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Abstract volume

The palynological record: variability in palynomorph preservation, geothermal alteration, sampling strategies, processing methods, recording techniques, data analysis and palaeoenvironmental interpretation

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The preserved palynomorphs in sedimentary sequences are influenced by depositional processes and early sedimentary diagenesis. With later deep burial, geothermal alteration may also degrade the recoverable palynomorphs. Sampling strategies often sample a small proportion of the available material, with the aim of providing a representative suite of samples. While the basic palynological processing techniques regularly used are broadly similar, the slight differences in method can result in surprisingly different results. Recording techniques are somewhat variable, depending in part on the required data analysis and palaeoenvironmental interpretation. All of these variables will have an influence over the accuracy of palynomorph data records throughout the Palaeozoic.

Talk

High resolution palynological data – implications for the interpretation of palaeoenvironmental and climatic changes in the sedimentary record

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The absolute abundance of acritarchs in the Palaeozoic varies with sedimentation rate related to sediment type, as well as nutrient availability, which is influenced by palaeoenvironment and palaeolatitude. Analysis of the absolute abundance of the marine acritarch phytoplankton record in Silurian tropical open marine shelf sequences with apparently continuous slow sedimentation show a remarkable consistency in the preserved acritarch assemblages over short distances laterally at the same horizon, with greater differences between stratigraphical samples. The high resolution data may be used to estimate the reliablity of low resolution presence / apparent absence data when used in palaeoenvironmental interpretation.

Talk

Acritarch evidence of marine Silurian cyclicity and climate change

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Silurian marine sedimentary sequences in eastern Avalonia and Baltica show cyclic variation in carbonate content, that can be assigned to more argillaceous Primo episodes, and more calcareous Secundo episodes. In the type Wenlock area,

acritarch assemblages of Primo episodes have diverse acritarch assemblages, often with a high relative abundance of Diexallophasis. In contrast, Secundo episodes have acritarch assemblages including the very large acritarchs *Estiastra*, *Hoegklintia* and *Pulvinosphaeridium*. Abundances range between 200 and 2000 per gram, with the four most common genera represented by *Leiosphaeridia* at 6-67%, Very*h*achium at 10-28%, *Micrhystridium* at 7-53% and *Diexallophasis* at 3-37%. Given an averaged sedimentary accumulation rate of 21.5 years per mm, the preserved marine phytoplankton productivity ranges between 25,000 and 250,000 for each square metre per year.

Poster

Determination of organic maturity based on quantitative determination of acritarch colour

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The objective of this project is to develop an inexpensive alternative method for the assessment of organic maturity of vitrinite-deficient marine hydrocarbon source rocks, based on colour change in acritarchs. Previously, visual estimation of palynomorph colour has been used to assess maturity, but quantative colour analysis of palynomorph colour is a more precise and objective method of determining this characteristic. Colour is relatively simple to measure using readily available equipment, the price of which had been steadily falling.

Vitrinite reflectance is the standard technique for assessing the organic maturity of sedimentary rocks. However, very little vitrinite is found in pre-Devonian successions and marine hydrocarbon source rocks of Devonian and younger age commonly contain little vitrinite. In contrast, these lithologies often contain acritarchs and these change colour with increasing temperature. Quantative determination of the colour of these palynomorphs, calibrated against vitrinite reflectance offers an improved method of assessing sample maturity.

Calibration of acritarch colour against vitrinite reflectance data is currently taking place using Late Devonian shale samples collected from the Midwest USA. These samples contain abundant acritarchs and vitrinite, and range from immature to marginally post-mature. Mean random vitrinite reflectance (R_r) and acritarch colour (relative RGB intensity) determinations are being made in TCD using existing digital photomicrographic and image analysis equipment on fossil plant material already extracted from the samples. Methods of enabling inter-laboratory calibration are also being explored.

Talk

Evolution of diversity in the marine phytoplankton: from acritarchs to dinocysts

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Major changes in the hierarchy of dominant components of the marine microphytoplankton correspond to major events in the biological history of oceans. It is reflected for example by the apparent taxonomic replacement between acritarchs well known from the Proterozoic to Paleozoic and dinocysts from the Mesozoic. Series of observations/new questions are proposed herein to evaluate the prehistory of dinoflagellates and posible links with producers of acritarchs. The possibilities of use of acritarchs are equivalent to those of dinoflagellate workers : to investigate the extent to which the composition of the associations and their distribution may reflect hydrographic characteristics and how it is possible to develop the study of the cysts as paleoceanographic indicators. The best information provided by diversity is obtain when we concentrate the analysis on the level of species and ecosystems. And here, the reappraisal of evolution of diversity in the Phanerozoic microphytoplankton is better understand through precise examples : operational palynology in the Silurian of Saudi Arabia ; palynological tracers of glaciation and deglaciation in the late Ordovician ; phytoplankton development in the late Devonian as a possible key for the modern associations.

Talk

Acritarch research in China

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Since the first paper published in 1974, more than 100 scientific articles dealing with Chinese Paleozoic acritarchs have been published. These papers have mostly been submitted to Chinese journals and are generally published in Chinese. Most articles deal with the Ordovician acritarchs from Southern China. These results are becoming increasingly important, not only for a better understanding of acritarch biostratigraphy at a local scale, but also for international correraton, for global paleobiogeographical scenarios and for paleoecological interpretation. A number of palaeobiogeographical models for Ordovician organic-walled microphytoplankton (acritarchs, prasinophytes, and related groups) have been published during the past 30 years. In general, acritarch workers have recognized two distinct geographic acritarch assemblages in the Ordovician that were attributed to cold and warm-water environments. We present a series of new plots on recently compiled palaeogeographical maps. The review of the literature and the new plots indicate that a number of preliminary conclusions can be drawn. Following minor biogeographical differentiation of acritarch assemblages during the Cambrian, 'provincialism' started at the Cambrian-Ordovician boundary. In the late Tremadocian a warm-water assemblage seems to be limited to low latitudes localities. From the late Tremadocian and throughout most of the Arenigian an acritarch assemblage following the southern margin of the supercontinent Gondwana can be recognized. It seems reasonable to consider the acritarchs of teh palaeocontinent Baltica, at intermediate latitudes, as belonging to a temperate water 'province', which was probably not restricted to the palaeocontinent of Baltica but had a wider distribution at about the same latitude, as some of the elements recorded from Baltica also occur in South China and Argentina. Palynological investigations from several sections located in different parts of the platform allow the observation of an inshore-offshore trend in the late Early Ordovician (Yushanian) *Didymograptus deflexus* graptolite Biozone and in the early

Middle Ordovician (Dawanian) *Azygograptus suecicus* graptolite Biozone. From west to east the acritarch assemblages show not only a remarkable increase in both abundance and diversity with the deepening of the water column, but also changes in the composition of the assemblages. Poorly diversified in the western part of the platform (Kunming area), the acritarchs are more abundant and diversified in the central (Tongzi area) and eastern part (Yichang area) of the Platform. These differences very probably reflect an inshore-offshore trend, and not only palaeogeographical changes or sea-level fluctuations, as previously suggested in the literature.

Talk

Life cycle of Early Ordovician acritarch species

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Acritarchs are marine planktonic autotrophic protistans of heterogeneous origins. Their diversification into many morphotypes occurred throughout Neoproterozic and Early Palaeozoic; some morphotypes represent green algal classes but most are of unknown biological affinities. Palaeobiology and relationships to extant microbiota of some acritarchs, with emphasis on their life cycle, reproduction and environmental adaptations, may be inferred from phenetic morphological features and cell wall ultrastucture. Microfossils from the Cambrian-Ordovician of China are studied to reveal the wall ultrastructure of vegetative cells and dormant/reproductive cysts, the structural complexity of early eukaryotic cytoskeleton, and to recognize by morphological and ultrastructural means the relationships between various phenotypes. Acritarchs are considered to be preservable cysts of unicellular algae. The new discovery of the entire organism consisting of vegetative envelope and internal cyst shows that some taxa indeed represent the dormant/reproductive cysts whereas other may represent vegetative cells in their complex life cycle. Formation of the cyst, the excystment structure (pylome) and change of the generations (sexual and asexual) in the life cycle of unicellular microbiota may shed light on the development of the early adaptations to survive ecological crises events and as a competitive advantage in increasingly complex marine ecosystems.

Talk

Integrated biostratigraphy (acritarch and graptolite) on Ordovician–Silurian boundary in the Bardo Syncline, Holy Cross Mountains, Poland

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In the southern part of Holy Cross Mountains, in the Bardo Syncline two sections were investigated near the Ordovician–Silurian (O/S) boundary. A conformable and gradual transition from sandy through silty to clayey strata as well as a gradual

change of colour of the rock from light to dark occurs in one of them (Bardo Stawy section) .That succesion indicates a gradual stagnation and progressive oxygen deficiency of the depositional environment related to a deepening of the sea during the post-glacial sea-level rise.

In the second section (Zalesie Nowe) the pass from Ordovician to Silurian occurs within the interval of clayey shales.

Three graptolite biozones are distinguished for the O/S boundary interval deposits: *?persculptus, ascensus-acuminatus* and *vesiculosus.* The first, rare graptolites appear below "graptolitic shales" in the *?persculptus* Biozone. The diversity of the assemblage increases in the next two biozones.

An analysis of acritarch frequency shows a decrease of acritarch frequency at the O/S boundary and then a gradual increase in the lower part of the *ascensus-acuminatus* Biozone with a maximum in the *vesiculosus* Biozone. The peak in acritarch frequency noted in the lower part of the *ascensus-acuminatus* Biozone coincides with a considerable increase in Chitinozoa abundance whereas bioturbation was observed slightly below.

The peak in acritarch frequency noted in the lower part of the *vesiculosus* Biozone coincides with a huge increase in Chitinozoa abundance, and the occurrence of bioturbation, brachiopods, and conodonts.

The taxonomic diversity of the acritarch assemblage shows a similar trend although the maximum of acritarch frequency observed in the *vesiculosus* Biozone do not coincide the maximum of acritarch taxonomic diversity.

The change in acritarch assemblages is not related to lithology. The distinct drop in frequency in the *?persculptus* and lower part of *ascensus-acuminatus* biozones occurs in the Zalesie Nowe section within the interval of clayey shales, and, in the Bardo Stawy section, it occurs in a gradual change in lithology (from a sandy and silty to a clayey succession).

Talk

The phytoPal database

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The phytoPal (relational) database is currently being constructed within Microsoft Access 2000. The database will contain details of all of the published phytoplankton genera and species. At present the details (name, author, stratigraphical range and taxonomic information) of 724 genera and approximately 1500 species have been entered. However, to fully understand the distribution of the phytoplankton it will be neccesary to include additional information on the collector/researcher, geographical locality, palaeoenvironment, lithology, thermal maturation and processing method amongst others. Each of these is likely to introduce its own bias to the data and each will need to be quantified.

A relational database, such as Access, allows data to be 'mined' effectively. For example, queries could be run that would identify those taxa which are restricted to certain stratigraphical intervals, palaeogeographical areas, or palaeoenvironments. Relational databases also provide a good means of making the data public via the WWW. Given that Fensome et al. is now 13 years out of date, part of the database could be made freely available to provide a valuable reference of up to date taxonomic information.

Talk

Acritarch biostratigraphy in the Cambrian-Ordovician of Arctic Russia

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The most comprehensive study on Cambrian and Ordovician acritarchs in Russia had been done in Moscow sineclise and its adjacent areas to the northwest. Only few data regarding the Cambrian–Ordovician are known from the other parts of the large territory. In frame of the Intas–Nemlor (Northern Eurasian Margin and Lomonosov Ridge) project concentrated on magmatism, palaeomagnetism, structural geology and stratigraphy of the Eurasian high Arctic the first palynological study of Lower Palaeozoic strata had been carried out in the central part of Severnaya Zemlya Archipelago (October Revolution Island). Two Cambrian (Universitetskaya and Kurchavinskaya) and two Ordovician (Kruzhikikhskaya and Ushakovskaya) Formations, consisting mostly of terrigenous rocks, were sampled along Kurchavaya and Kanyon rivers. These sediments are exposed in individual blocks that cause difficulty to consecutive investigation. More than 40 samples have been treated to clarify the age of the formations. Among them less than half yielded more or less diverse acritarchs of moderate or poor preservation. However, most of the identified taxa showed high biostratigraphical utility. Five acritarch assemblages had been distinguished in the studied sequences. The oldest one including *Eliasum llaniscum*, *Comasphaeridium* sp., *Timofeevia* sp. A, *Timofeevia janischewskyi*, *Cristallinium* sp., *Retisphaeridium dichamerum*, *R. howellii*, suggests a correlation of the rocks with the *Paradoxides paradoxissimus – P. forchhammeri* trilobite Zones of Middle Cambrian age. Assemblage II, comprising *Leiofusa stoumonensis*, *Vulcanisphaera turbata*, *C. randomense*, *Cristallinium* cf. *cambriense*, *Timofeevia lancarae* and *T. pentagonalis*, undoubtedly indicates on Upper Cambrian age, being an equivalent to the *Olenus-Parabolina spinulosa* trilobite Zones. The two younger assemblages III and IV are different only in its diversity (that is probably due to the different facial conditions), both distinguished by the appearance of diacrodian (*Acanthodiacrodium*, *Actinothodissus*, *Dasydiacrodium*) and galeate (*Cymatiogalea*, *Stelliferidium*) acritarchs together with *Lusatia dramatica*, *L. triangularis*, *Impluviculus villosiuskulus*. This allows a correlation of the sediments with the upper part of Upper Cambrian embracing an interval of the *Protopeltura praecursor*, *Peltura minor* and *P. scarabaeoides* trilobite Zones. None of the Cambrian taxa extends into the youngest assemblage V. The latter is remarkably poor and contains no biostratigraphical markers.The studied succession straddling the Cambrian–Ordovician boundary shows a break in the Late Cambrian stratigraphy of Severnaya Zemlya.

Talk

Ordovician phytoplankton (acritarch) diversity

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A major objective of the IGCP project 410 "The Great Ordovician Biodiversification Event" (1997-2002) was the assessment of biodiversity patterns of all taxonomic groups. In order to understand if the marine phytoplankton production in the Ordovician can be correlated to the invertebrate diversity, all data from Ordovician acritarchs have been compiled: some 700 articles have been published, describing over 250 genera (Servais, 1998) and over 1300 species and infraspecific taxa from Ordovician localities (Servais et al., 2004). The database of species described from the Ordovician Series includes over 1300 species of which most are established from localities of Gondwana and peri-Gondwana (some 400 species) and of Baltica (some 300 species), because most localities investigated are located in Europe and northern Africa. Over 250 new species have been described from the former Soviet Union, and nearly 100 from China. Data from North America and Australia add information to the global picture, while many other areas remain fairly or totally unstudied. In addition, most data on Ordovician acritarchs come from the Early to Middle Ordovician, publications of the Upper Ordovician are less abundant. Many taxonomic problems exist and the systematic position, as well as the spatial and temporal distribution of most species is not known. The elements to understand the diversity evolution of the Ordovician phytoplankton at a global scale are thus far from comprehensive. Global extinction events on the acritarch assemblages are not observed during the Early and Middle Ordovician, but at the end of the Upper Ordovician local changes have been reported: a great number of taxa disappeared before a new generation of taxa radiated during the beginning of the Silurian. More precise information are provided at regional scales, especially from South China (Li in Servais et al., 2004) and North Africa (Vecoli in Servais et al., 2004).

Talk

Proposal of a new IGCP project: Ordovician Palaeogeography and Palaeoclimate : IGCP project no 503

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In October 2003, we proposed a new project, entitled “Ordovician Palaeogeography and Palaeoclimate: The impact of the changing palaeogeography and palaeoclimate on the major biotic changes through the Ordovician (Ordovician biodiversification, end-Ordovician extinction, Silurian radiation)” to the board of the International Geological Correlation Programme (IGCP). If accepted, our new project (n° 503) should run over five years from 2004 to 2008.

The project can be outlined as follows: arguably the most sustained rise in marine biodiversity took place during the Ordovician and the second largest mass extinction event took place close to the end of that Period, coincident with an episode of major climate fluctuation. The results of the very successful IGCP project n° 410 “The Great Ordovician Biodiversification Event” not only included the development of an improved globally- integrated biozonation for graptolites, conodonts and chitinozoans, but also generated biodiversity curves that have been constructed for all Ordovician fossil groups. Numerous questions arise from these results, for example how has changing palaeogeography affected the biodiversifications observed during the Ordovician, the extinctions at the end of the period, and the subsequent radiation in the Silurian. What was the influence of the climate on the major biotic changes through the Ordovician and Silurian? Following the work of the numerous regional teams and of the clade teams, that were established for each fossil group in IGCP project n° 410, we propose a new successor project in order to attempt to answer some of these questions (and generate others), and develop a better understanding of the environmental changes, e.g., global sea-level, temperature, oceanic circulation, climatic thresholds, etc. during the Early Palaeozoic. The new project will be developed in collaboration with the Subcommission on Ordovician Stratigraphy (SOS) and with the Subcommission on Silurian Stratigraphy (SSS).

The following working plan has been proposed: (1) the first year of the project will culminate in an assessment of all available information on ocean and climate modelling, as well as from the development of stable C- and O-isotopes in the Lower Palaeozoic; (2) the second year will focus on the evolutionary palaeoecology of the Early Palaeozoic, in order to understand the architecture of the ecosystems that developed and changed during the Ordovician biodiversification and extinction, and during the subsequent Silurian radiation and extinctions; (3) in the third year, relationships will be sought between the changing palaeogeographical patterns and the changing biodiversities observed during the investigated intervals; (4) in the fourth year, we plan to compile all information on Early Palaeozoic events and stratigraphy, in order to improve the international standard time scale; (5) in the last year of our project, all information collected from the different regional teams should allow us to reconstruct Early Palaeozoic sea-level changes. At the end of our project, we also plan to produce a final synthesis bringing together the varied facets of the project and how they have addressed the objectives.

Five major meetings are scheduled between 2004 and 2008. Each of these meetings comprises indoor sessions, including the presentation of new results, and field excursions:

In 2004, if accepted, the official opening meeting of the new IGCP project will be organised at the Universität Erlangen, Germany, September, 1-3, 2004, just following

the International Geological Congress at Florence, Italy. This meeting will be focused on Early Palaeozoic Climate Modelling and isotope geochemistry. The associated geological excursion will cover the Ordovician of Öland and the Silurian of Gotland (Sweden).

The second major meeting will be held in 2005 at the Milwaukee Public Museum (Wisconsin, USA) and focus on the ecological evolution in the Early Palaeozoic. The geological excursions will be organized in the Ordovician of the American mid-Continent (Kentucky, Ohio, etc.). We plan to organize this conference just before or after the North American Paleontological Convention meeting.

In 2006, a major meeting of the new IGCP project will be held at Glasgow University, Scotland, UK, and concentrate on palaeo(bio)geography, and the relation between Early Palaeozoic biodiversity and climatic belts. A geological excursion to the Lower Palaeozoic of Scotland and northern England will include a visit to the GSSP of the base of the Silurian at Dob's Linn and to Scottish Silurian inliers in Southern Uplands and Pentland Hills.

The Nanjing Institute of Geology and Palaeontology, Academia Sinica, China, will organize the 10th ISOS in 2007. Jointly with the Ordovician Meeting, the Silurian Subcommission will also held its International Symposium. An IGCP related symposium on Early Palaeozoic events is scheduled at Nanjing, as well as several geological excursions to Lower Palaeozoic sections of southern China, to Ordovician to Early Silurian sections of the Upper Yangtze Platform.

The closing meeting of our project should take place in 2008 at the Université des Sciences et Technologies de Lille, France. This meeting is dedicated to the reconstruction of Early Palaeozoic sea-level changes. Geological excursions to Lower Palaeozoic sections of France and Belgium will be organised.

A series of additional meetings are already scheduled (Argentina, Spain, Czech Republic, Estonia, etc.).

Talk

Similar patterns of vertical distribution in Silurian acritarchs: another tool for the reconstrution of palaeoenvironmental changes in the Ludlow of Gotland, Sweden

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Most of the investigation on Palaeozoic acritarchs concern the biostratigraphy although palaeoecological approaches still need to be developed. In the Ludlow (Late Silurian) of Gotland (Baltic Sea), such an approach has been tentatively introduced on two abundant and diversified acritarch genera, *Micrhystridium* Deflandre 1937 and *Veryhachium* Deunff 1954. The vertical distribution of these genera have been quantitatively investigated and show large changes in their development and of their species. In the Gorstian, most of the taxa are well ornamented (long processes) and the morphological diversity is high, whereas upper Ludfordian assemblages are extremely reduced in diversity, with morphotypes of short process length. At the Early

and Late Ludfordian boundary, both genera show a continuous shift to more simple morphologies, associated with palaeoenvironmental and palaeoclimatic changes (arid conditions) as deduced from the facies occurences and a large d13C isotope excursion, respectively. At the end of the Ludfordian, the throwback to normal marine conditions provides morphotypes with an enhanced ornamentation. Similar trends in the frequency of morphotypes are also observed in a Gorstian lateral-transect. Thus, these results allow some considerations regarding the palaeoecological properties of some acritarch taxa, frequently used for biostratigraphical purpose. The quantitative analysis of large populations may provide an accurate tool for the potential use of selected acritarch taxa for the reconstructions of Silurian palaeoenvironments.

Talk

Sea levels, paleoclimate and hydrocarbon systems in Bolivia

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In Bolivia there is a world class reservoir (Huamampampa Sandstone) and source rock (Los Monos Shales). Producing fields are in the sub-Andean zone where they occur in a structurally complex thrust terrain. Seismic recognition in the subsurface of the reservoir is difficult because of this structural complexity. However, success has been achieved using palynology. A bloom of the acritarch (marine phytoplankton) *Evittia sommerii* occurs in the lowest Los Monos Shales, immediately above the Huamampampa Sandstone. The bloom only occurs at this stratigraphic level and represents an influx of this distinctive acritarch into the basin. This event has not been studied before at surface outcrop. Surface exposures of the Huamampampa-Los Monos interval have been investigated over two field seasons and the rock samples collected have revealed the precise stratigraphic extent of the bloom. This data will be used for bio-steering purposes during drilling in Bolivia. In Devonian times, Bolivia was in the high latitude, coldwater Malvinokaffric province. The Evittia bloom is monospecific and is coincident with a peak of prasinophyte algae (leiospheres) that are generally associated with deeper water. The presence of these two palynomorphs suggests there was a sea level rise possibly associated with an influx of warm water from lower latitudes. An influx of warm water would have contributed to the breakdown of the Malvinokaffric realm in the Mid-Devonian times.

Talk

Biodiversity patterns of Ordovician marine microphytoplankton: biological and palaeoecological meaning

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Calculation of evolutionary rates and diversity curve at specific level, form the basis for discussing the influence of global palaeoenvironmental perturbations on the

evolution of organic-walled microphytoplankton in northern Gondwana during latest Cambrian through Ordovician times.

The most important Cambro-Ordovician acritarch bio-events are short periods of diversification, which also correspond to introduction of morphological innovations, observed in latest Cambrian and earliest Tremadoc, late Tremadoc, early Arenig, basal Llanvirn, and latest Ashgill, and an important extinction phase in the early Caradoc. Overall, acritarch diversity increased from the basal Ordovician up to the middle Llanvirn, then declined in the early and middle Caradoc. During Ashgill times, the assemblages are poorly diversified at the generic level as a result of a combined effect of sea level drawdown and onset of glacial conditions, but no major extinction event is observed in connection with the end-Ordovician biotic crisis. The peak in acritarch diversity during Middle Ordovician times appears to be correlated to maximum spread of palaeogeographical assembly. Acritarch dynamics appear largely uncorrelated to second order sea-level oscillations; the primary abiotic controls on acritarch evolution were palaeogeographical and the associated palaeoceanographic changes (especially during Middle Ordovician), and the end-Ordovician palaeoclimatic shift.

The acritarch fossil record provides important information on the evolution of oceanic primary producers, however, the relationships between acritarch diversity, oceanic productivity, and evolution of invertebrate animals are proving much more complex than previously thought. In particular, the hypothesis of a causal relationship between changes in acritarch diversity and metazoan evolution in the Palaeozoic is not supported by our data.

Talk

An overview of Devonian acritarchs and prasinophytes

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Although there appears to be a fairly extensive literature on Devonian acritarchs and prasinophytes during the past thirty years, their study has, in fact, been somewhat uneven, both stratigraphically and geographically. There is, however, a growing body of literature in which well-preserved acritarch and prasinophyte assemblages from independently dated surface and subsurface sections are described allowing for regional and global zonations and correlations.

Most Devonian published acritarch and prasinophyte studies have been concentrated primarily in North America and Europe, followed by South America, Australia, and Asia. It is becoming increasingly clear that Lower, Middle, and Upper Devonian acritarch and prasinophyte assemblages are fairly distinct from each other. The literature indicates the least is known for the Lower Devonian both in diversity of the acritarch and prasinophyte assemblages and geographic distribution, followed by greater coverage for the Middle Devonian, with the greatest attention focused on the Upper Devonian, particularly North America and Europe.

The distribution of Devonian acritarchs and prasinophytes is presumably influenced by the same factors affecting modern phytoplankton taxa, namely light, temperature, salinity, nutrients, water depth, and surface currents. There appears to be a correlation between increasing diversity and change in morphotypes with increasing distance from the paleoshoreline as well as a change in the spore/acritarch ratio that is related to paleoshoreline proximity.

Before any meaningful conclusions can be made concerning the effect of fluctuating acritarch and prasinophyte diversity patterns on the Devonian marine ecosystem and climate, the role played by ecology, biogeography, taxonomy, and taphonomy must be addressed and analyzed.

Talk