work (graduate student, exploration stratigrapher, etc.)

_____

Send to: Dr. Gordon D. Wood
Amoco Production Company
P.O. Box 3092
Houston, Tx 77253 U.S.A.

Please send $30.00 U.S./yr with you application.

Change of Address Form

Date:_____

Listed Name:_____

New Address
Name:

(First) (Middle) (Last)

Address:

Telephone:

Fax:

Send to: Dr. Gordon D. Wood
Amoco Production Company
P.O. Box 3092
Houston, Tx 77253 U.S.A.

ANNUAL DUES NOTICE

DUES MAY BE PAID UP TO THREE YEARS IN ADVANCE. OVERSEAS AASP MEMBERS (INDIVIDUAL OR INSTITUTIONAL) WHO WOULD LIKE TO RECEIVE THEIR NEWSLETTER AND PALYNOLOGY BY AIR MAIL, RATHER THAN SURFACE MAIL, NEED TO INCLUDE THE APPLICABLE POSTAGE SURCHARGE (NOTED BELOW). CREDIT CARD USERS MUST PAY A $1.00 U.S. SURCHARGE PER-TRANSACTION.

Dues	Enclosed
Individual dues: **$30.00** U.S./yr	$_____
Institution dues: **$40.00** U.S./yr	$_____
Air Mail Surcharge	
Europe & South America: **$ 9.00** U.S./yr	$_____
Africa, Asia & Australia: **$12.00** U.S./yr	$_____
Credit Card Surcharge ($1.00 per-transaction)	$_____
Contribution to the AASP Student Scholarship Fund	$_____
Total enclosed U.S.	$_____

CREDIT CARD PAYMENTS ALL INFORMATION MUST BE COMPLETED

☐ MASTERCARD ☐ VISA

Credit card number:_____ Expiration Date:_____

Signature:_____

Send dues, surcharges (if applicable) and Student Scholarship contributions, with this form, to:

Dr. Gordon D. Wood
AASP Secretary-Treasurer
Amoco Production Co.
P.O. Box 3092
Houston , TX 77253 U.S.A.

BE SURE YOUR NAME IS ON YOUR CHEQUE OR INTERNATIONAL MONEY ORDER

Your cancelled cheque is your receipt. If you need a written receipt, advise the Secretary-Treasurer when you pay your dues.

All drafts should be payable through a U.S. based bank.

Name:_____

Address:_____

City & State:_____

Country:_____ Zip:_____