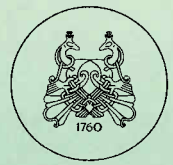




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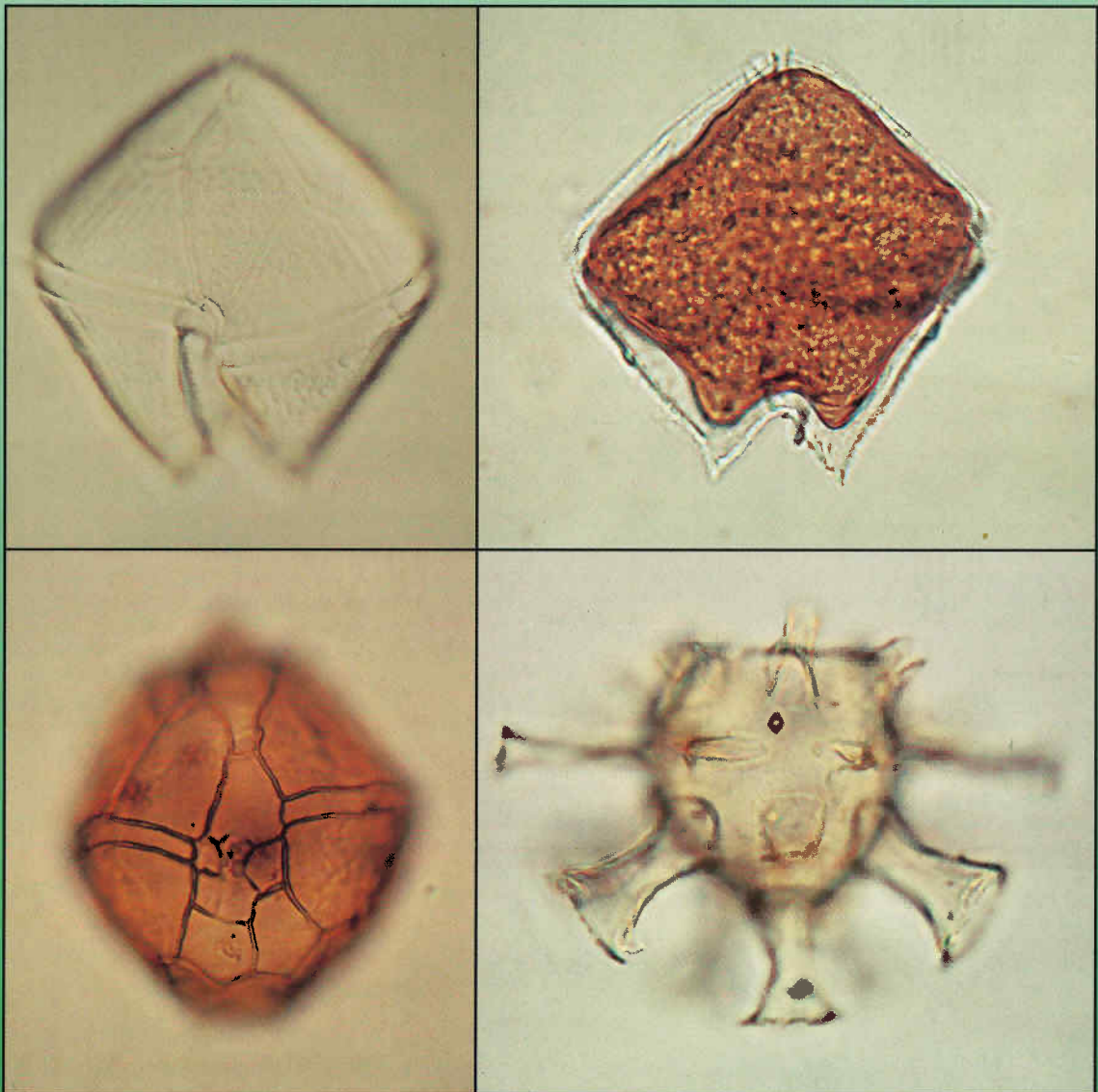


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Rapport botanisk serie 1998-2

From Excystment to Bloom? Personal Recollections of Thirty-Five Years of Dinoflagellate and Acritarch Meetings

William A.S. Sarjeant



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Eksempler:

Tidsskrift/serie

Flatberg, K.I. 1993. *Sphagnum rubiginosum* (Sect. *Acutifolia*), sp. nov. - *Lindbergia* 18: 59-70.

Moen, A. & Selnes, M. 1979. Botaniske undersøkelser på Nord-Fosen, med vegetasjonskart. - *K. norske Vidensk. Selsk. Mus. Rapp. bot. Ser.* 1979-4: 1-96.

Kapittel

Gjærevoll, O. 1980. Fjellplantene. - s. 316-347 i Voksø, P. (red.) Norges fjellverden. Forlaget Det Beste, Oslo.

Høeg, H.I. 1994. En pollenanalytisk undersøkelse av Tverrlisætri i Grimsdalen, Dovre kommune, Oppdal. - s. 193-200 i Mikkelsen, E. (red.) Fangstprodukter i vikingtidens og middelalderens økonomi. Universitetets Oldsaksamling Skr. Ny Rekke 18.

Monografi/bok

Bretten, S. 1973. Slekta *Draba* i Knutshø-Finshøområdet på Dovre. Sider ved dens systematikk og autøkologi. - Hovedfagsoppg. Univ. Trondheim. 113 s. Upubl.

Rønning, O.I. 1972. Vegetasjonslære. - Universitetsforlaget, Oslo. 101 s.

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Hver forfatter får inntil 50 eksemplarer gratis. Flere eksemplarer kan bestilles til kostpris. Dersom en rapport er skrevet av flere enn to forfattere, blir antall gratis-eksemplarer redusert.

Forsidebilder

Protoperidinium obtusum
resent, California

Protoperidinium obtusum
resent, California

Leptodinium mirabile
Øvre Jura, Alaska

Hystrichosphaeridium tubiferum
Øvre Krit, Montana

(Foto: William R. Evitt)

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From Excystment to Bloom?
Personal Recollections of Thirty-Five Years of
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William A.S. Sarjeant



Rapporten er trykt i 350 eksemplarer
This report is printed in 350 copies
Trondheim

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Preface

June 7 - 12, 1998, the Sixth International Conference on Modern and Fossil Dinoflagellates (Dino 6) was held in Trondheim, Norway. Conferences on Modern and Fossil Dinoflagellates are held once every four years and the objective of these conferences is to bring together scientists from various disciplines working with dinoflagellates and to enhance the exchange of knowledge and experience. The history of the Dino meetings dates back to 1978, when William R. Evitt proposed that the Geological Survey of America might devote one of its Penrose Conferences to fossil and living dinoflagellates. In the 20 years between the first meeting in Colorado Springs and the meeting in Trondheim, dinoflagellate research has undoubtedly been blooming. To celebrate these advances we organised a special gathering during the Dino 6 conference, and we were fortunate to have one of the leading authorities in the dino trade, Dr. William A.S. Sarjeant to present his personal recollections of 35 years of dinoflagellate and acritarch meetings: «From excystment to bloom? Personal recollections of thirty-five years of dinoflagellate and acritarch meetings». Unfortunately, this present paper can not reproduce and give full justice to the memorable presentation given by Bill Sarjeant. As promised (in the abstract) this was «profusely illustrated by slides (some of them potentially libellous!) and rendered lively by anecdotes of varying credibility and opinions of questionable wisdom». In other words, just as definitely alive and well presented as a memorable history of past days and years should be. We are all grateful for Bill's recollections, for his enthusiasm in promoting the «dinoflagellate science» and for sharing his memories with us. By publishing Bill's presentation, we will pay our tribute to those who (not so long ago) built the foundations of our research activities, and to mark a milestone for all who have inherited the trade and taken the initiative to build the future for studies on Modern and Fossil Dinoflagellates.

Trondheim, June 1998
Morten Smelror

Abstract

Sarjeant, W.A.S. 1998. From excystment to bloom? Personal recollections of thirty-five of dinoflagellate and acritarch meetings. - NTNU Vitensk.mus. Rapp. bot. Ser. 1998-2: 1-21+14 pl.

The report presents personal recollections of thirty-five years of dinoflagellate and acritarch meetings as presented at the Sixth International Conference on Modern and Fossil Dinoflagellates in Trondheim, June 7-12 1998. The review is based very largely upon personal diary notes, covering the early CIMPA meetings (1963-1966), happenings in the United States in 1968, International meetings in Europe (1969-1974), a gathering in Canada in 1976, the Penrose and Hexrose conferences from 1978 to 1981 (the meetings which later became the Dino 1 and Dino 2 events) and more recent IPC meetings and Conferences on Modern and Fossil Dinoflagellates. The informal history, enlivened with anecdotes and personal opinions, is accompanied by a bibliography listing references to publications of special relevance to the history of palynology and by fourteen plates showing some of the scientists prominent in the history of dinoflagellate research.

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Beginnings

To have a gathering of dinoflagellate specialists, there must be a sufficient number of such persons to make any getting-together effective. When I began work in this field, no such gathering could have been held. Christian Ehrenberg, who had been not only the discoverer of fossil dinoflagellates but also a major describer of modern forms, was long dead and the days of the oceanographic expeditions, that had done so much to enlarge knowledge of the living organisms of the seas, were over. The research of Charles Kofoid and his associates was long since finished and workers on modern microscopic algae were few. Yes, fisheries workers were busily at work, monitoring the migrations (vertical and horizontal) of the phytoplankton in general. However, the dinoflagellates themselves were receiving so little attention that their encystment was still a phenomenon virtually unknown to biologists and their reproduction still believed to be exclusively asexual.

On the fossil side, the wave of interest aroused by Ehrenberg's visit to England had long subsided: Gideon Mantell, Henry Hopley White and the other Clapham microscopists had left no heirs, even among the stalwart amateurs of the Quekett Microscopical Club. Moreover, these pioneers had left many major problems unresolved. Yes, there were undoubted fossil dinoflagellates; had not Ehrenberg illustrated them? But what were the spiny bodies, found in such abundance in the same flint and chert flakes? Were they silicified, the statoblasts of bryozoans - "xanthidia"? Were they of organic composition, as Mantell had claimed - "spiniferites"? Might they be the eggs - "ova hispida" - or the cysts - "palinospheres" - of planktonic organisms, as studies of the results of modern plankton had suggested?

When in 1922 Walter Wetzel effectively re-discovered these micro-organisms in flints, he did nothing to resolve that question. The second wave of study did not truly begin till

the early 1930's, when the investigations of his namesake Otto Wetzel and of George Deflandre immensely enlarged knowledge of these microfossils. However, while repeating unaware Mantell's recognition of the organic nature of the spiny bodies, they merely substituted the new name "hystrichosphere" for the older ones. The researches of Maria Lejeune (later Lejeune-Carpentier) added precision to these observations, while those of Alfred Eisenack extended the range of the spiny bodies back into the Palaeozoic. Many new forms were reported in the ensuing years - the discovery of siliceous and calcareous dinoflagellates was especially noteworthy - but, by the 1950's, the nature of those spiny microfossils remained unresolved. Most studies were still being made of forms naturally enclosed within silica; chemical extraction techniques were only just beginning to be used and microscopes were little better than those which White and Mantell had used. Moreover, though fossil dinoflagellates were known to have a considerable stratigraphical range, it had still not been ascertained whether they might serve as biostratigraphical indices.

That last question was the one which, in my Ph.D. researches, I was called upon to answer. Charles Downie, during a general stratigraphical study of the Late Jurassic Kimmeridge Clay of Dorset, had tried out simple palynological extractive techniques on his samples and, to his surprise, found both dinoflagellates and "hystrichospheres". My own task was to study strata slightly earlier in the Jurassic - the beds of the Callovian and Oxfordian stages - and see whether I could discover any consistent zonation that might facilitate correlation.

Unbeknown to us, several persons in other countries were tackling this problem in varied fashion. Walter Wetzel, who had unexpectedly re-entered this field of research in the 1950's, was setting such students as Barbara Klumpp, Dorothea Maier and Peter Morgenroth to this task. Georges Deflandre's

student Lionel Valensi, having completed a meticulous thesis on small spiny forms from the Middle Jurassic, was trying to use them in tracing the sites from which Palaeolithic worked flints had been obtained in distant prehistoric times. Alfred Eisenack was not only vigorously describing new taxa, but also overseeing the activities of a distinguished roster of graduate students - Gerhard Alberti, Ellen Gerlach, Karl Klement and Hans Gocht. Even so, one could have counted on one's fingers the active workers on organic palynomorphs world-wide.

The wild card in this limited deck was an American, William R. Evitt. Pursuing his precise studies of the morphology of these micro-organisms, he had visited Sheffield in 1960 and striven to persuade Charles Downie and me that the post-Palaeozoic "hystrichospheres" were truly dinoflagellate cysts. Initially we had thought his ideas wild; however, when they were fully set forth in his publications, we were convinced. Soon the three of us were jointly engaged in formulating a first classification for the ex-"hystrichospheres" that were not demonstrably of dinoflagellate affinity - the acritarchs.

The Early CIMPA Meetings (1963-1966)

The publication in 1963 of our classification narrowly preceded the holding of a meeting in Paris of the Commission Internationale sur le Microflore du Paléozoïque. This was to include a gathering of Sous-Commission 9 "Hystrichosphères". Well, that old name would not do; so off I went to France, to try to sell our new gospel with its Old Testament "Acritarchs" and its New Testament "Dinoflagellates".

The meeting, which took place on the 20 and 21 of June, 1963, was the first at which palynologists concerned with these microfossils ever got together. The secretary of the Sous-Commission was a Dutchman, Fred H. van Oyen. Deflandre and Eisenack were both present and others included the Belgian Palaeozoic palynologists François Stockmans

and his wife Yvonne Willièrè, Marthe Deflandre-Rigaud and the Swiss palynologist Marcel Millioud.

My diary records that, when I presented our ideas to the Sous-Commission, "Marcel proved a great help, translating both ways for me [i.e. from French into English and from English into French]. I gave a series of speeches, introducing every aspect of hystrichosphere classification that was discussed! Full agreement on the general proposals attained".

Next day, I was able to report gleefully: "Second day of Conference - title now changed to "Sous-Groupe des Acritarches" - a great triumph! Discussion on genera. Again I was heavily involved; and again all went well. People were appointed to deal with the various genera and the meeting was then closed".

George Deflandre had proved a particular enthusiast for Evitt's ideas and was loyally to support them thereafter. Most other attendees were persuaded. Only Alfred Eisenack sat throughout as a solitary thundercloud of disapproval. Some years later, in a paper in the English journal *Biological Reviews* (1963), he launched a vigorous attack on Evitt's interpretations; but even he was an eventual convert.

Sixteen months later, the first gathering of the Sous-Commission under its new name was held in Bordeaux, France (25-26 November 1964). My only diary comment was: "Discussed dinoflagellate classification - talked at length on this (in French) and had a series of verbal clashes with Chairman Deflandre." However, there are richer memories - of a party at André Combaz's residence, the Domain de St. Michèle, during which Deflandre relaxed and not only played melodies on a comb-and-paper during an impromptu dance called "the Cimpa", but even did conjuring tricks! When I called him "un véritable prestidigitateur", he beamed and

said in laborious English: "Your French is improving, Monsieur Sarjeant!" I spent much of the evening with Genviève Vachey, to whom some other French palynologists (including the ever irrepressible Henri Caro) were trying to marry me off, but Genviève and I were in no wise compliant!

The second gathering of the renamed Sous-Commission took place three years later, incidentally during the Second International Congress on Palynology in Utrecht, The Netherlands from 28 September to 3 November 1966. My diary comment was: "I seem likely to have some work on acritarch morphology ahead", though I also noted that André Combaz gave "an excellent review of the leiosphaerids". More importantly, many specialists were present who had not previously foregathered: Bill Evitt and his colleague Lewis Stover; Charles Downie; David Wall and Barrie Dale (by then well launched into their fruitful Woods Hole collaboration); Leonard R. Wilson; Nicolae Baltes and Dan Beju from Romania; Frank Staplin and Jan Jansonius from Canada; Srinivasan Venkatachala from India; Bartholomew Nagy, who had just stirred up the palynological world by claiming, jointly with George Claus, to have found microfossils in meteorites; and Wilfried Krutzsch and Eberhard Schulz from the German Democratic Republic. (Burgeoning political restrictions in their unhappy homeland meant that the latter two palynologists were never again seen at international meetings.)

My diary notes, for 30 September: "The morning began with an interesting lecture on fluorescence as a tool in palynology: this was followed by [another] interesting lecture by Bill Chaloner; but, after that, things deteriorated. Vainly tried in the afternoon to get a Mesozoic "CIMP" going; but [Norman] Hughes, determined to keep his life easy as Secretary of the Mesozoic Palynology Committee, easily outmanoeuvred me".

Hughes's political adroitness was further

made manifest to me four days later, when he invited me to be Dinoflagellate Secretary of the MPC. I acceded reluctantly and produced several circulars, but Hughes himself did nothing and the Committee died of inanition.

This was the first occasion when I learned that, at such large meetings, private discussions with individuals are likely to be more profitable than attending lectures. It was a physicist, I think, who said: "All the best scientific meetings are held in bars" - a profoundly percipient comment.

Happenings in the United States (1968)

I spent the academic year 1967-1968 as Visiting Professor at the University of Oklahoma. That was a year of several significant happenings. My first meetings with the ever-memorable Fritz H. Cramer and with Geoffrey Norris, with whom I had already co-authored a large paper (at the long distance of England to New Zealand!), during the Geological Society of America meeting in New Orleans (November 1967); my only encounter with Karl Klement in early December, just before the foundation of the American Association of Stratigraphic Palynologists on 8 December 1968 (I didn't like the name - I'd have preferred Society of North American Palynologists, with the acronym SNAP!); my giving, at Louisiana State University, of the first in a series of short courses on dinoflagellates, to be organized by George Hart (28 February-2 March 1968); and a gathering of dinoflagellate specialists in Tucson, Arizona (1-4 May 1968), organized by Lucy Cranwell and Gerhard Kremp, with Bill Evitt, Lew Stover, Geoff Norris, Paul Martin, Charles Downie, David Wall and Graham Williams also present. My diary for 3 May notes:

"The day's discussion proved the most heated of all, with David Wall attacking on classification - I agreed with most of what he said, but he did not admit that! - and with Geoff Norris propounding the eclectic idea that classification should not be attempted

above species level. (Bill Evitt, unfortunately, was unwell and withdrew from the sessions before midday). Out of all the discussions, what most clearly emerged was our **lack** of knowledge, how much is still to be discovered."

Indeed, the days of consensus - the consensus that had emerged from the CIMPA meetings and survived the Utrecht gathering - were over. Henceforward, the field of dinoflagellate study - and especially, of the study of fossil dinoflagellates - was destined to become more and more one of intellectual conflict.

International Meetings in Europe (1969-1974)

CIMPA met again at INIEX, in Liège, Belgium on 15-17 April 1969. This was the most major rallying of specialists so far, with Downie, Serge Jardiné, Francine Martin, Judi Kline (later Lentin), Raymond Rauscher, Jan De Coninck, Graeme Wilson, Walter Riegel, Michel Vanguetstaine, Marjorie Muir (later Curtis) and Dick Lister among those present. A major theme was the possibility of discovering dinoflagellate-like features in the acritarchs, with (as my diary records) "Lister presenting his ideas on the Acanthomorphae in aggressive fashion." There was also, for me, a memorable encounter:

"After lunch at INIEX, Michel Vanguetstaine took Graeme and I to the Palaeozoology Institute to meet Maria Lejeune-Carpentier - a major figure in early plankton studies and a delightful person, newly recovered from pulmonary cancer but bright and cheery. She showed us many of her dinoflagellate holotypes and we were able to make considerable new interpretations, but **not** to fault her superlative drawings, albeit they were produced on a low-power microscope. All in all, we were profoundly impressed."

Later I was to have the pleasure of collaborating with her in two joint restudies of her holotypes.

In September 1970, there came the Second International Planktonic Conference in Rome (I had missed the first). Quite a number of palaeoplanktologists were present, familiar faces like Geoffrey Eaton, Graeme Wilson and Roger Davey, Baltes, Beju, Riegel and Gulden Gitmez, but also unfamiliar ones like K.P. Jain (India), Daniel Habib (USA), Domenico Corradini (Italy) and Olga Čornazukova (USSR). The meeting afforded us a first opportunity to meet specialists on modern microplankton, like Mary Parke and Gerald Boalch (England), Richard Norris (USA) and Estela da Sousa e Silva (Portugal). In terms of dinoflagellate research, though, it was not memorable; my only diary note is of my incredulity concerning a paper by Adam Bursa (Canada) on supposed discoaster production by dinoflagellates! The high cost of living in Rome proved a shock so unanticipated that my money ran out early; consequently, I had to hasten homeward before the meeting was over.

Indeed, it was in part because of low academic earnings in Britain, so low that I had to undertake consulting, to support my growing family and even faster-growing book collection, that we emigrated to Canada in April 1972. The other reason, however, was that North America had become the principal focus for researches on marine palynomorphs. Neither factor would nowadays apply, British academic salaries have risen faster than Canadian ones and Europe has again become the centre for research on marine palynomorphs. Even so, we've never regretted our decision to cross the Atlantic.

I travelled back to Europe to attend the Third International Planktonic Conference, held in Kiel, Germany on 3-11 September 1974. This meeting brought first encounters with two persons of comparable distinction, H.A. von Stosch, the first person to convincingly demonstrate sexuality in dinoflagellates, and Walter Wetzel. Among many old friends present were some I'd not met at earlier meetings, Rex Harland (England), Hans Gocht

(Germany), Lucy Costa (Argentina), Jean-Pierre Verdier and Martine Rossignol-Strick (France), Al Loeblich and Helen Tappan (USA), plus numerous persons unfamiliar to me, like Paul von Benedek (Germany), Kenichi Harada (Japan), Alan Bé (USA), F.J.R. "Max" Taylor (Canada), José Hermesilla and Enrique Balech (Argentina), and Helmut Weiler (Austria). This time, quite a lot of the talks were interesting enough to gain diary mention, Paul von Benedek, outlining a joint dinoflagellate-coccolith zonation scheme; Enrique Balech, talking about current-controlled distribution patterns off Argentina and the Falklands (which he miscalled the Malvinas, of course!), Gerald Boalch, describing some remarkable variants of *Gyrodinium/Gymnodinium* in a culture, and Richard Norris, with his "superb slides showing the ultrastructure of a prasinophycean alga". There were again discussions of acritarch-dinoflagellate affinities.

The high spot, however, was a "controversial talk by Taylor, in which he set forth his ideas on the interrelationship of dinoflagellates, as suggested by comparisons of plate patterns seen in antapical and apical view. He thought that there were originally three plates in each position and showed how various tabulation patterns might be derived by displacement [of these plates] consequent upon torsion. While the ideas may or may not be correct, they are unquestionably most stimulating".

Unfortunately, the proceedings of that meeting never appeared and the publication of Max's ideas was, in consequence, greatly delayed. That proved to be the last of the Planktonic Conferences; henceforward, dinoflagellate specialists were to have their own gatherings.

A Gathering in Canada (1976)

The joint meeting of the American Association of Stratigraphic Palynologists and the Commission International de Microflore du Paléozoïque was the first of either body to be staged in Canada. It took place on 12-15

October 1976 in Halifax, Nova Scotia. Because transatlantic flights were still relatively inexpensive, attracted strong European participation, including some twenty persons who, like me, were graduates of the University of Sheffield's palynological research programme.

On the first morning, as my diary notes, there was "an acritarch session, Charles Downie was Chairman and gave a witty introductory speech; then P.J. Hill of Derby talked on Ordovician systematic problems, after which I gave my own paper on *Arpylorus*. To my relief, not only was this well received but also I convinced my audience that it was indeed a dinoflagellate cyst".

One of the audience who agreed with me was Bill Evitt; he told me that he was especially pleased since, from reading my abstract, he'd not been clear as to my opinions. That wasn't surprising; the abstract had been demanded so early that I'd written it **before** beginning my study of *Arpylorus*, at a time when I hadn't even formulated an opinion!

That afternoon, Bill himself, "relaxed and confident", gave what my diary described as "a brilliant analysis of *Spiniferites* morphology". Other talks included "a rather tentative but interesting talk by David Wall, from which it seems that the siliceous dinoflagellates are also truly cysts", and "a quite incredible polemic from Dewey MacLean, more political speech than scientific address".

Next day brought "a thought-provoking contribution on palaeogeographic techniques" from George Hart and an informal discussion in the bar with Charles Downie, Bill Evitt and Marjorie Muir, concerning the desirability of establishing a special classification for the Precambrian multicellular organisms. Both [Bill and Charles] were opposed to a "Supergroup" embracing the Acritarcha, but both were otherwise agreeable and Charles may act as co-author".

Since I left early on the third morning to attend an invitation-only meeting of historians of science amid the glorious autumn colours of the New Hampshire woods, I missed the rest of that meeting and do not figure in the group photograph of Sheffield palynologists that nowadays hangs on so many office walls - which is, no doubt, a great mercy!

From Penrose to Hexrose (1978-1981)

During the early 1970's, George Hart continued to sponsor short courses on palynological topics at Louisiana State University, Baton Rouge. I gave one on Jurassic dinoflagellates in May 1975, while two others were given by Graham Williams, jointly with Evan Kidson (May, 1976) and Lew Stover (September 1977). Those courses served not only to introduce beginners to the study of dinoflagellates, but also to update specialists like me on the new developments in dinoflagellate biostratigraphy.

However, they did not serve to bring palaeoplanktologists into contact with neoplanktologists, and that was clearly necessary. It was Bill Evitt who first proposed that the Geological Society of America might devote one of its Penrose Conferences to fossil and living dinoflagellates. Such conferences were intended to afford to geoscientists, who shared a common ground, the opportunity to exchange their ideas in an informal setting, without any commitment to subsequent publication. The idea was accepted, the meeting being organized by Bill, in association with Lew Stover and a leading U.S. specialist on living dinoflagellates, Karen Steidinger. It was scheduled to be held in the ski resort of Keystone, Colorado on 16-21 April 1978; however, because of an outbreak of Rocky Mountain fever there, it was transferred at a week's notice to Colorado Springs.

Though the largest number of participants were from the United States, there was a substantial representation from abroad, and, as had been hoped, an equal mix of workers

on modern and on fossil dinoflagellates. Hans Gocht and Harald Netzel (Germany); Geoff Norris, Satish Srivastava, Anad Prakash, Wayne Brideaux and Max Taylor (Canada); Bill Evitt, Warren Drugg, Marcel Millioud, Judi Lentin, Lew Stover, Eleanor Cox and Al Loeblich III (USA); Barrie Dale (by then residing in Norway); Wayne Harris (Australia) and Geoff Eaton and John Dodge (England) - all these persons were not merely present, but active and vocal participants.

Geoff Eaton presented his concepts of the development of plate patterns, consistently mispronouncing *Suessia* (properly "*Sewssia*") as "*Swessia*", to my initial irritation and our subsequent mutual amusement! His ideas proved quite different from Max Taylor's, though just as feasible on present evidence. A third approach to the understanding of dinoflagellate evolutionary sequences, presented by Geoff Norris, afforded further scope for meditation.

The greatest jolt to us palaeoplanktologists, though, came from our exposure to the huge expansion of knowledge of modern dinoflagellate morphology, an expansion of which, hitherto, we had been scarcely aware. To see a transmission-electron micrograph of an **eyespot** on a dinoflagellate, filling a screen and yet in perfect focus, was awesome. For the neontologists, the vast amount of new information on fossil dinoflagellates came as an equal surprise. It was this stimulating cross-fertilization that was to generate a rich progeny of future meetings.

When the Fifth International Palynological Congress was held in Cambridge, England, on 29 June-6 July 1980, many specialists on dinoflagellates and acritarchs were present. Most of these were well known to me, but some had not been at earlier meetings: these included Marie T. Morzadec-Kerfourn and Jean-Jacques Chateauneuf (France); Leslie Riley, Ron Woollam, David Batten, Jim Fenton and Stanley Duxbury (England); Gonzalez Vidal (Spain); Malcolm Wilson (Ca-

nada); Andrew Knoll (USA) and Ulderico Biffi (Italy).

Lectures attracting diary mention were a session on dinoflagellates in modern sediments by Chris Reid, Rex Harland and Barrie Dale. "Rex illustrating the variety of cysts produced by *Protoceratium* and Barrie demonstrating that cysts can, after all, be used as palaeoclimatic indicators"; Dan Beju showing "pictures of his excellent Jurassic assemblages from Pakistan"; Les Riley summarizing the Robertson Research scheme of Bajocian to Callovian dinoflagellate zonation (based, in truth, on his Ph.D. researches under my supervision at Nottingham University); Bill Diver's "interesting discussion on the cryptarch idea (originally developed by Marjorie Muir and me)" and his account of latest Precambrian (Torridonian) acritarchs; and Gonzalez Vidal's "summary of developing concepts of Upper Proterozoic to Cambrian faunas of the Atlantic and European regions."

The eldest of the Penrose progeny had been christened "Hexrose" by its organizers, Hans Gocht and Harald Netzel; it was held in Tübingen, Germany on 31 August to 4 September 1981. Alfred Eisenack attended on the first day and, having now adopted the acritarch concept, treated me like a favourite son - a moving experience. There were many good talks, some of them quite controversial, as when Jens Morten Hansen (Denmark) adduced evidence which, he believed, demonstrated that *Deflandrea diebeli* was a descendant of *Pareodinia* or when Wolfgang Wille clashed with Gunther Dörhöfer concerning the phylogeny of Early Jurassic dinoflagellates - the irresistible force meeting the immovable object! Bill Evitt gave a fine presentation on the detailed morphology of *Oligosphaeridium* and *Hystriochosphaeridium*; Hans Gocht matched it with an equally meticulous account of *Thalassiphora*. Good talks on living dinoflagellates were given by Lois Pfeister, Donald Anderson, Carl Beam, Malte Elbrächter, Gregory Morey-Gaines and Paul Zubhoff.

However, the real revelation at this meeting was of the abundance and diversity of calcareous dinoflagellate cysts, a discovery entirely startling to most of us. (Yes, they had been discovered by Deflandre, but they had attracted little attention hitherto). Barrie Dale began this with an account of sediment-trap studies far offshore in the Atlantic Ocean: while organic-walled cysts were discovered to be rare, calcareous cysts were abundant. Then, on the last morning, the great richness of the Mesozoic and Tertiary fossil record of such cysts was exposed to us by Karl Tangen, Helmut Weiler and Helmut Keupp; Keupp's SEM pictures, in particular, were breathtaking. Some of these cysts had long been known to geoscientists, but only as "calcispheres" of unknown affinity. Henceforward, the calcareous cysts would be a major focus for biostratigraphical research.

From Dublin to Calgary (1982-1984)

Over the years since its formation in 1967, the American Association of Stratigraphic Palynologists had been holding regular annual meetings, at all of which a number of dinoflagellate and acritarch workers had been present. In 1982 it "went international", holding a joint meeting with the Commission International de Microflore du Paléozoïque in Dublin, Ireland on 12 to 18 September. Again this was a chance to meet old friends and make new ones: Lucy Edwards and L.R. Wilson (USA); Ed Davies, Rob Fensome, Peta Mudie and Bert van Helden (Canada); Stefan Piasecki (Denmark); Svein Manum (Norway); Philippe Taugourdeau and Josette Taugourdeau-Lantz (France); Peter Hochuli (Switzerland) and Julie Wiseman (Australia), were all names new to my diaries of those meetings. The high spot was Ed Davies' presentation of his innovative ideas concerning peridinioid evolution; the low spot, for me at least, my own talk on "Dinoflagellate cyst variation through time", of which I made a complete botch!

When Max Taylor staged his "First Temperate Dinoflagellate Course" at Friday Harbor, San

Juan Islands, Washington in August 1983, I plunged even lower, nearly drowning when my clumsiness overturned a boat in the yacht harbour! My water saturated diary of that meeting is illegible, but I remember that Carl Beam and Marion Himes, Donald Anderson, Saburo Toriumi (Japan) and my student, Duncan Wall, were all present. Indeed, it was Carl and Duncan who plucked me from the water!

In 1984, the Sixth International Palynological Congress was held in Calgary, Alberta. There was a strong French presence, all of them hopeful (in view of Canada's proclaimed bilingualism) that much of the meeting would be conducted in French; but this was western Canada and they were to be disappointed. There were many familiar faces and a few new ones: Friedemann Scharschmidt (Germany); Alain Le Hérisse and Edwige Masure (France); Kenneth Piel and Merrell Miller (USA); Kenneth Dorning (England); Arun Kumar (India); Andres Boltovskoy (Argentina); and Eckart Schrank (Germany). Dan Beju, now a U.S. resident, came to bid us a poignant farewell, for he knew that his death from cancer was imminent.

The recent death of Alfred Eisenack occasioned a memorial tribute by me, which was well received. Papers attracting diary notice included Barrie Dale's more extended demonstration that the siliceous dinoflagellates of the Eocene were cysts (an opinion later to be challenged); a joint paper by Le Hérisse and Miller on the significance of openings in acritarchs; Fensome "competently arguing for a more dinoflagellate-oriented dinoflagellate classification" and Schrank speaking on the dating of Egyptian Late Cretaceous phosphate deposits.

Also mentioned is the fact that I acted "as a panel member (along with Al Traverse, Mike Boulter, Bill Chaloner and Jan Jansonius, with Dave Nichols as chairman) in a forum in which Norman Hughes' new scheme for a non-botanical-code statistical recording of

palynological data came under criticism. I was a little sorry for "The Bishop" [Hughes], he had no supporters, from panel or floor, and it is clear that his scheme cannot go forward. Nevertheless it does have certain merits, and I am pretty cool about the ICBN [International Code of Botanical Nomenclature] in its present manifestation, after loss of the organ genus".

From England to Australia (1985-1988)

The Third International Conference on Modern and Fossil Dinoflagellates, this time only informally called "Heptrose", took place at the Royal Holloway and Bedford College in Egham, near London, from 11 to 17 August 1985. It was organized courageously by John Dodge, even though he had only recently endured the loss of his wife. The meeting was very well attended by both palaeoplanktologists and neoplanktologists including many newcomers to such meetings: Stefan Hultberg (Sweden); Naresh Mehrotra (India); Stephen Heaney, Chris Hunt, David Wharton and Jane Lewis (England); Claus Heilmann-Clausen (Denmark); Joyce Lucas-Clark, Gregory Gaines and Nairn Albert (USA); and Danièle Fauconnier (France).

The papers attracting diary attention were numerous: John Dodge, proposing a subdivision of the living genus *Gonyaulax*; David Wharton, discussing the *Pareodinia* group; Max Taylor, whose summary of the principles of modern dinoflagellate classification I considered "the best paper of the day;" Stephen Heaney on freshwater *Ceratium* from Esthwaite Water and Jane Lewis on the problems of cyst recognition in Scottish sea-lochs; Greg Gaines on "the different modes of dinoflagellate nutrition;" Lucy Costa giving "a good account of variation in the *Ascodinium* group" and David Goodman an "equally good" account of "an attempt to evaluate the *Wetzeliella* complex by cladistic methods, it didn't succeed." Judi Lentin described "from China and Japan, a variety of new cysts, including a freshwater *Ceratium*" and Nairn Albert "talked about the

"incidental" paraplates of Jurassic dinoflagellate cysts; I was able to concur with most of his conclusions." Indeed, it was a meeting at which many interesting new data and ideas were presented.

The next meeting of consequence was held almost at the other side of the world, the Seventh International Palynological Congress in Brisbane, Australia on 28 August to 3 September 1988. Even though the combination of distance, escalating costs and declining governmental support for research must have eroded attendance, the roster of participants from other continents remained impressive, Raimond Below (Germany); Waldemar Hergreen, Daan Zeevenboom and Han Leereveld (The Netherlands); Anne de Vernal (Canada); Eric Monteil (Switzerland); Anneli Uutela (Finland); Namio Uesugui (Brazil); Malgorzata Moczydowska (Poland); Javier Helenes (Mexico); Eszther Nagy (Hungary); Vidal (by then, from Sweden); Manum (Norway); Hill, Harland and Davey from England; Jansonius (Canada); Stover, Edwards, Gordon Wood, Lucas-Clark and Virgil Wiggins from the USA; and Jain and Venkatachala from India. Also among those present were Marjorie Curtis (formerly Muir), now an Australian resident, and such other Australians as Alan Partridge, Robin Helby, Dennis Burger, Roger Morgan and John Backhouse.

The meeting was prefaced by one of the wettest excursions I recall, fittingly so, since it was to the Queensland rain-forest! The formal proceedings began with a keynote address by Basil Balme; after this, Basil was presented with a "Festschrift" volume in his honour and Swedish-domiciled palynologist John Rowley was awarded the Erdtman Medal. Then to business. Papers which especially impressed me were by John Backhouse, on Australian Lower Cretaceous non-marine dinoflagellates; Eric Monteil, with "a lucid and well-planned presentation on *Odontochitina* and *Xenascus*"; Lew Stover, speaking on the evolution and relationship of the *Areosphaeridium* lineage "with espe-

cially magnificent pictures"; Barrie Dale, describing low-salinity assemblages from the Baltic Sea; Joyce Lucas-Clark talking on Californian Cretaceous forms, "very lively"; and Raimond Below's "unscheduled talk on paraplate overlap as a key to evolutionary relationships - much the best talk of the morning and one of the best of the meeting. "

There was much also that was controversial. The Taylor-Evitt approach to dinoflagellate plate nomenclature and classification was gaining vigorous critics, as well as adherents. I was not happy with Javier Helenes' concepts of the taxonomy of the *Gonyaulacysta* group and dubious about Tony Bint's supposed Triassic dinoflagellates. Moreover, I commented: "As for Lucy Edwards' proposals of yet further new approaches to dinoflagellate plate labelling, I rank their chance of acceptance very low, however sensible they may be!"

The affinity of the acritarchs with other algal groups (Prasinophyceae and Chlorophyceae) was a recurrent theme for discussion; and indeed, there was much exciting new data on Palaeozoic assemblages, marine or freshwater. My diary notes that I "gave a short lesson on Welsh place-name pronunciation to Gordon Wood, "Shlandoverly," indeed! - which he took very amiably and even seemed grateful for! " Discussions on acritarch wall structure and chemistry and on future research on *micrhystridia*, with Vidal and Moczydowska also gain mention. All in all, the meeting was an undoubted success and a particular credit to Mary Dettmann and Geoffrey Playford, its principal organizers.

From Massachusetts to Norway (1989 to date)

The Fourth International Conference on Modern and Fossil Dinoflagellates brought a return to the United States and, for the first time, a conference visit to an oceanographic laboratory, the venerable institution at Woods Hole, Massachusetts. It was held from 19 to 21 April 1989. This time, Australians were

few on the ground, Europeans and North Americans numerous - so numerous, indeed, that any listing would be invidious. Perhaps because of the setting, the opening session on modern dinoflagellates seemed especially interesting, with "Ruth Schmitter talking on the mysterious globular bodies that survive through several ecological stages, but are of obscure purpose; Estela de Sousa e Silva defending her 'small forms' concept [and] Frederic Partensky in part challenging it; Lawrence Fritz describing the sexual cycle in *Gonyaulax tamarensis*; Jane Lewis expounding theca-cyst relationships in *Scrippsiella* [and, after lunch] Donald Anderson, Utsa Pollinger and Mary Tyler describing ecological relationships."

For me, the meeting's high spots were Rex Harland "giving a talk that made me proud to have launched him into Quaternary studies"; Barrie Dale "speaking with aggressive coherence" and, on another occasion, "relaxed and entertaining;" Xiaping Gao (China) on the reproduction of *Scrippsiella*, "comparatively lucid and interesting;" Andrew McMinn "lucid on east coast Australian forms;" Marie-Thérèse Morzadec-Kerfourn "clear on West African core assemblages;" Rob Fensome presenting "a truly excellent summation of our nascent dinoflagellate classification;" and Bill Evitt "fascinatingly demonstrating that *Palaeoperidinium* cysts were formed externally to the membrane, a real break-through!" In general, though some talks were uninspired and others interesting in content but dully presented, this meeting raised dinoflagellate studies to new heights.

In September 1991, the Commission Internationale de Microflore du Paléozoïque staged a Symposium on Acritarchs and Chitinozoa at the offices of the British Geological Survey in Keyworth, Nottinghamshire, England. Present were such notable persons as Hanna Górka (Poland); Michel Vanguetaine and Thomas Servais (Belgium); Dorothy Guy-Ohlsen (Sweden); Nils Poulsen (Denmark); Milada Vavrdová (Czech Republic); and Reed

Wicander (USA), along with a number of British workers. (That national distribution indicated how definitely acritarch studies had moved from west to east across the Atlantic!). I had expect much further discussion of acritarch relationships, but that theme received little attention. However, the account by Alain Le Hérisse of his work on the mazueloids brought another puzzling group to international attention.

With time, increasing travel costs and proportionately decreasing financial resources, it became for me more and more a question of which meetings to attend and which must be missed. The Eighth International Palynological Congress at Aix-en-Provence, France, 6 to 12 September 1992, was one that I skipped, much as I like France in general and Provence in particular; but then, its programme did not contain much that seemed relevant to my research concerns, so I did not repine.

A more serious "miss" was the Fifth International Conference on Modern and Fossil Dinoflagellates, held on 19 to 25 April 1993, **exactly** at the time of the University of Saskatchewan's final examinations, which made my participation impossible. An exactly comparable problem of timing precluded my participation in the meeting of CIMPA in Prague, Czech Republic, three years later (10 to 12 April 1996). April dates may suit European academic palynologists, but for us North American professors, they're disastrously difficult!

The Ninth International Palynological Conference was staged in Houston, Texas on 23 to 28 June 1996. This was the meeting at which, for the first time, I became aware how completely a new generation of dinoflagellate specialists were taking over from us "old 'uns"; the unfamiliar names and faces were too many to list. Quite clearly, also, it was to be the last gathering of friends seen at many earlier conferences; the time of retirement, voluntary or otherwise, from the scientific

fray had come for many, while age and sickness were taking an increasing toll. (The subsequent death of Gonzalez Vidal, though, was an unexpected shock). At a gathering of the Sheffield school of palynology graduates, only one of the dozen or so persons dining together, Barrie Dale, was well known to me, Graham Williams and David Wall not being able to come that evening. Indeed, time was passing and the old giving place to the new.

That was inevitable enough but, for me at least, a less happy feature was the completeness with which the computer seemed to be taking over. In most lectures, graphs vastly outnumbered actual pictures of dinoflagellates or acritarchs. Yes, the species names were listed; but how reliable were those identifications? Very often, one could not tell and, in consequence, could not properly assess either the biostratigraphical correlations or the palaeoecological deductions. One speaker, whom I shall not name, repeatedly pointed to his graphs and said "As you'll clearly see...." when, in fact, his graphs made nothing clear. Some verbal presentations were supplemented by informative poster displays; most, unfortunately, were not.

Yet there were numerous currants of interesting information to be found in that suet-pudding of statistics. Speakers who earned favourable diary notes were Martin Head, giving "a coherent account of dinoflagellates as climatic indices in the North Atlantic"; Sarah Hall, showing "how fluorescence microscopy could be used to discriminate reworked forms"; Jim Riding, with a presentation that gave a new impetus to Jurassic dinoflagellate studies in Russia and Siberia; and Laurent de Verteuil, speaking "interestingly on his work in Florida and the Keys." There was an evening rallying of CIMPA, at which Thomas Servais recounted the history of the Sous-Groupe, and there

were several presentations that pleased me by casting doubt on the universality of the alleged extra-terrestrially-induced mass extinction at the end of the Cretaceous. The publication at this meeting of the three volume work *Palynology: Principles and Applications*, edited by Jan Jansonius and D. Colin McGregor, marked a significant watershed in the progress of our discipline.

So now for Norway and the Sixth International Colloquium on Fossil and Living Dinoflagellates. Will it bring further controversies or new consensuses? (I'm unhappily sure that it will bring many, many, more statistical analyses and graphs!) Will there be new techniques to be learned? Will old problems be resolved or will new ones arise, to stimulate our researches afresh or set them back? Might we be able to settle on a common terminology, Kofoidian, Taylorian or Evittian, so that we are again speaking the same descriptive language? With Norwegian prices so high, will we be able to afford enough alcohol to properly lubricate our discussions? These are questions I can't answer, but I'm sure it will be an exhilarating experience!

Disclaimer and Acknowledgements.

The above article was written at the invitation of Dr. Morten Smelror, who has aided me in the compilation of data and the elimination of blatant errors. It is based very largely upon my diaries. In consequence, I must take full responsibility for the opinions expressed and for any factual errors that have passed undetected.

I am indebted to Dr. Robert A. Fensome and Dr. Graham L. Williams (Geological Survey of Canada) for their jogs to my memory and to my research assistant, Mrs. Linda Dietz, for data-searching and aid in manuscript preparation.

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The listing that follows is presented in descending stratigraphical order and is selective. Certain early works on Ehrenberg in particular, unlikely to be readily accessible to persons interested in the history of palynology, are not listed; newspaper articles and references of minor importance are not listed. (For fuller listings, see Sarjeant 1980, 1987, 1996). Years of birth and death are given for deceased persons; I have omitted birth years for persons still living, not because of lack of interest, but because that information could not be gained without extensive correspondence, which I'd have been glad to undertake but for which, alas, I had no time.

Most names will be familiar to readers. In the few instances where names may be unfamiliar, I have noted the person's relevant contribution briefly. In preparing my listing of biographies of modern dinoflagellate workers, I was kindly assisted by Dr. Robert A. Fensome (Atlantic Geoscience Centre, Geological Survey of Canada) and Dr. F.J.R. Taylor (University of British Columbia). I would welcome notification of any omissions.

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Newsl., vol. 14, no. 2, pp. 18-20, 2 ports.

Ehrenberg, Christian Gottfried (1795-1876)

- 1980 S. Locker. Christian Gottfried Ehrenberg (1795-1896) und die mikrogeologische Sammlung. *Z. geol. Wiss. Berlin*, vol. 8, no. 2, pp. 231-238, text-figs. 1-3.
- 1978 W.A.S. Sarjeant. Hundredth Year Memoriam. Christian Gottfried Ehrenberg 1795-1876. *Palynology*, vol. 2, pp. 209-211.
- 1976 R. Bolling. "Das Leben und das Werk Christian Gottfried Ehrenbergs. Erweiterter Festvortrag zur 100. Wiederkehr seines Todestages am 26. Juni 1976" (pp. 7-70). In: Christian Gottfried Ehrenberg 1795-1876. *Veröff. delitz. Gesch.*, pt. 8. Delitzsch, Germany: Kreismuseum, 92 pp., 8 unnumb. pls.
- 1976 J. Lische. Christian Gottfried Ehrenberg als Teilnehmer an der Naturforscherversammlung in Jena 1836 (p. 71-92). In: Christian Gottfried Ehrenberg 1795-1876. *Veröff. delitz. Gesch.*, pt. 8. Delitzsch, Germany: Kreismuseum, 92 pp., 8 unnumb. pls.
- 1969 G. Engelmann. Christian Gottfried Ehrenberg, ein Wegbereiter der deutschen Tiefseeforschung. *Dt. hydrogr. Z.*, vol. 22, pp. 145-157.
- 1966 Wetzel, Otto. Christian Gottfried Ehrenberg, 1795-1876. (p. 141-148, port. In: H. Freund & A. Berg, eds., *Geschichte der Mikroskopie: Leben und Werk grosser Forscher*, vol. III. Angewandte Naturwissenschaften und Technik. Frankfurt am Main, Germany: Umschau Verlag.
- 1923 C. Dobell. C.G. Ehrenberg (1795-1876). A biographical note. *Parasitology*, vol. 15, pp. 320-325.

Eisenack, Alfred (1891-1982)

- 1985 W.A.S. Sarjeant. Alfred Eisenack (1891-1982) and his contributions to palynology. *Review of Palaeobotany and Palynology*, vol. 45, pp. 3-15, 1 pl.

- 1984 W.A.S. Sarjeant. Eisenack's mentor: a correction. *Micropaleontology*, vol 30, no. 2, pp. 223.
- 1983 H. Gocht and W.A.S. Sarjeant, 1983. Pathfinder in palynology: Alfred Eisenack (1891-1982). *Micropaleontology*, vol. 29, no. 4, pp. 470-477.
- 1982 H. Gocht. Alfred Eisenack *13.5.1891 †19.4.1982. *Paläont. Z.*, vol. 56, nos. 3-4, pp. 151-152, port.
- 1982 H. Gocht. Das wissenschaftliche Werk von Alfred Eisenack. *Neues Jb. Geol. Paläont. Mh.*, no. 11, pp. 637-647, port.
- 1982 A. Martinsson. Alfred Eisenack deceased. *Chitinozoan Newsl.*, no. 4, pp. 6-7.
- 1975 R.W. Hedlund. American Association of Stratigraphic Palynologists Honorary Membership Awards, 1975. Alfred Eisenack. *Palynology*, vol. 1, p. 185, port.

Evitt, William R.

- 1983 H.A. Leffingwell & B.L. Whitney. American Association of Stratigraphic Palynologists Medal for Scientific Excellence, 1982. William R. Evitt. *Palynology*, vol. 7, p. 3, port.

Fuchs, Theodor (1842-1925)

Believed that the "xanthidia" were copepod eggs.

- 1925 F.X. Schaffer. Theodor Fuchs. Sein Leben und Werk. *Mitt. geol. Ges. Wien*, vol.18, pp.174-187, 2 pls., port. [Also publ. 1927 under the title "Sein Leben und sein Werk", *Annl. naturh. Mus. Wien*, vol.41, pp.1-24, port.]
- 1967 R. Kettner. Theodor Fuchs (1842, + 1925). *Cas. Miner. Geol.*, vol.12, no.3, pp. 363-364.

Gocht, Hans

- 1996 Anon. American Association of Stratigraphic Palynologists Medal of Scientific Excellence Awards. Dedication to Hans Gocht. *Am. Ass. strat. Palynols Newsl.*, vol. 29, no. 3, pp. 5-6, port.

Gran, Haaken Hasberg (1870-1955)

Studies of modern dinoflagellates.

- 1956 T. Braarud. Haaken Hasberg Gran (1870-1955). *J. cons. int. Explor. Mer.*, vol. 21, no. 2, pp. 122-124, port.

Hoffmeister, William S. (1901-1980)

His joint work on the "hystrichosphaerids" with L.R. Wilson might have revolutionized the discipline; but it was published only in abstract.

- 1980 W.R. Evitt. William S. Hoffmeister, 26 February 1901-20 March 1980. *Palynology*, vol. 4, p. 232.
- 1975 W.R. Evitt. American Association of Stratigraphic Palynologists Honorary Membership Awards, 1975. William S. Hoffmeister. *Palynology*, vol. 1, p. 186, port.

Hughes, Norman Francis (1918-1994)

- 1994 D.J. Batten. Norman Hughes (1918-1994). *Palynol.*, vol. 17, no. 4, p. 7. [Repr. 1994 *Am. Ass. strat. Palynols Newsl.*, vol. 27, no. 4, pp. 7-8, port.; 1995 *Geol. Soc. Lond. Ann. Rept. for 1994*, pp. 17-18].
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Jørgensen, Eugen Honoratus (1862-1938)

Studies of modern dinoflagellates.

- 1939 J. Holmboe. Minnetale over Lektor Eugen Jørgensen. *Norsk. Videns. Akad. Oslo, Årbok 1938*, pp. 1-4, port.

Klebs, Georg Albrecht (1857-1918)

Made some studies of living dinoflagellates.

- 1919 E. Küster. Georg Klebs 1857-1913. *Ber. dtsh. bot. Ges.*, vol. 36, pp. 90-116, port.

Klement, Karl Walter (1931-1982)

- 1982 B.M. Hanson. Karl Walter Klement (1931-1982). *Bull. Am. Ass. Petrol. Geol.*, vol. 66, no. 8, p. 1156, port.

Kofoid, Charles Atwood (1865-1947)

1949 R.B. Goldschmidt. Biographical memoir of Charles Atwood Kofoid (1865-1947). *Nat. Acad. Sci.*, vol. 26, *Biog. Mem.*, no. 7, pp. 121-151, port.

Lebour, Marie Victoire (1876-1971)

Studies of modern dinoflagellates.

1972 F.S. Russell. Dr. Marie V. Lebour. *J. mar. biol. Ass. UK*, vol. 52, pp. 777-778, 2 illus.

Lentin, Judi K.

1987 J.K. Lentin. Dino Travels. Travels with your editor. *Round Brown Newsl.* vol. 2, no. 1 (summer), pp. 15-19.

1985 J.K. Lentin. "Dino Travels". *Can. Ass. Palynols Newsl.*, vol. 8, no. 2 (winter), pp. 13-14.

Loeblich, Alfred Richard, Jr. (1914-1994)

1995 R. Wicander. Alfred Richard Loeblich, Jr. August 15, 1914-September 9, 1994. *Acritarch Newsl.*, no. 7, 2 unnumb. pp., port.

Mantell, Gideon Algernon (1790-1852)

Demonstrated the organic character of the wall of the so-called "xanthidia" and erected the genus *Spiniferites*.

1992 W.A.S. Sarjeant. Gideon Mantell and the "Xanthidia." *Archs nat. Hist.*, vol. 19, no. 1, pp. 91-100, figs. 1-4 (1 port.).

1972 A.D. Morris. Gideon Algernon Mantell L.L.D., F.R.C.S., F.R.S. (1790-1852), surgeon and geologist: "Wizard of the Weald." *Proc. r. Soc. Med.*, vol. 65, pp. 215-222, text-figs. 1-4.

1967 W.A.S. Sarjeant. The rediscovery of a lost species of dinoflagellate cyst, *Hystriochosphaera* (ex: *Spiniferites*) *reginaldi* (Mantell 1844) comb. nov. *Microscopy: J. Quekett Microsc. Club*, vol. 30, pp. 241-250.

1940 E.C. Curwen. *The journal of Gideon Mantell, surgeon and geologist*. Oxford, New York, Toronto: Oxford University Press. 315 pp., frontis., 4 pls.

1927 S. Spokes. *Gideon Algernon Mantell: surgeon and geologist*. London: Bale.

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Martin, Francine (1937-1994)

1995 M. Tongiorgi & A. Di Milia. Francine Laure Martin 1937-1994. *Am. Ass. strat. Palynols Newsl.*, vol. 28, no. 2, pp. 7-8, port.

1995 M. Tongiorgi & A. Di Milia. Francine Laure Martin (* Woluwe St. Lambert 11/26/37, † Bruxelles 12/16/95). *Comm. int. Microfl. Paléoz. Newsl.*, no. 48, pp. 4-5.

Muller, Jan (1922-1983)

Wrote on the environmental relations of dinoflagellates in the Orinoco delta region.

1983 W.H. Zagwijn. Jan Muller (1922-1983) "After a life lived to the full". *Newsl. Int. Comm. Palynol.*, vol. 6, no. 2, pl. 1, port.

Müller, Otto Friderich (1730-1784)

A pioneer observer-albeit uncomprehending-ly! - of living dinoflagellates.

1950 J. Anker. *Otto Friderich Müller's Zoologica Danica*. Copenhagen: Copenhagen University Press, 108 pp.

Nathorst, Alfred Gabriel (1850-1921)

Reported organic-walled microfossils from the Precambrian Visingsö Formation of Norway.

1921 G. Andersson. Nekrolog. *Ymer. Stockholm*, vol. 41, pp. 47-55, port.

1921 A. Clément. A.G. Nathorst. Mindeord der 31 Januar 1921. *Meddr dansk geol. Foren.*, vol. 6, no. 1, pp. 1-8, port.

1921 T.G. Halle. Alfred Gabriel Nathorst. En minnesteckning. *Geol. För. Stockh. Förh.*, vol. 43, pts. 3-4, pp. 241-311, 6 unnumb. figs., port.

1921 T.G. Halle. Nekrolog. *Fauna Flora, Upps.*, vol. 16, pp.33-40, port.

1921 A.C. Seward. Alfred Gabriel Nathorst (p.lxv-lxvi). In: R.D. Oldham, The anniversary address of the President. *Proc. Geol. Soc. Lond.*, pp. lv-xcii.

1921 A.C. Seward. Obituary. *Bot. Gaz.*, vol. 71, pp. 464-465, port.

1897 [A.G. Nathorst]. *Förteckning på skrifter af Alfred Gabriel Nathorst 1869-1896*. Stockholm: privately published. 18 pp.

Newton, Edwin Tulley (1840-1930)

Described the first *Tasmanites* from the so-called "white coals" of Tasmania.

- 1932 [A.S. Woodward]. Edwin Tulley Newton, 1840-1930. *Obit. Not. Fell. r. Soc. Lond.*, vol. 1, pp. 5-7, port.
- 1931 [C.D. Sherborn]. E. T. Newton. *Proc. geol. Ass.*, vol. 42, p. 71-72.
- 1930 Anon. Edwin Tulley Newton. *Geol. Mag.*, vol. 67, pp. 286-287.

Parke, Mary Winifred (1908-1989)

Studies of modern prasinophytes.

- 1991 G.T. Boalch & G.E. Fogg. Mary Winifred Parke 23 March 1908 - 17 July 1989. *Biog. Mem. Fellows r. Soc. Lond.*, vol. 37, pp. 381-397, port.

Pascher, Adolf (1881-1945)

Studies of modern marine and freshwater algae, including dinoflagellates.

- 1955 E. Pohl. Adolf Pascher 1881-1945. *Ber. dtsh. bot. Ges.*, vol. 73, pp. 117-120.
- 1953 M. Hartmann & J. Buder. Adolf Pascher zum Gedächtniss. *Arch. Protistenk.*, vol. 98. [Not seen].
- 1953 A. Pascher. Lebenslauf und Arbeitenverzeichnis. Eine Selbstbiographie. *Arch. Protistenk.*, vol. 98. [Not seen].

Pavillard, Jules (1868-1961)

Studies of modern phytoplankton, including dinoflagellates.

- 1962 G. Trégouboff. À la mémoire de Jules Pavillard (1868-1961). *Bull. Inst. océanogr. Monaco*, no. 1247, 16 pp., port.
- 1947 J. Pavillard. Quelques réminiscences planktologiques. *Rec. Trav. Inst. Bot. Montpellier*, pt. 2. [Not seen].

Piel, Kenneth M.

- 1992 Anon. Ken Piel. In: Where are they now, 25 years later. *Am. Ass. strat. Palynols Newsl.*, vol. 25, no. 4, p. 13, port.

Reade, Joseph Bancroft (1801-1870)

Early studies of English "xanthidia".

- 1982 W.A.S. Sarjeant. Joseph B. Reade (1801-1870) and the earliest studies of fossil dinoflagellate cysts in England. *J. Micropalaeont.*, vol. 1, no. 1, pp. 85-93, 3 figs.

ropalaeont., vol. 1, no. 1, pp. 85-93, 3 figs.

Reinsch, Paul Friedrich (1836-1914)

Proposed the name "palinospheres" for what are now called tasmanitids, believing they were cysts of dinoflagellates.

- 1914 H. Glück. Paul Friedrich Reinsch. *Ber. deutsch. bot. Ges.*, vol. 32, pp. 3-17.

Sarjeant, William Antony Swithin

- 1996 R. Thomas. Science, literature, humour, travel... book donor's gift has it all. *Folio*, Edmonton, Alberta, vol. 33, no. 16, p. 3. [Republ. 1996, *Can. Ass. Palynols Newsl.*, vol. 19, no. 1, pp. 10-11, port.]

- 1992 M. Aldrich & W.A.S. Sarjeant. Presentation of the History of Geology Division Award to William Antony Swithin Sarjeant. *Bull. geol. Soc. Am.*, vol. 104, no. 3, pp. 367-369, port.

- 1992 U.B. Marvin. History of Geology Award to William A.S. Sarjeant, University of Saskatchewan. *INHIGEO Newsl.*, no. 24, pp. 39-41.

- 1992 W.A.S. Sarjeant. William Antony [sic] Swithin Sarjeant (p. 15-16, port.). In: J.K. Lentin, ed., Where are they now, 25 years later. *Am. Ass. stratigr. Palynols Newsl.*, vol. 24, no. 2.

- 1991 [W. Eyre]. The amazing Professor Sarjeant. *Green and White*, Saskatoon, Spring, pp. 4-6, 3 illus. (incl. port.).

Schiller, Josef (1877-1960)

Studies of living phytoplankton-dinoflagellates, in particular.

- 1961 F. Wawrik. In memoriam Professor Dr. Josef Schiller. *Rev. algol.*, pp. 229-235, port.

Stover, Lewis E. (1925-1993)

- 1993 R. Harland. Dr. Lewis E. Stover. *Br. Micropalaeont.*, no. 49, pp. 18-19.

- 1993 A.D. Partridge. Lew Stover's Australian connection. *Am. Ass. strat. Palynols Newsl.*, vol. 26, pp. 9-10.

- 1993 G.L. Williams. Dr. Lewis E. Stover. *Palynols*, vol. 16, no. 1, pp. 4-5, port.

- 1993 G.L. Williams. Lewis E. Stover 1925-1993. *Am. Ass. strat. Palynols Newsl.*, vol. 26, no. 2, pp. 7-8, port.
- 1989 [H.A. Leffingwell & L.E. Stover]. American Association of Stratigraphic Palynologists Medal for Scientific Excellence is presented to Lewis E. Stover. *Palynology*, vol. 13, pp. 1-2, port.

Taugourdeau-Lantz, Josette, (1935-1989)

Published observations of Jurassic dinoflagellates.

- 1989 G. Lachkar. Josette Taugourdeau-Lantz 1935-1989. *Géochronique*, no. 32, p. 29.
- 1991 [J. Didier]. Josette Taugourdeau-Lantz (1935-1989). *Bull. Soc. géol. Fr., C.r. somm.Séanc.* (1990), *Supp.*, vol. 162, no. 4, p. 19.

Timofeyev, Boris Vasililyevich (1916-?1982)

- 1968 Anon. Boris Vasililyevich Timofeev (p. 144-146). In: Anon., *Imena vologzhan v nauke i tehnike*. Vologda, USSR: Severo-Zapadnoe Kzizhnoe Izdatel.

Tyler, Stanley Allen (1906-1963)

Jointly with E.S. Barghoorn, he reported the earliest known microfossils, including cryptarchs, from the Proterozoic strata of Canada.

- 1965 R.W. Marsden. Memorial to Stanley Allen Tyler (1906-1963). *Proc. geol. Soc. Am.*, pp. P27-P30, port.

Vozzhennikova, Tamara F.

- 1985 J.K. Lentin. "Dino Travels". *Can. Ass. Palynols Newsl.*, vol. 8, no. 2 (winter), pp. 13-14.

Walton, Huon Seward (1920-1981)

Wrote on Canadian Cambrian acritarchs.

- 1982 B.G.T. van Helden. In memoriam. Huon Seward Walton 1920-1981. *Am. Ass. strat. Palynols Newsl.*, vol. 15, no. 1, p. 1.
- 1981 M.S. Stanton. Huon Seward Walton 1920-1981. *Bull. Can. Petrol. Geol.*, vol. 29, no. 4, pp. 638-639, port.

Wetzel, Otto Christian August (1891-1971)

- 1998 L.F. Dietz & W.A.S. Sarjeant. The dreamer and the pragmatist: A joint biography of Walter Wetzel and Otto Wetzel, geologists and micropaleontologists. *Micropaleontology*, vol. 4, no. 1 [in press: 72 ms. pp., 9 figs.].
- 1971 W. Wetzel. Otto Wetzel †. 1.2.1891 - 20.8.1971. *Meyniana*, vol. 21, 1 unnumb. p.

Wetzel, Konrad Alois Siegmund Karl Walter (1887-1978)

- 1998 L.F. Dietz & W.A.S. Sarjeant. The dreamer and the pragmatist: A joint biography of Walter Wetzel and Otto Wetzel, geologists and micropaleontologists. *Micropaleontology*, vol. 4, no. 1 [in press: 72 ms. pp., 9 figs.].
- 1982 W. Prange. Wetzel, Konrad Alois Siegmund Karl *Walter*, geb. 27.2.1887 Hannover, gest. 17.4.1978 Kiel; ev. - Geologe, Paläontologe. In: *Biographisches Lexikon für Schleswig-Holstein und Lübeck*, Neumünster, Germany: Karl Wachholtz Verlag, vol. 6, pp. 301-303.
- 1978 W.W. Ders. Walter Wetzel †. *Nachr. dt. geol. Ges.*, vol. 19, pp. 67-69.
- 1978 H. Böger. In memoriam, Walter Wetzel 27 Februar 1887 - 17. April 1978. *Christina Albertina*, new series, vol. 9, pp. 193-194.
- 1978 E. Seibold. Walter Wetzel †. 27.2.1887 - 17.4.1978. *Meyniana*, vol. 30, pp. 1-6.

White, Henry Hopley (1790-1877)

Early studies of English "xanthidia".

- 1991 W.A.S. Sarjeant. Henry Hopley White (1790-1877) and the early researches on Chalk "xanthidia" by Clapham microscopists. *J. Micropalaeont.*, vol. 10, no. 1, pp. 83-93, figs. 1-6 (1 port).

Wiggens, Virgil D.

- 1991 B.G.T. van Helden. Retirement of two prominent geologists. *Can. Ass. Palynols Newsl.*, vol. 14, no. 2, pp. 18-20, 2 ports.

Williams, Graham Lee

1996 Anon. American Association of Stratigraphic Palynologists Medal of Scientific Excellence Awards. Dedication to Graham Lee Williams. - *Am. Ass. strat. Palynols Newsl.*, vol. 29, no. 3, pp. 6-7, port.

Wilson, Leonard R.

Wrote on Permian acritarchs. His joint work with W.S. Hoffmeister (1955) might have revolutionized dinoflagellate studies, but was published only in abstract.

1995 R.M. Kosanke & A.T. Cross. Leonard

Richard Wilson (1906-): Palynologist, paleobotanist, and geologist. In: P.C. Lyons, E. Darrah Morey & R.H. Wagner, eds., *Historical Perspectives of Early Twentieth Century Carboniferous Paleobotany. In memory of William Culp Darrah. Mems. geol. Soc. Am.*, no. 185, pp. 237-244.

1975 Anon. American Association of Stratigraphic Palynologists Honorary Membership Awards, 1975. Leonard R. Wilson. *Palynology*, vol. 1, pp. 187-188, port.

Plates 1-14

Unless otherwise indicated, the pictures from Plate 4-lower to Plate 14 were made, and are owned, by William A.S. Sarjeant

Plate 1

upper left

upper right

middle left

middle right

lower left

lower right

Early workers on fossil dinoflagellates

Christian G. Ehrenberg (1795-1876)

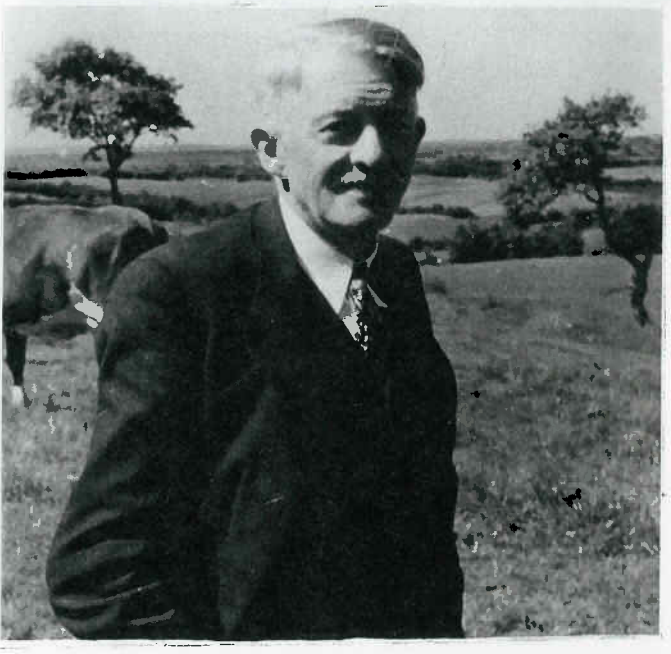
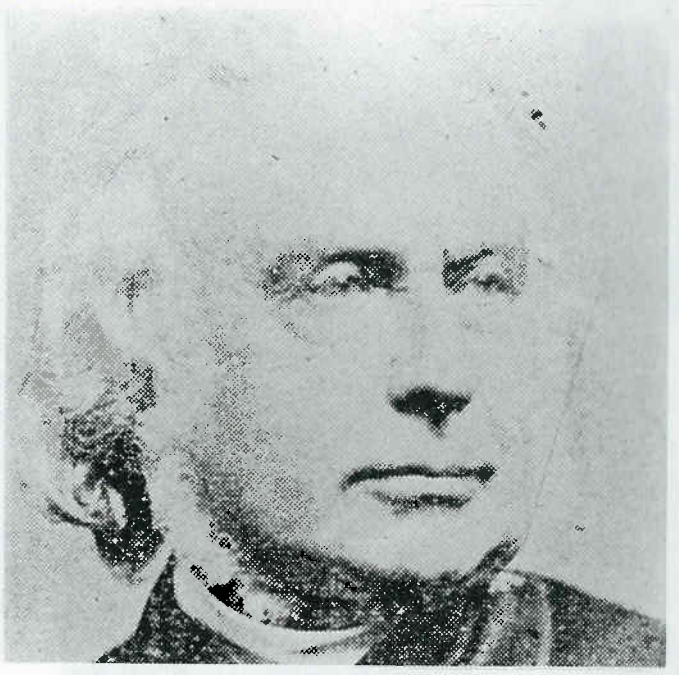
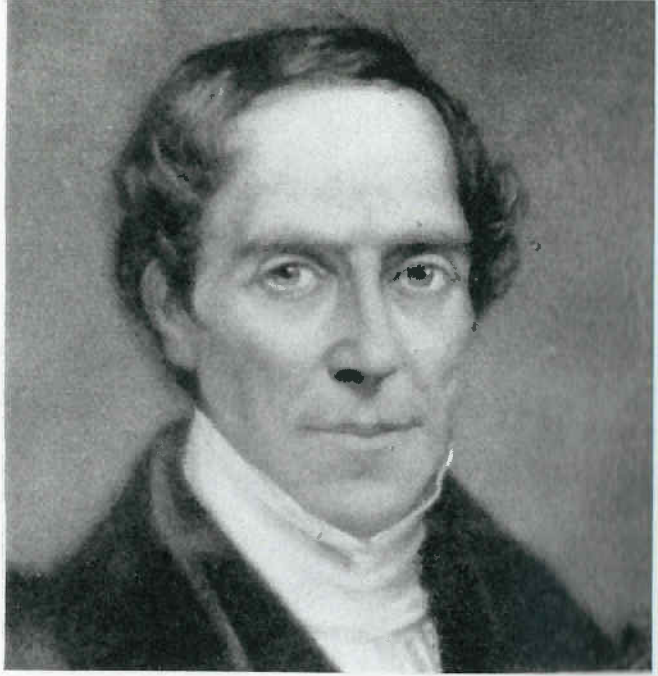
Gideon Algernon Mantell (1790-1852)

Henry Hopley White (1790-1876). Shown in barrister's outfit. Courtesy of Middle Temple, London.

Rev. Joseph B. Reade (1801-1870)

Otto Wetzel (1891-1971), standing in front of an aeroplane, ca. 1955. Courtesy of Dr. Werner Prange.

Walter Wetzel (1887-1978), standing in a field near Kiel, 1950. Courtesy of Dr. Werner Prange.



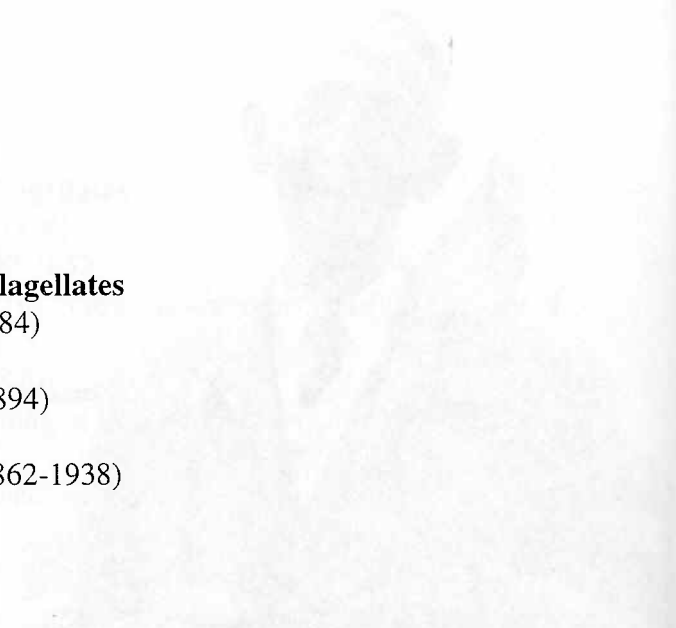
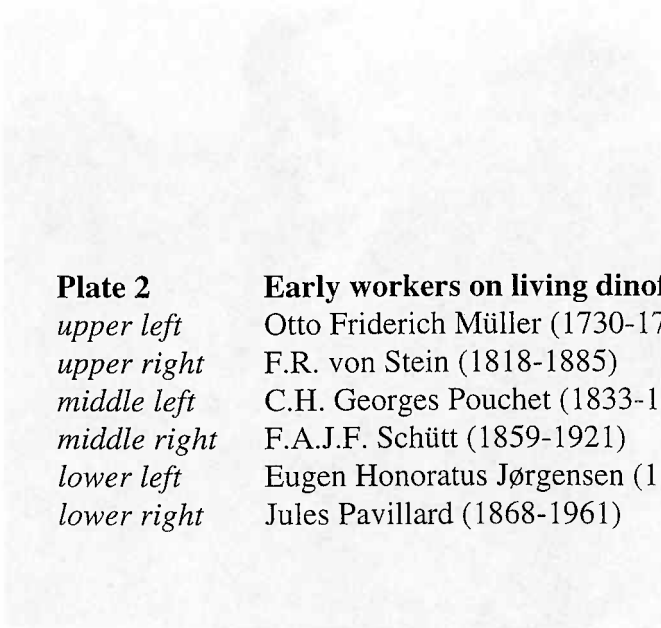
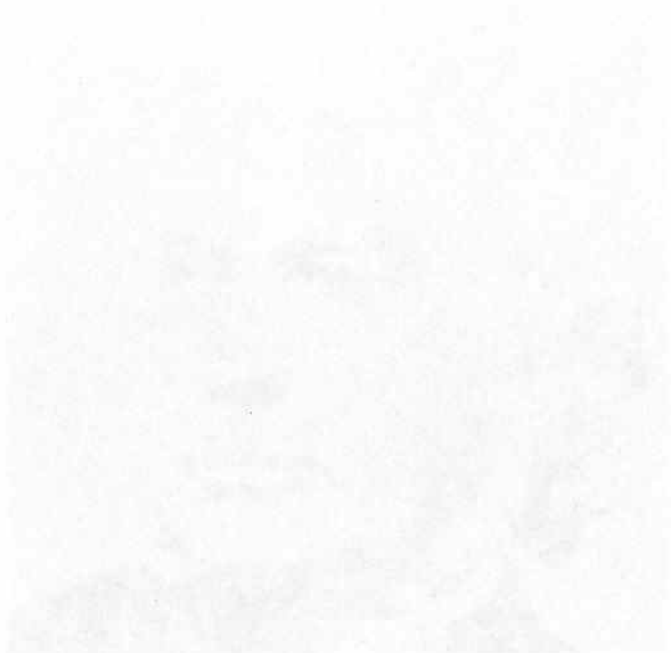


Plate 2

upper left

upper right

middle left

middle right

lower left

lower right

Early workers on living dinoflagellates

Otto Friderich Müller (1730-1784)

F.R. von Stein (1818-1885)

C.H. Georges Pouchet (1833-1894)

F.A.J.F. Schütt (1859-1921)

Eugen Honoratus Jørgensen (1862-1938)

Jules Pavillard (1868-1961)



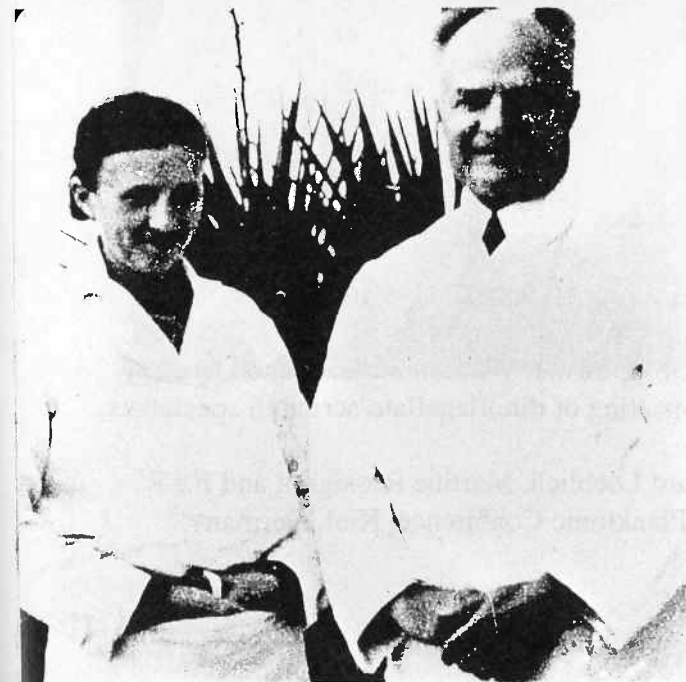
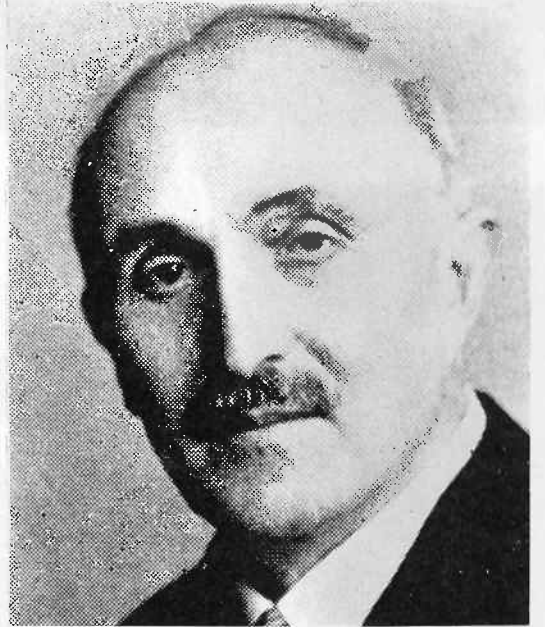
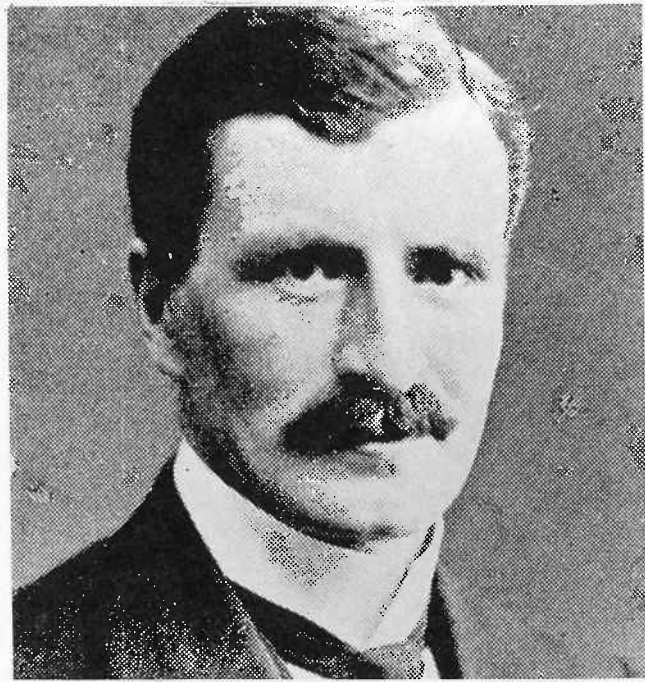


Plate 3

upper left
upper right
middle left
middle right
lower left
lower right

Early workers on living dinoflagellates

Ove Poulsen
Marie V. Lebour (1876-1971)
Charles Atwood Kofoid (1865-1947)
Josef Schiller (1877-1960)
Berthe Biecheler and Edouard Chatton (1883-1947)
Tohru H. Abé (1899-1971) in the last months of his life.



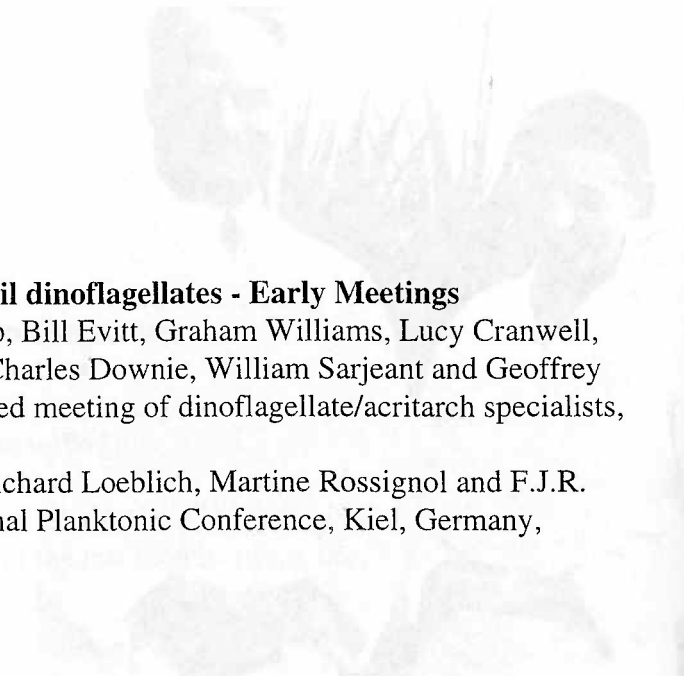
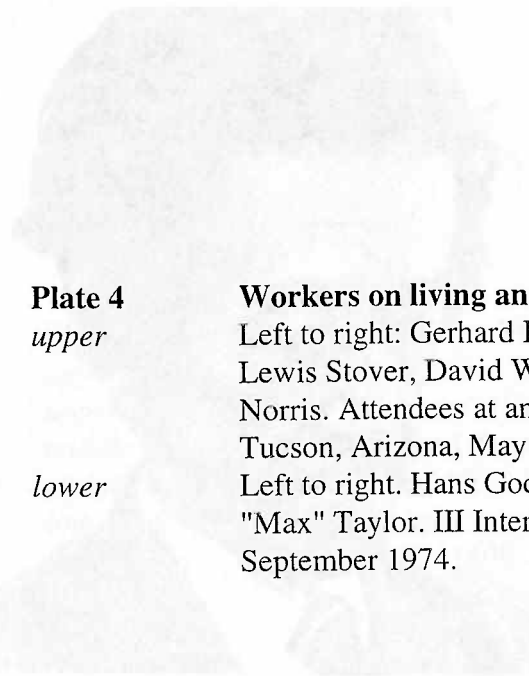


Plate 4
upper

Workers on living and fossil dinoflagellates - Early Meetings

Left to right: Gerhard Kremp, Bill Evitt, Graham Williams, Lucy Cranwell, Lewis Stover, David Wall, Charles Downie, William Sarjeant and Geoffrey Norris. Attendees at an invited meeting of dinoflagellate/acritarch specialists, Tucson, Arizona, May 1968.

lower

Left to right. Hans Gocht, Richard Loeblich, Martine Rossignol and F.J.R. "Max" Taylor. III International Planktonic Conference, Kiel, Germany, September 1974.





Plate 5

Early 20th-century fossil dinoflagellate workers

upper left

Georges Victor Deflandre (1897-1973) and Marthe Emilie Françoise Deflandre, née Rigaud (1902-1987), in their office, Laboratoire de Micro-paléontologie of the École Pratique des Hautes Études, Paris, March 1961.

upper right

Maria Lejeune-Carpentier (1910-1995), in her office/laboratory at the Museum of Zoology, University of Liège, Belgium, April 1969.

middle left

Alfred Eisenack (1891-1982). Reutlingen, south Germany, August 1963.

middle right

Left to right: William Evitt and Lewis E. Stover (1925-1993). II International Congress on Palynology, Utrecht, The Netherlands, August 1966.

lower left

Leonard Richard Wilson. Reading Abbey, England, August 1962.

lower right

Geoff Norris and Wayne Brideaux. Penrose Meeting on Modern and Fossil Dinoflagellates, Denver, Colorado, April 1978.



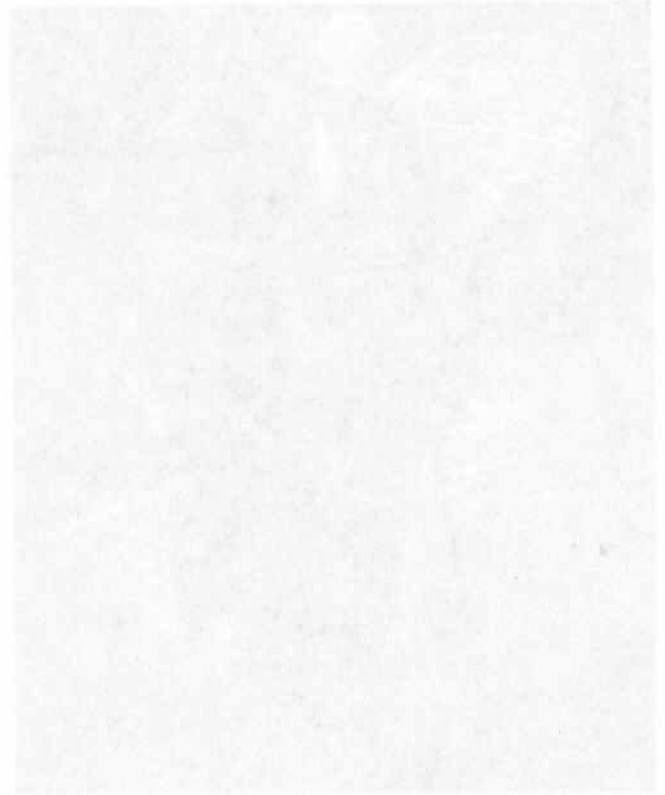


Plate 6

Later 20th-century fossil dinoflagellate and acritarch workers

upper left

Charles Downie. V International Palynological Conference, Cambridge, England, July 1980.

upper right

Hans Gocht, in his office at the Geological Institute in Tübingen, Germany, November 1979.

middle left

Isabel Clifton Cookson (1893-1973). Courtesy of Mary Dettmann.

middle right

Norman Francis Hughes (1918-1994). "The Bishop" in action at the II International Congress on Palynology, Utrecht, The Netherlands, September 1966.

lower left

Left to right: André Combaz and François Calandra. Meeting of the Sous-Commission Acritarches of the Commission Internationale sur le Microflore du Paléozoïque, Bordeaux, France, November 1964.

lower right

Marcel Millioud. Penrose Meeting on Modern and Fossil Dinoflagellates, Denver, Colorado, April 1978.



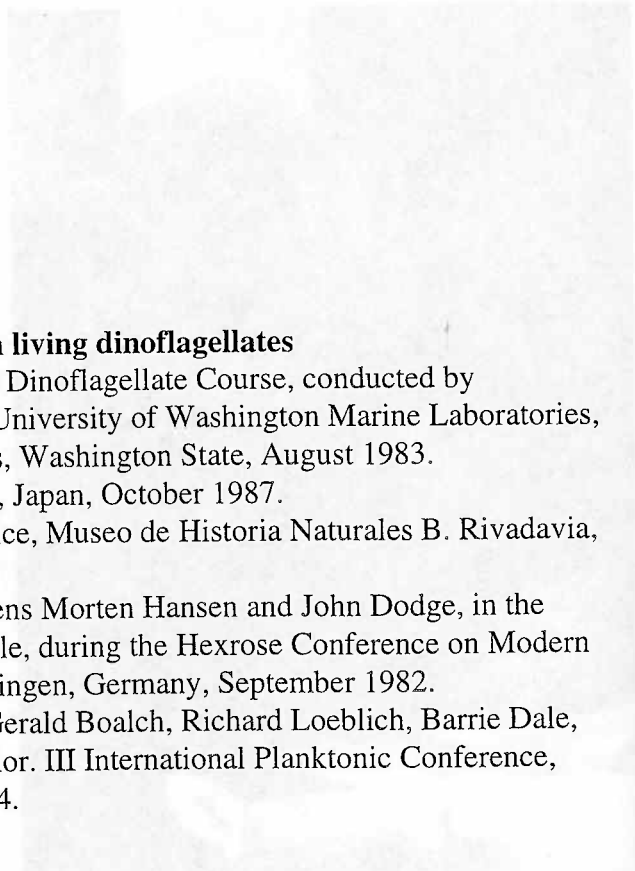


Plate 7
upper left

Later 20th-century workers on living dinoflagellates

Don Anderson. First Temperate Dinoflagellate Course, conducted by Dr. F.J.R. "Max" Taylor at the University of Washington Marine Laboratories, Friday Harbor, San Juan Islands, Washington State, August 1983.

upper right

Kiyoshi Takahashi. Owakudani, Japan, October 1987.

middle left

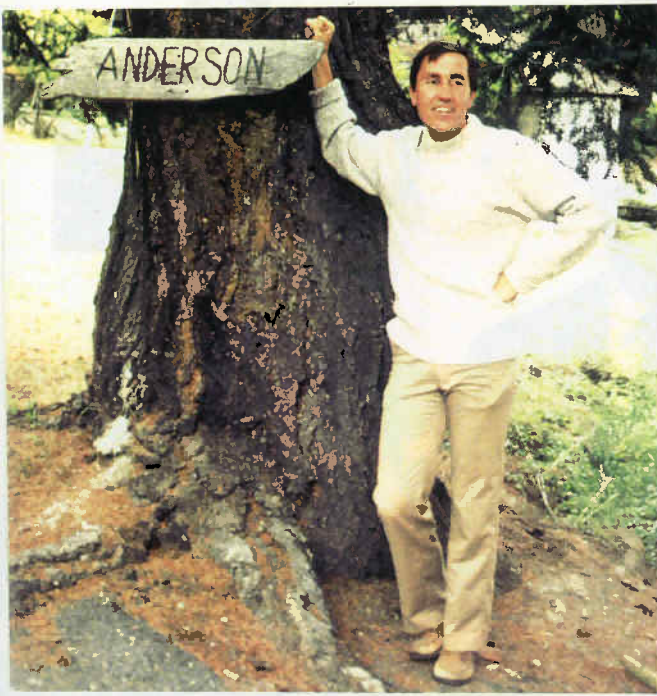
Sergio Archangelsky, in his office, Museo de Historia Naturales B. Rivadavia, Buenos Aires, July 1993.

middle right

Left to right: Stefan Piasecki, Jens Morten Hansen and John Dodge, in the restaurant at Hohenzollern Castle, during the Hexrose Conference on Modern and Fossil Dinoflagellates, Tübingen, Germany, September 1982.

bottom

Left to right: Enrique Balech, Gerald Boalch, Richard Loeblich, Barrie Dale, H.A. von Stosch, and Max Taylor. III International Planktonic Conference, Kiel, Germany, September 1974.



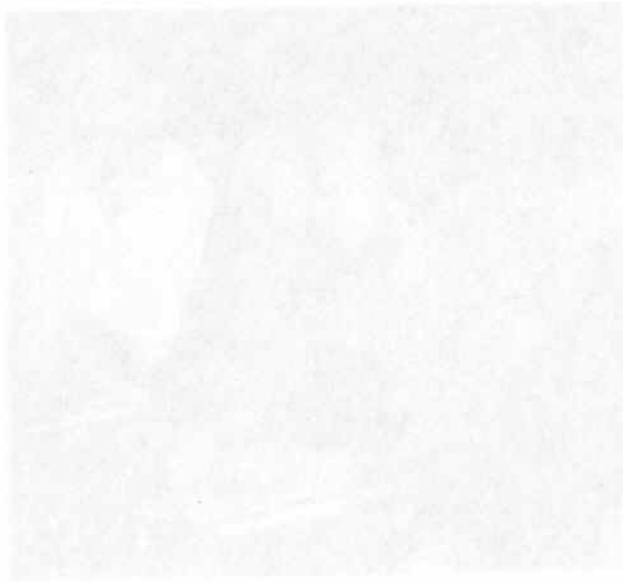


Plate 8

Later 20th-century workers on living dinoflagellates

top

Left to right: David Wall, Bartholomew Nagy and Barrie Dale. II International Congress on Palynology, Utrecht, The Netherlands, September 1966. [Nagy had recently jointly reported micro-organisms from the Orgueil meteorite.]

middle left

Saburo Toriumi. Owakudani, Japan, October 1985.

middle right

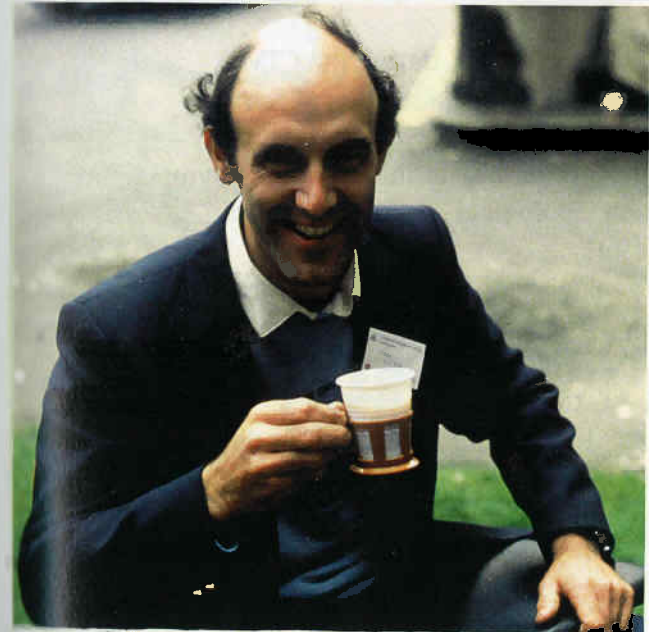
Marion Himes and Carl Beam. First Temperate Dinoflagellate Course, conducted by Dr. F.J.R. "Max" Taylor at the University of Washington Marine Laboratories, Friday Harbor, San Juan Islands, Washington State, August 1983.

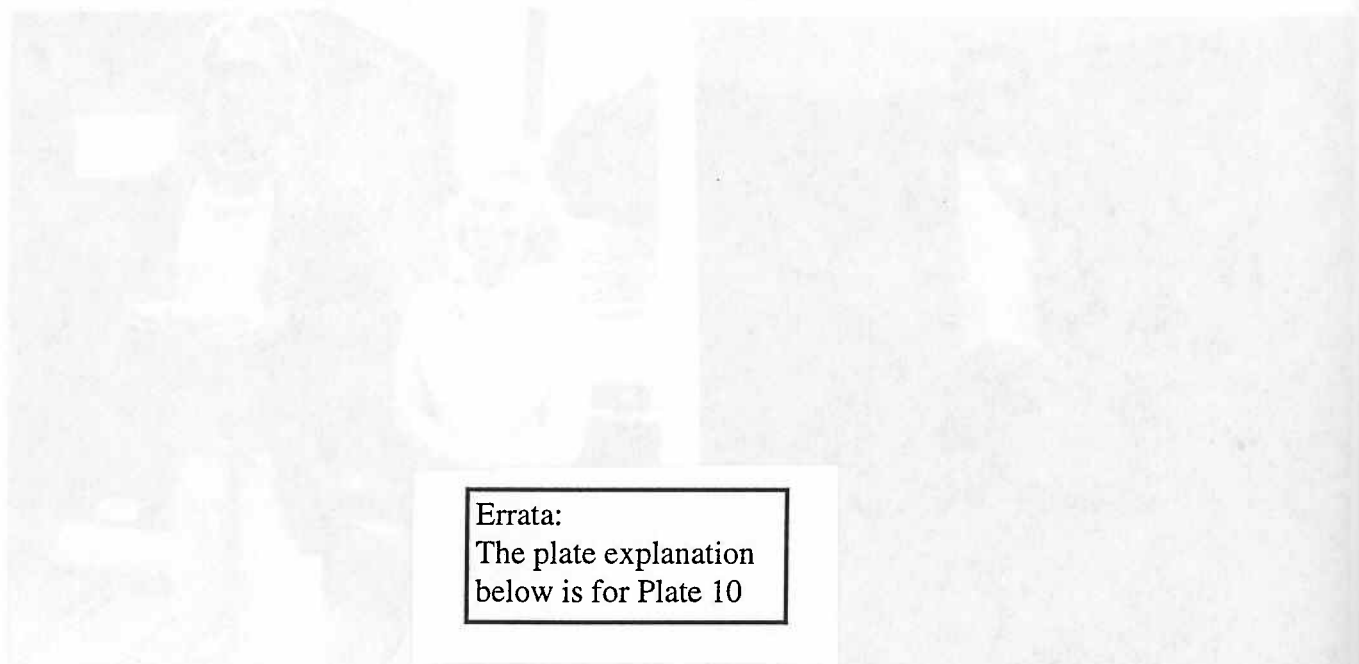
lower left

Chris Reid. VII International Palynological Conference, Cambridge, England, July 1980.

lower right

Kenichi Harada. Yamagata University, Yamagata, Japan, October 1985.





Errata:
The plate explanation
below is for Plate 10

Plate 9 Acritarch specialists

upper left Fritz Cramer. Geological Society of America Meeting, New Orleans, Louisiana, November 1967.

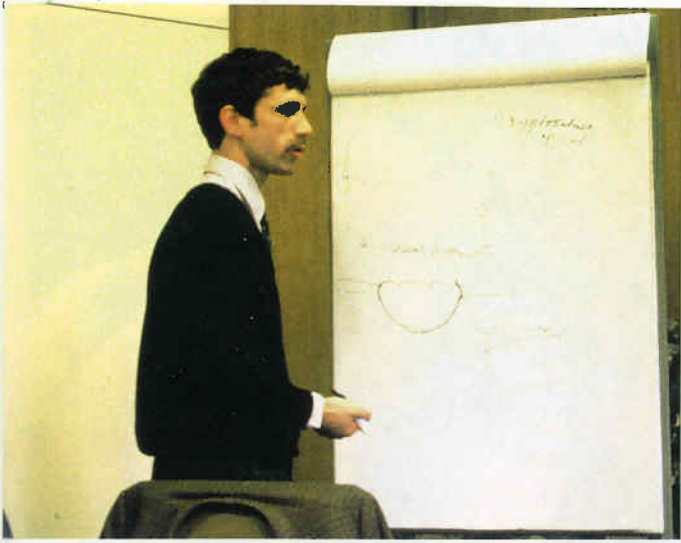
upper right Florentin Paris, in cafeteria of Geological Survey, during the CIMP Symposium on Acritarchs and Chitinozoa, British Geological Survey, Keyworth, Nottingham, England, September 1991.

middle left Hanna Górká, in cafeteria of Geological Survey, during the CIMP Symposium on Acritarchs and Chitinozoa, British Geological Survey, Keyworth, Nottingham, England, September 1991.

middle right Göran Kjellström, in the palynological laboratory, Geological Survey of Sweden, Solna, Sweden, September 1971.

lower left Geoffrey Playford, leading a field excursion, during the VII International Palynological Congress, Brisbane, Australia, August 1988.

lower right Michel Vanguetstaine, in cafeteria of Geological Survey, during the CIMP Symposium on Acritarchs and Chitinozoa, British Geological Survey, Keyworth, Nottingham, England, September 1991.





Errata:
The plate explanation
below is for Plate 9

Plate 10

upper left

Early acritarch workers

T. Richard Lister. Sous-Commission Acritarches of the Commission International sur le Microflore du Paléozoïque Meeting, Liège, Belgium, April 1969.

upper right

Francine Martin (1937-1994), in her office, Institut Royale, Brussels, Belgium, November 1979.

middle left

Frank Staplin. II International Congress on Palynology, Utrecht, The Netherlands, September 1966.

middle right

Jan Jansonius. VII International Palynological Congress, Brisbane, Australia, September 1988.

lower left

Gonzalo Vidal and Ma gorzata Moczydowska. VII International Palynological Congress, Brisbane, Australia, September 1988.

lower right

Vavrdová, Milada, in cafeteria of Geological Survey, during the CIMP Symposium on Acritarchs and Chitinozoa, British Geological Survey, Keyworth, Nottingham, England, September 1991.

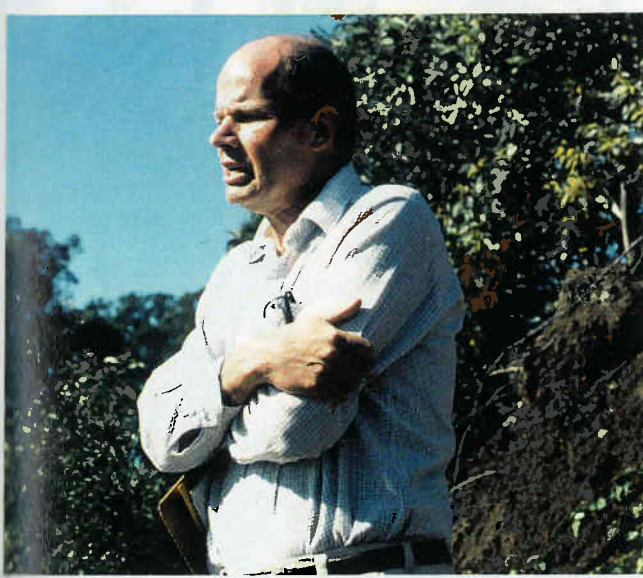




Plate 11

Later 20th-century dinoflagellate workers

upper left

Tamara Vozzhennikova. International Geological Congress, Moscow, Russia, 1984. Courtesy of Judi K. Lentin.

upper right

Walter Riegel, in his office at the University of Göttingen, Germany, November 1979.

middle left

Left to right: Roger Davey, William Sarjeant, and Geoffrey Eaton. II International Planktonic Conference, Rome, Italy, August 1970.

middle right

Dennis Burger, on the Molunglo River at Casuarina Sands, Australia. Excursion following the VII International Palynological Congress, Brisbane, Australia, September 1988.

lower left

Left to right: Domenico Corradini and Enrico Serpagli. Modena, northern Italy, September 1987.

lower right

Paul von Benedek, standing by giant ammonite outside the Senckenberg Museum, Frankfurt-am-Main, Germany, November 1979.

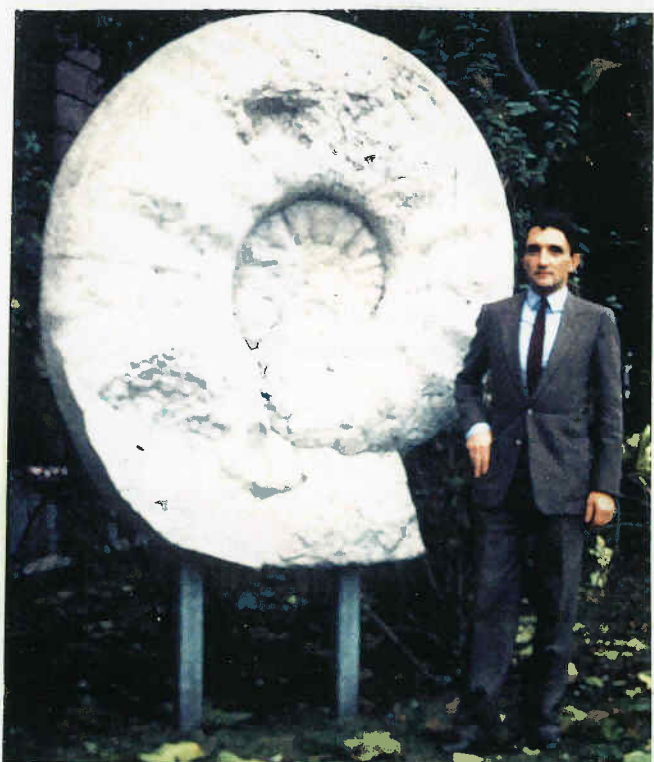
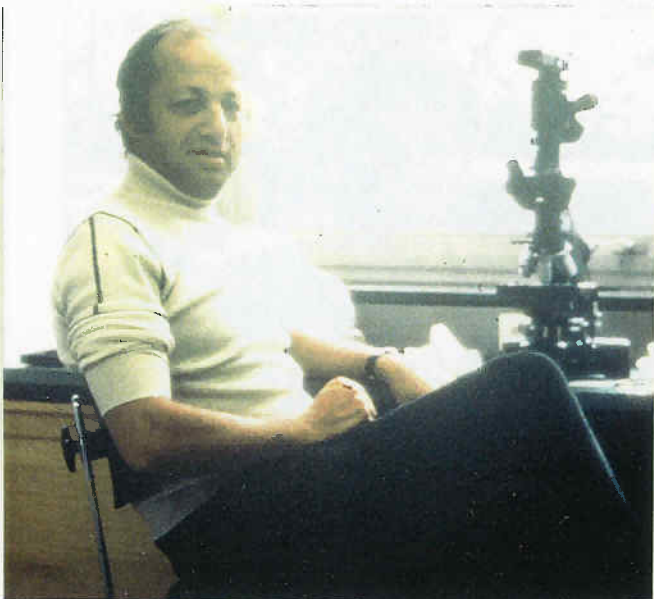


Plate 12

upper left

upper right

middle left

middle right

bottom

Later 20th-century fossil dinoflagellate workers

Left to right: Nicolae Balte with Srinivasan Venkatachala. II International Palynological Congress, Utrecht, Netherlands, September 1966.

Alan Partridge. VII International Palynological Congress, Brisbane, Australia, September 1988.

Lucy Costa and Geoff Eaton, examining dinoflagellate holotypes. III International Planktonic Conference, Kiel, Germany, September 1974.

Nikos Ioannides, in his office at the Institute of Sedimentology and Petroleum Geology, Geological Survey of Canada, Calgary, Alberta, Canada, November 1980.

Left to right: Robin Helby, Joyce Lucas-Clark and Raimond Below. VII International Palynological Congress, Brisbane, Australia, September 1988.

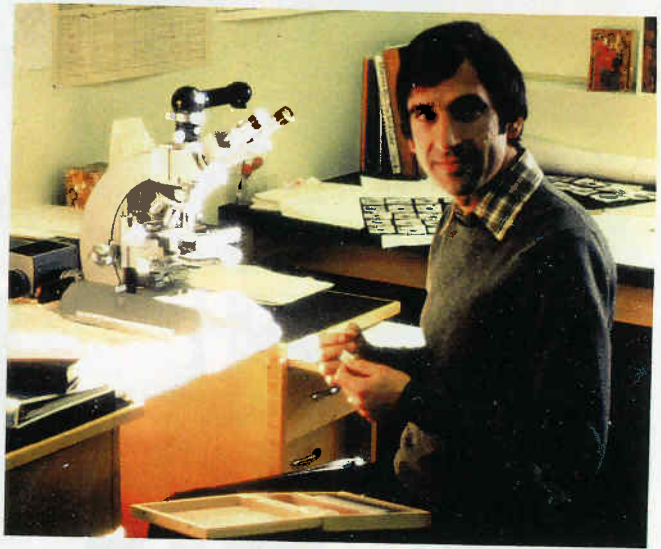
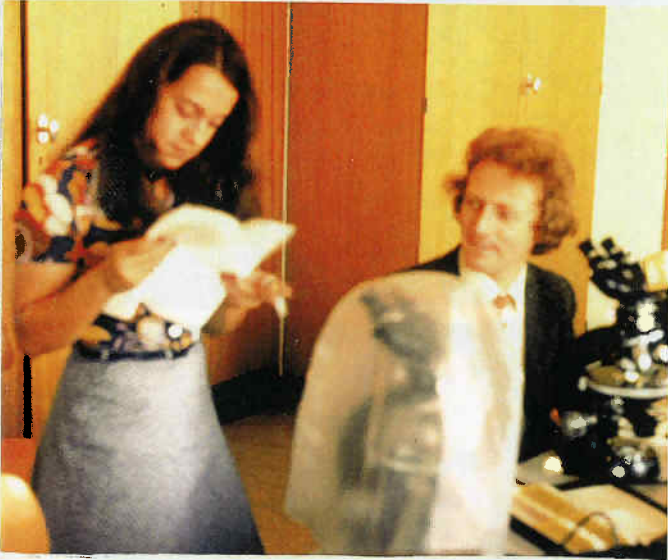




Plate 13 **Later 20th-century fossil dinoflagellate workers**

top Javier Helenes [centre] and Abbas Kimyai [right], with another Iranian palynologist and with lobsters at Fenno House, during the International Conference on Modern and Fossil Dinoflagellates, Woods Hole, Massachusetts, April 1989.

middle left Waldemaar Herengreen. VII International Palynological Congress, Brisbane, Australia, September 1988.

middle right John Filatoff. VII International Palynological Congress, Brisbane, Australia, September 1988.

lower left Mirta Quattrocchio, in her office, Laboratorio de Palinología, Cátedra de Geología, Departamento de Geología, Universidad Nacional del Sur, Bahía Blanca, Argentina, July 1993.

lower right Virgil Wiggins. VII International Palynological Congress, Brisbane, Australia, September 1988.





Plate 14

Later 20th-century fossil dinoflagellate workers

upper left

Left to right: Carmel Coyne, Naresh Mehrotra and Jaishree Sharma, on bluff overlooking South Saskatchewan River, Saskatoon, Saskatchewan, Canada, October 1983.

upper right

Svein Manum, sitting on a rock at Fountainstown, Ireland, during an excursion following the AASP/CIMP Joint Meeting, Dublin, Ireland, September 1982.

middle left

Nils Poulsen and Anne de Vernal on trip to Edgartown, Martha's Vineyard, during the Fourth International Conference on Modern and Fossil Dinoflagellates, Woods Hole, Massachusetts, April 1989.

middle right

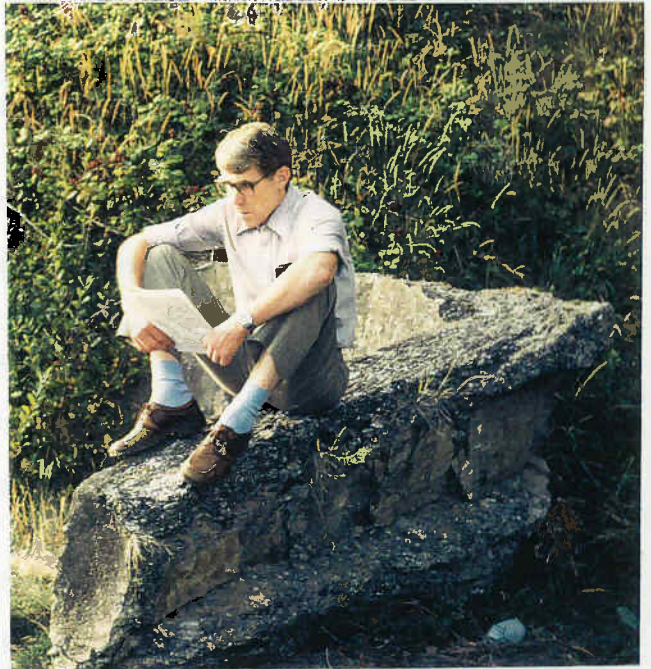
Rob Fensome. V International Palynological Conference, Cambridge, England, July 1980.

lower left

Dan N. Beju (1931-1981). V International Palynological Conference, Cambridge, England, July 1980.

lower right

Sarah Pierce Damassa and David Goodman, holding a "stuffed" dinoflagellate at the Fourth International Conference on Modern and Fossil Dinoflagellates, Woods Hole, Massachusetts, April 1989.



- 1974 1 Klokk, T. Myrundersøkelser i Trondheimsregionen i forbindelse med den norske myrreservatplanen. 30 s. kr 20,-
- 2 Bretten, S. Botaniske undersøkelser i forbindelse med generalplanarbeidet i Snillfjord kommune, Sør-Trøndelag. 24 s. utgått
- 3 Moen, A. & T. Klokk. Botaniske verneverdier i Tydal kommune, Sør-Trøndelag. 15 s. utgått
- 4 Baadsvik, K. Registreringer av verneverdig strandengvegetasjon langs Trondheimsfjorden sommeren 1973. 65 s. kr 40,-
- 5 Moen, B.F. Undersøkelser av botaniske verneverdier i Rennebu kommune, Sør-Trøndelag. 52 s. utgått
- 6 Sivertsen, S. Botanisk befaring i Åbjøravassdraget 1972. 20 s. utgått
- 7 Baadsvik, K. Verneverdig strandbergvegetasjon langs Trondheimsfjorden - foreløpig rapport. 19 s. kr 20,-
- 8 Flatberg, K. I. & B. Sæther. Botanisk verneverdige områder i Trondheimsregionen. 51 s. utgått
- 1975 1 Flatberg, K. I. Botanisk verneverdige områder i Rissa kommune, Sør-Trøndelag. 45 s. utgått
- 2 Bretten, S. Botaniske undersøkelser i forbindelse med generalplanarbeidet i Åfjord kommune, Sør-Trøndelag. 51 s. kr 40,-
- 3 Moen, A. Myrundersøkelser i Rogaland. Rapport i forbindelse med den norske myrreservatplanen. 127 s. kr 40,-
- 4 Hafsten, U. & T. Solem. Naturhistoriske undersøkelser i Forradalsområdet - et subocceanisk, høytliggende myrområde i Nord-Trøndelag. 46 s. kr 20,-
- 5 Moen, A. & B. F. Moen. Vegetasjonskart som hjelpemiddel i arealplanleggingen på Nerskøgen, Sør-Trøndelag. 168 s., 1 pl. kr 60,-
- 1976 1 Aune, E. I. Botaniske undersøkinger i samband med generalplanarbeidet i Hemne kommune, Sør-Trøndelag. 76 s. kr 40,-
- 2 Moen, A. Botaniske undersøkelser på Kvikne i Hedmark, med vegetasjonskart over Innerdalen. 100 s., 1 pl. utgått
- 3 Flatberg, K. I. Klassifisering av flora og vegetasjon i ferskvann og sump. 39 s. kr 20,-
- 4 Kjølvik, L. Botaniske undersøkelser i Snåsa kommune, Nord-Trøndelag. 55 s. kr 40,-
- 5 Hagen, M. Botaniske undersøkelser i Grøvuområdet i Sunndal kommune, Møre og Romsdal. 57 s. kr 40,-
- 6 Sivertsen, S. & Å. Erlandsen. Foreløpig liste over Basidiomycetes i Rana, Nordland. 15 s. kr 20,-
- 7 Hagen, M. & J. Holten. Undersøkelser av flora og vegetasjon i et subalpint område, Rauma kommune, Møre og Romsdal. 82 s. kr 40,-
- 8 Flatberg, K. I. Myrundersøkelser i Sogn og Fjordane og Hordaland i forbindelse med den norske myrreservatplanen. 112 s. kr 40,-
- 9 Moen, A., L. Kjølvik, S. Bretten, S. Sivertsen & B. Sæther. Vegetasjon og flora i Øvre Forradalsområdet i Nord-Trøndelag, med vegetasjonskart. 135 s., 2 pl. kr 60,-
- 1977 1 Aune, E. I. & O. Kjærem. Botaniske undersøkinger ved Vefnsavassdraget, med vegetasjonskart. 138 s. 4 pl. kr 60,-
- 2 Sivertsen, I. Botaniske undersøkelser i Tydal kommune, Sør-Trøndelag. 49 s. kr 20,-
- 3 Aune, E. I. & O. Kjærem. Vegetasjon i planlagte magasin i Bjøllådalen og Stormdalen, med vegetasjonskart i 1:10 000, Saltfjellet/Svartisen-prosjektet. Botanisk delrapport nr. 1. 65 s., 2 pl. kr 60,-
- 4 Baadsvik, K. & J. Suul (red.). Biologiske registreringer og verneinteresser i Litlvatnet, Agdenes kommune i Sør-Trøndelag. 55 s. kr 40,-
- 5 Aune, E. I. & O. Kjærem. Vegetasjonen i Saltfjellområdet, med vegetasjonskart Bjøllådal 2028 II i 1:50 000. Saltfjellet/Svartisen-prosjektet. Botanisk delrapport nr. 2. 75 s., 1 pl. kr 60,-
- 6 Moen, J. & A. Moen. Flora og vegetasjon i Tromsdalen i Verdal og Levanger, Nord-Trøndelag, med vegetasjonskart. 94 s., 1 pl. kr 60,-
- 7 Frisvoll, A. A. Undersøkelser av mosefloraen i Tromsdalen i Verdal og Levanger, Nord-Trøndelag, med hovedvekt på kalkmosefloraen. 37 s. kr 20,-
- 8 Aune, E. I., O. Kjærem & J. I. Koksvik. Botaniske og ferskvassbiologiske undersøkinger ved og i midtre Rismålsvatnet, Rødøy kommune, Nordland. 17 s. kr 20,-

- 1978 1 Elven, R. Vegetasjonen ved Flatisen og Østerdalsisen, Rana, Nordland, med vegetasjonskart over Vesterdalen i 1:15 000. Saltfjellet/Svartisen-prosjektet. Botanisk delrapport nr. 3. 83 s., 1 pl. kr 60,-
- 2 Elven, R. Botaniske undersøkelser i Rien-Hyllingen-området, Røros, Sør-Trøndelag. 53 s. kr 40,-
- 3 Aune, E. I. & O. Kjærem. Vegetasjonsundersøkingar i samband med planene for Saltdal-, Beiarn-, Stor-Glomfjord- og Melfjordutbygginga. Saltfjellet/Svartisen-prosjektet. Botanisk delrapport nr. 4. 49 s. kr 20,-
- 4 Holten, J. I. Verneverdige edellaauvskoger i Trøndelag. 199 s. kr 40,-
- 5 Aune, E. I. & O. Kjærem. Floraen i Saltfjellet/Svartisen-området. Saltfjellet/Svartisen-prosjektet. Botanisk delrapport nr. 5. 86 s. kr 40,-
- 6 Aune, E. I. & O. Kjærem. Botaniske registreringar og vurderingar. Saltfjellet/Svartisen-prosjektet. Botanisk sluttrapport. 78 s., 4 pl. kr 60,-
- 7 Frisvoll, A. A. Mosefloraen i området Borrsåsen-Barøya-Nedre Tynes ved Levanger. 82 s. kr 40,-
- 8 Aune, E. I. Vegetasjonen i Vassfaret, Buskerud/Oppland med vegetasjonskart 1:10 000. 67 s., 6 pl. kr 60,-
- 1979 1 Moen, B. F. Flora og vegetasjon i området Borrsåsen-Barøya-Kattangen. 71 s., 1 pl. kr 40,-
- 2 Gjærevoll, O. Oversikt over flora og vegetasjon i Oppdal kommune, Sør-Trøndelag. 44 s. kr 20,-
- 3 Torbergsen, E. M. Myrundersøkelser i Oppland i forbindelse med den norske myrreservatplanen. 68 s. kr 40,-
- 4 Moen, A. & M. Selnes. Botaniske undersøkelser på Nord-Fosen, med vegetasjonkart. 96 s., 1 pl. kr 60,-
- 5 Kofoed, J. -E. Myrundersøkingar i Hordaland i samband med den norske myrreservatplanen. Supplerande undersøkingar. 51 s. kr 40,-
- 6 Elven, R. Botaniske verneverdier i Røros, Sør-Trøndelag. 158 s., 1 pl. kr 60,-
- 7 Holten, J. I. Botaniske undersøkelser i øvre Sunndalen, Grødalen, Lindalen og nærliggende fjellstrøk. Botaniske undersøkelser i 10-årsverna vassdrag. Delrapport 1. 32 s. kr 20,-
- 1980 1 Aune, E. I., S. Aa. Hatlelid & O. Kjærem. Botaniske undersøkingar i Kobbelv- og Hellemo-området, Nordland med vegetasjonskart i 1:10 000. 122 s., 1 pl. kr 60,-
- 2 Gjærevoll, O. Oversikt over flora og vegetasjon i Trollheimen. 42 s. kr 20,-
- 3 Torbergsen, E. M. Myrundersøkelser i Buskerud i forbindelse med den norske myrreservatplanen. 104 s. kr 40,-
- 4 Aune, E. I., S. Aa. Hatlelid & O. Kjærem. Botaniske undersøkingar i Eiterådalen, Vefsn og Krutvatnet, Hattfjelldal. 58 s., 1 pl. kr 60,-
- 5 Baadsvik, K., T. Klokk & O. I. Rønning (red.). Fagmøte i vegetasjonsøkologi på Kongsvoll, 16. - 18.3 1980. 279 s. kr 60,-
- 6 Aune, E. I. & J. I. Holten. Flora og vegetasjon i vestre Grødalen, Sunndal kommune, Møre og Romsdal. 40 s., 1 pl. kr 60,-
- 7 Sæther, B., T. Klokk & H. Taagvold. Flora og vegetasjon i Gaulas nedbørfelt, Sør-Trøndelag og Hedmark. Botaniske undersøkelser i 10-årsverna vassdrag. Delrapport 2. 154 s., 3 pl. kr 60,-
- 1981 1 Moen, A. Oppdragsforskning og vegetasjonskartlegging ved Botanisk avdeling, DKNVS, Museet. 49 s. kr 20,-
- 2 Sæther, B. Flora og vegetasjon i Nesåas nedbørfelt, Nord-Trøndelag. Botaniske undersøkelser i 10-årsverna vassdrag. Delrapport 3. 39 s. kr 20,-
- 3 Moen, A. & L. Kjølvik. Botaniske undersøkelser i Garbergselva/Rotla-området i Selbu, Sør-Trøndelag, med vegetasjonskart. 106 s., 2 pl. kr 60,-
- 4 Kofoed, J. -E. Forsøk med kalibrering av ledningsevne målere. 14 s. kr 20,-
- 5 Baadsvik, K., T. Klokk & O. I. Rønning (red.). Fagmøte i vegetasjonsøkologi på Kongsvoll 15.-17.3.1981. 261 s. kr 60,-
- 6 Sæther, B., S. Bretten, M. Hagen, H. Taagvold & L. E. Vold. Flora og vegetasjon i Drivas nedbørfelt, Møre og Romsdal, Oppland og Sør-Trøndelag. Botaniske undersøkelser i 10-årsverna vassdrag. Delrapport 4. 127 s. kr 40,-
- 7 Moen, A. & A. Pedersen. Myrundersøkelser i Agder-fylkene og Rogaland i forbindelse med den norske myrreservatplanen. 252 s. kr 60,-
- 8 Iversen, S. T. Botaniske undersøkelser i forbindelse med generalplanarbeidet i Frøya kommune, Sør-Trøndelag. 63 s. kr 40,-
- 9 Sæther, B., J. -E. Kofoed & T. Øiaas. Flora og vegetasjon i Ognas og Skjækraas nedbørfelt, Nord-Trøndelag. Botaniske undersøkelser i 10-årsverna vassdrag. Delrapport 5. 67 s. kr 20,-

- 10 Wold, L. E. Flora og vegetasjon i Toås nedbørfelt, Møre og Romsdal og Sør-Trøndelag. Botaniske undersøkelser i 10-årsverna vassdrag. Delrapport 6. 58 s. kr 40,-
- 11 Baadsvik, K. Flora og vegetasjon i Leksvik kommune, Nord-Trøndelag. 89 s. kr 40,-
- 1982 1 Selnes, M. og B. Sæther. Flora og vegetasjon i Sørlivassdraget, Nord-Trøndelag. Botaniske undersøkelser i 10-årsverna vassdrag. Delrapport 7. 95 s. kr 40,-
- 2 Nettelbladt, M. Flora og vegetasjon i Lomsdalsvassdraget, Helgeland i Nordland. Botaniske undersøkelser i 10-årsverna vassdrag. Delrapport 8. 60 s. kr 40,-
- 3 Sæther, B. Flora og vegetasjon i Istras nedbørfelt, Møre og Romsdal. Botaniske undersøkelser i 10-årsverna vassdrag. Delrapport 9. 19 s. kr 20,-
- 4 Sæther, B. Flora og vegetasjon i Snåsavatnet, Nord-Trøndelag. Botaniske undersøkelser i 10-årsverna vassdrag. Delrapport 10. 31 s. kr 20,-
- 5 Sæther, B. & A. Jakobsen. Flora og vegetasjon i Stjørdalselvas og Verdalselvas nedbørfelt, Nord-Trøndelag. Botaniske undersøkelser i 10-årsverna vassdrag. Delrapport 11. 59 s. kr 40,-
- 6 Kristiansen, J. N. Registrering av edellauvskoger i Nordland. 130 s. kr 40,-
- 7 Holten, J. I. Flora og vegetasjon i Lurudalen, Snåsa kommune, Nord-Trøndelag. 76 s., 2 pl. kr 60,-
- 8 Baadsvik, K. & O. I. Rønning (red.). Fagmøte i vegetasjonsøkologi på Kongsvoll 14.-16.3.1982. 259 s. kr 60,-
- 1983 1 Moen, A. og medarbeidere. Myrundersøkelser i Nord-Trøndelag i forbindelse med den norske myrreservatplanen. 160 s. kr 40,-
- 2 Holten, J. I. Flora- og vegetasjonsundersøkelser i nedbørfeltene for Sanddøla og Luru i Nord-Trøndelag. 148 s. kr 40,-
- 3 Kjærem, O. Fire edellauvskogslokalteter i Nordland. 15 s. kr 20,-
- 4 Moen, A. Myrundersøkelser i Sør-Trøndelag og Hedmark i forbindelse med den norske myrreservatplanen. 138 s. kr 40,-
- 5 Moen, A. & T. Ø. Olsen. Myrundersøkelser i Sogn og Fjordane i forbindelse med den norske myrreservatplanen. 37 s. kr 20,-
- 6 Andersen, K. M. Flora og vegetasjon ved Ormsetvatnet i Verran, Nord-Trøndelag. 37 s., 1 pl. kr 60,-
- 7 Baadsvik, K. & O. I. Rønning (red.). Fagmøte i vegetasjonsøkologi på Kongsvoll 7.-8.3.1983. 131 s. kr 40,-
- 1984 1 Krovoll, A. Undersøkelser av rik løvskog i Nordland, nordlige del. 40 s. kr 20,-
- 2 Granmo, A. Rike løvskoger på Ofotfjordens nordside. 46 s. kr 20,-
- 3 Andersen, K. M. Flora og vegetasjon i indre Visten, Vevelstad, Nordland. 53 s., 1 pl. kr 60,-
- 4 Holten, J. I. Flora- og vegetasjonsundersøkelser i Raumavassdraget, med vegetasjonskart i M 1:50 000 og 1:150 000. 141 s., 2 pl. kr 60,-
- 5 Moen, A. Myrundersøkelser i Møre og Romsdal i forbindelse med den norske myrreservatplanen. 86 s. kr 40,-
- 6 Andersen, K. M. Vegetasjon og flora i øvre Stjørdalsvassdraget, Meråker, Nord-Trøndelag. 83 s., 2 pl. kr 60,-
- 7 Baadsvik, K. & O. I. Rønning (red.). Fagmøte i vegetasjonsøkologi på Kongsvoll 18.-20.3.1984. 107 s. kr 40,-
- 1985 1 Singsaas, S. & A. Moen. Regionale studier og vern av myr i Sogn og Fjordane. 74 s. kr 40,-
- 2 Bretten, S. & A. Moen (red.). Fagmøte i vegetasjonsøkologi på Kongsvoll 1985. 139 s. kr 40,-
- 1986 1 Singsaas, S. Flora og vegetasjon i Ormsetområdet i Verran, Nord-Trøndelag. Supplerende undersøkelser. 25 s. kr 20,-
- 2 Bretten, S. & O. I. Rønning (red.). Fagmøte i vegetasjonsøkologi på Kongsvoll 1986. 132 s. kr 40,-
- 1987 1 Bretten, S. & O. I. Rønning (red.). Fagmøte i vegetasjonsøkologi på Kongsvoll 1987. 63 s. kr 40,-
- 1988 1 Bretten, S. & O. I. Rønning (red.). Fagmøte i vegetasjonsøkologi på Kongsvold 1988. 133 s. kr 40,-
- 1989 1 Wilmann, B. & A. Baudouin. EDB-basert framstilling av botaniske utbredelseskart. 21 s. + 10 kart. kr 20,-
- 2 Bretten, S. & O. I. Rønning (red.). Fagmøte i vegetasjonsøkologi på Kongsvold 1989. 136 s. kr 40,-
- 1990 1 Singsaas, S. Botaniske undersøkelser i vassdrag i Trøndelag for Verneplan IV. 101 s. kr 40,-

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