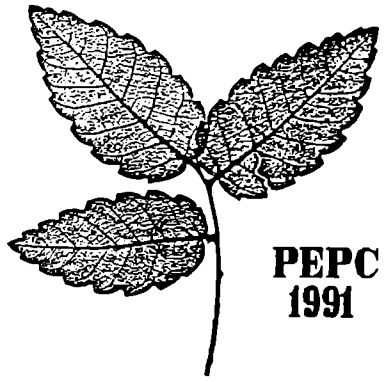
PANEUROPEAN PALAEOBOTANICAL CONFERENCE

PAN-EUROPÄISCHE PALÄOBOTANISCHE KONFERENZ

19. - 23. September 1991, Wien



Palaeovegetational development of Europe
Die Entwicklung der Paläovegetation in Europa

ABSTRACT - VOLUME
KURZFASSUNGEN

Naturhistorisches Museum Wien

PAN-EUROPEAN PALAEOBOTANICAL CONFERENCE 1991

Palaeovegetational development of Europe

Vienna, September 19th to 23rd 1991

organized by the

Natural History Museum Vienna and the **Austrian Commission for UNESCO**
under the auspices of IOP

supported by

Bundesministerium für Wissenschaft und Forschung
Austrian Commission for UNESCO
Wiener Fremdenverkehrsverband
Kulturabteilung des Magistrats der Stadt Wien
Freunde des Naturhistorischen Museums
Creditanstalt-Bankverein
Ankerbrot-Aktienges.
ÖMIG - Österreichische Milchinformationsgesellschaft
Österreichischer Raiffeisenverband
YO - Ybbstaler Obstverwertung
Bundesobstbauverband Österreichs
LAVAZZA Ges.m.b.H.

ABSTRACT - VOLUME

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August 1991

Zur Palynologie des Neogens Der Niederrheinischen Bucht

ASHRAF,A.R., BELZ,G., HEBEKKER,U., HUHN,B., MEISWINKEL,G., MOSBRUGGER,V., POLKEMANN,T., SCHÄFER,A., VAN DER BURGH, J.

(Poster)

Die Niederrheinische Bucht ist als Riftbecken in idealer Weise für die Analyse der Wechselwirkungen zwischen Prozeßabläufen der Geosphäre, Biosphäre und Atmosphäre geeignet. Ziel des Vorhabens ist es, die paläoökologische und sedimentologische Entwicklung der Niederrheinischen Bucht im Neogen zeitlich und räumlich differenziert zu rekonstruieren, um so Hinweise auf die Zusammenhänge zwischen Vegetation und Ablagerungsmilieu zu erhalten. In einer ersten Phase (DFG-Projekt Mo 412/2-1/2-2) werden die Deckschichten (Inden-Schichten - Reuver-Serie) auf der Rur- und Erft-Scholle in Vergleichsprofilen bearbeitet (Erft-Scholle: Tagebau Hambach; Rurscholle: Bohrungen SNQ 1-5). Stratigraphische Aussagen sollen sich dabei vor allem auf die Palynologie, paläoökologische Aussagen zusätzlich auf Analysen der Blatt-, Frucht- und Samenfloren stützen.

Palynologische Untersuchungen im Neogen der Niederrheinischen Bucht

ASHRAF, A.R. & MOSBRUGGER, V.

Die Niederrheinische Bucht (zur Lage und geologischen Situation vgl. das Abstract von UTESCHER et al.) besteht im wesentlichen aus drei tektonischen Einheiten (von W nach E: Rur-Scholle, Erft-Scholle, Köln-Scholle), die zum Teil eine sehr unterschiedliche tektonische und sedimentologische Entwicklung genommen haben. Parallelisierungen innerhalb der Niederrheinischen Bucht basieren zur Zeit ausschließlich auf einer lithostratigraphischen Gliederung, wobei die chronostratigraphische Einstufung der einzelnen Schichtglieder und Vergleiche mit anderen Neogen-Vorkommen (etwa der zentralen Paratethys) nach wie vor große Schwierigkeiten bereiten. Hier wird über erste Ergebnisse einer detaillierten palynologischen Untersuchung des Miozäns und Pliozäns der Niederrheinischen Bucht berichtet, die Vergleichsprofile auf der Rur- und Erft-Scholle berücksichtigt. Es werden die wichtigsten Formen der Palynomorphen-Flora anhand von SCAN-Aufnahmen vorgestellt, die Florenentwicklung auf der Rur- und Erft-Scholle verglichen und die chronostratigraphische Einstufung der einzelnen Schichtglieder diskutiert.

The Liassic seed ferns of Mecsek Mountains (S. Hungary)

BARBACKA Maria (Poster)

In result of the Liassic slow transgression, there was formed a small quantity of pit coal in Mecsek Mountains. The later tectonic processes caused the uplift of the Liassic level, which now is found in small depth under ground. These coal beds have been exploited since XIX century and such a way a plant remains have turned up in several coal-mines or dumps.

The fossil flora from Mecsek Mountains hasn't been worked out to a great extent, neither the cuticular examination has been made yet. In the locality there is an overwhelming majority of the Gymnospermae and there can be found seed ferns (Pteridospermopsida) among the material. They belong to two classes: Caytoniales - in which there are some Sagenopteris species and Pteridospermales, which is represented by some Thinnfeldia species.

Among the material only Sagenopteris nilssoniana (Brongn) Ward (=rhoifolia) and Thinnfeldia rhomboidalis Ett. have been known till present from this locality. It turned out recently, that there are some new species in Hungary (S. phillipsii (Brongn.) Presl, S. hallei Harris, Th. nordenskiöldi Nath., Th. rhomboidalis forma major Raciborski) and some other species of both of these genera, which hadn'n been described before.

Die nicht-torfbildende Vegetation im Neogen der Niederrheinischen Bucht - eine paläoökologisch-sedimentologische Modellstudie

BELZ, G., ASHRAF, A.R. , HILGER, D. & MOSBRUGGER, V.

Die Niederrheinische Bucht (zur Lage und geologischen Situation vgl. Abstract von UTESCHER et al.) bietet durch ihre großen Tagebaue hervorragende Möglichkeiten zur Analyse der torfbildenden und nicht-torfbildenden Vegetation im Miozän/Pliozän. Über die torfbildende Vegetation liegen durch palynologische und kohlenpetrographische Untersuchungen Informationen vor; die Ökologie der nicht-torfbildenden Vegetation ist dagegen vor allem durch die Arbeiten von van der BURGH über die Frucht- und Samenfloren bekannt geworden. Hier fehlen aber bisher kombinierte makropaläobotanisch/palynologisch/sedimentologische Untersuchungen zur Ökologie der Vegetation im klastischen Faziesbereich. Eine erste derartige Modellstudie wurde im Obermiozän (Inden-Schichten) des Tagebaues Bergheim durchgeführt. In einer Abfolge von mehreren fining-up-Sequenzen, die einer zyklischen Entwicklung von Altwasserarmen mit wiederholter Erosion entsprechen, wurden die Blatt- und Palynofloren analysiert. Diese Berücksichtigung von Sedimentologie und pflanzlichen Mikro- und Makroresten erlaubt eine feinere Differenzierung innerhalb der nicht-torfbildenden Vegetation.

Biostratigraphic correlations between European Charophytes and Mammals from the Paleocene to Middle Miocene.

BERGER, Jean-Pierre

During the last decades, the progress in mammal stratigraphy (especially owing to the rodents) were very important. The principal interest of these faunas is the precision of the zonation. Unfortunately, rodent-stratigraphy needs a lot of material (> 100 kgs) and is not easily applicable with small samples (as in boreholes, for example).
On the contrary, the charophytes are very frequent in non-marine sediments, and their zonation is now very well established for the European area. Recently, a group of charophytologists have discussed the correlation between Mammal- and Charophyte- zonation; the principal results (probably to be published in 1992) are presented here, with example from the Swiss molasse basin.

Vegetational and facial changes of flora/microflora in the Late Eocene, Oligocene and Early Miocene.

BERGER, Jean-Piere & KONZALOVA, Magda

The investigation has been focussed on the vegetational changes reflected in the macro/microfloristic and charophyte assemblages in the time span of the Late Eocene - Priabonian up to the Early Miocene - Egerian and Eggenburgian, inclusive the Oligocene sequencies.

The detailed investigations were carried out in the various Tertiary localities (outcrops and open casts) and bore-profiles in the territory of Czecho-Slovakia, Austria und Switzerland. The results led us to a brief overview of the vegetational changes in the taxa composition/frequencies in the various facies - terrestrial, marine and lagoonal - in the southern and western part of Central Europe. Special attention has been paid to the depositional environments for the climatic reconstructions. The groups of taxa, mainly of conifers and Arctotertiary elements among dicots, and further the marker taxa of pollen, dinos and gyrogonites have been evaluated. The environment controlled differences and the evidenced changes in the floral composition comprising the most striking events are interpreted.

Fossil woods from the Tertiary deposits of Iceland
BLOKHINA Nadezhda

Eleven species of fossil woods were determined from the Tertiary deposits of Iceland. They are the representatives of Pinaceae (Abies, Picea, Larix, Pinus) and Angiosperm formal-genera Ilicoxylon and Plataninium (Blokhina, 1976; Schönfeld, 1956).

The petrified wood remains were found in the base of the Tjörnes marine sequence ("Tapes"-"Mactra" zones). These zones corresponds to the sleggyulekurskyi horizon of the Early Pliocene age (Akhmetjev et al., 1978). But the composition of fossil woods indicates to the growing of conifer forests, perhaps, of the taiga type with Abies, Picea and Larix. This type of vegetation is more characteristic of the Late Miocene when the khredavatnenskyi horizon was accumulated.

The Tertiary woods of Iceland have closer relations with recent North-American and European species among those there are many representatives of the mixed conifer and conifer-hardwood mountain forests of the temperate aspect.

In the evolutionary process of Iceland vegetation the conifer-hardwood decidious forests are changed by taiga conifer forests which degraded during the Pliocene and replaced by sparse growth of trees and then - by mordern tundra.

AN UPPER MIOCENE LEAF FLORA AND ITS ECOLOGICAL INTERPRETATION

VAN DER BURGH, JOHAN

From 1988 onwards a leaf compression flora has been collected from Upper Miocene deposits in the neighbourhood of Heerlen, the Netherlands. They represent a cool temperate flora of a composition which was different from that of comparable floras of the same region.
The ecological position of this flora has been established resulting in a picture of a vegetation of a river environment with rapidly shifting situations, caused by river erosion. As a result the normal dominant *Fagus* is only represented by small numbers of leaves and only in part of the deposit, its position being taken over by *Quercus*. Other markers of the great influence of streaming water are the leaves and fructifications of conifers.

HOLZANATOMISCHE UND DENDROCHRONOLOGISCHE UNTERSUCHUNGEN AN UR- UND FRÜHGESCHICHTLICHEN HOLZFUNDEN

CICHOCKI Otto

Xylotomische Untersuchungen wurden am Institut für Ur- und Frühgeschichte im Rahmen des Fonds-Forschungsschwerpunktes "Neue Wege der Frühgeschichtsforschung" im Sommer 1985 begonnen. Diese Untersuchungen hatten zunächst die Holzartenbestimmung der Holzkohlenreste der Grabung Gars-Thunau zum Ziel. Weiters wurde mit der Probensammlung für den Aufbau dendrochronologischer Regionalkurven begonnen, da Versuche, Holzproben aus Ostösterreich mit Hilfe der Süddeutschen Standardkurve zu datieren, keinen Erfolg hatten. Das Vorhaben, die Holzkohlereste der Grabung Gars/Thunau relativchronologisch zu bearbeiten, setzte die Erarbeitung einer Präparationsmethode voraus, die Stücke ausreichend zu festigen und eine orientierte, plane und vollständig erhaltene Querschnittsfläche zur Messung zu erzeugen.

Das "Pfahlbauprojekt" der Prähistorischen Abteilung des Naturhistorischen Museums ermöglichte die holzanatomische und dendrochronologische Untersuchung einer Probeserie von Pfählen der Siedlung See am Mondsee. Auch für diese Region wurde mit der Sammlung von Holzproben für Regionalkurven begonnen, wobei interessante Proben aus dem Moor von Gerlham und aus der Grabung im Kloster Mondsee stammen.

Abschließend folgen einige Bestimmungsergebnisse von Holzkohlen aus prähistorischen Siedlungsschichten.

DIE FOSSILEN HÖLZER ÖSTERREICHS

CICHOCKI Otto

Zunächst soll das Projekt P 8015-GEO vorgestellt werden, das vom Fonds zur Förderung der Wissenschaftlichen Forschung finanziert wird. Dieses Projekt hat die Bearbeitung fossiler Hölzer aus tertiären und quartären Sedimenten des Mühl-, Wald- und Weinviertels und der Molasse zum Ziel. Diese finden sich ausschließlich in klastischen Sedimenten, und zwar vorwiegend in Schottern und Sanden aus dem Oberoligozän (Rupel-Eger), Untermiozän (Eggenburg, Ottnang), Obermiozän (Pannon) und dem Quartär (teiweise wohl umgelagerte Kreide). Die Hölzer sind überwiegend verkieselte Laubholzreste mit ausgezeichneter Erhaltung der anatomischen Feindetails. Neben bereits vorliegenden Bestimmungsergebnissen werden weitere Fragestellungen des Projektes diskutiert (Taphonomie, Versteinerungsvorgang, Untersuchung der intuskrustierenden Minerale und der organischen Restsubstanz, Sedimentologie und Stratigraphie der fossilführenden Schichten, Alterseinstufung der Holzreste).

Nach einem Überblick über die zahlreichen weiteren Fundstellen fossiler Hölzer in Österreich und Beispielen für deren Erhaltungszustand folgt abschließend ein Bericht über die Untersuchung des größten im Verband erhaltenen verkieselten Stammes Österreichs aus dem Perm von Laas/Kärnten.

Early Jurassic plants from the Holbav Formation, eastern part of the Getic Realm (Carpathians)

DRAGASTAN, Ovidiu

The Holbav Basin, near the town of Brasov, that contains Liassic coal-deposits and belongs to the Getic Realm (Carpathians), has yielded some of the megafossil-plants which are presently revised from the collections of the Laboratory of Palaeontology (University of Bucharest) as well as of the Museum of Geology.

An attempt is made to account for the palaeogeographic distribution of the Dictyophyllum - Clathropteris - Equisetum assemblage, which corresponds, in the Carpathian area, to the Hettangian age. The palaeogeographic distribution of the species Nilssonia orientalis (Bennettitales) and Klukia exilis (Schizeaceae) first reported from the Sinemurian and later from the Pliensbachian, is also considered.

The migration from eastern source areas, Japan or China (Upper Triassic), towards the western areas of Northern America (Lower Cretaceous) case of Nilssonia orientalis is noted.

Die Interglazialflora von Pianico (Prov. Bergamo, Italien)

EMMERT-STRAUBINGER Elisabeth

Eine gründliche und umfassende Großrestanalyse der bereits seit Ende des 19.Jh. bekannten, riß-würm-zeitlichen Seetone ermöglicht, neben einer beträchtlichen Erweiterung des Artenspektrums, v.a. durch die Anwendungsmöglichkeit cuticularanalytischer und elektronenoptischer Methoden neue Erkenntnisse hinsichtlich der Abgrenzung bestimmter, makroskopisch-morphologisch nicht eindeutig determinierbarer Taxa.
Nach einer vegetationsgeographisch-florengeschichtlichen sowie palökologischen und pflanzensoziologischen Interpretation der so gewonnenen Ergebnisse ist Pianico, in Relation zu vergleichbaren circumalpinen (und z.T. ebenso die kennzeichnende Art Rhododendron ponticum führenden) Interglazialfloren, charakterisiert durch:

- einen außerordentlich hohen Anteil südosteuropäischer und westasiatischer, z.T. heute dort endemischer Florenelemente
- ausgesprochen humide, ozeanisch getönte, wintermilde Klimaausprägung
- beträchtliches, eher kleinstandörtlich-edaphisch bedingtes Auftreten sehr thermophiler, submediterraner Arten
- das fast völlige Fehlen von Sumpf- und Wasserpflanzen sowie von Indikatoren ausgedehnter Alluvionen
- durch viele nahezu obligate Vertreter mitteleuropäisch geprägter Interglaziale auch deutlicher Bezug zu diesen.

NEUE ERKENNTNISSE ÜBER DIE SAMMELARTEN TRICOLPOPOLLENITES LIBLARENSIS UND TRICOLPOROPOLLENITES CINGULUM

ESCHIG Manfred

Schon seit langem werden den beiden Sammelarten Tricolpopollenites liblarensis und Tricolporopollenites cingulum THOMSON & PFLUG 1953 fossile Pollenformen zugeordnet, die mit dem Lichtmikroskop nur ungenügend bestimmt werden können. Zu ersterer Form zählt man die Subspezies der liblarensis- bzw. fallax-Typen und bei den tricolporaten Pollenkörnern sind es Formen der Subspezies der fusus- und pusillus- Gruppe, die vom Autor näher bearbeitet wurden. Auf Grund lichtmikroskopischer Untersuchungen konnten die einzelnen Typen nur selten eindeutig einer Formart zugeschrieben werden. Durch den routinemäßigen Einsatz des Rasterelektronenmikroskops soll eine bessere Bestimmung und Zuordnung einzelner Formen ermöglicht werden. Bei hohen Vergrößerungen konnte durch Details in der Skulpturierung der Pollenkörner eine genauere Zuordnung vorgenommen werden. Darüberhinaus läßt sich durch weitere Untersuchungen sicherlich auch die Frage der botanischen Zugehörigkeit zu rezenten Gattungen und Arten genauer klären.

Floristic events in the Cenozoic of north-eastern Asia

LIDIA FOTJANOVA

Early Paleocene temperate flora of the north-eastern Asia and Maastrichtian one are closely connected. The first reconstruction was on the Paleocene - Eocene boundary. Subtropical flora was formed (60% species with entire leaves and leaflets; Palmae are present). Early Paleocene - middle Eocene flora consist of 30% formal genera. The greatest reconstruction of flora took place at the beginning of the Late Eocene. Late Eocene ("preturgaian") flora is characterized by maximum for Paleogene variety of warm-temperate broadleaves Magnoliopsida (Dicotyledones), genera of which in recent flora of East Asia and North America are known. Formal genera are rare. All species (probably,section of genera) are extinct.At the beginning of Oligocene the sistematic variety of Magnoliopsida are reduced and Coniferae are increased.In the Late Oligocene the further reduction of Magnoliopsida and growth of the role of Coniferae take place.For the first time species which are very close to the recent ones appear.Just above the Oligocene - Miocene boundary a new increase of the systematic variety of Magnoliopsida,adaptive radiation of many temperate genera (Alnus,Betula,Carpinus,Ulmus,Acer and oth.) are marked.At the Lower-Middle Miocene boundary Magnoliopsida including subtropical genera become abundant.After Early Middle Miocene to Early Pliocene the reduction of sistematic composition of broadleaves Magnoliopsida occurs quickly,and the part of smallleaves Angiospermae and Coniferae increases (with a small reccurence in the Late Miocene).At the same time the geographical differentiation of flora of this region also increases.

Die Erhaltung von fossilen Pflanzen in vulkanischen Gebieten - Beispiele aus Island, Grönland und anderen Vulkangebieten des Känozoikums.

FRIEDRICH, Walter L. (Poster)

An Beispielen aus der Thule-Basalt-Provinz und anderen Vulkangebieten wird die Erhaltung von Pflanzenresten erläutert. Sie ist von zahlreichen Faktoren abhängig, wie z. B. die Art der vulkanischen Aktivität. So haben Stärke und Häufigkeit der Eruptionen bereits einen wesentlichen Einfluß auf den Vegetationstyp: Pionierfloren sind z.B. charakteristisch für Gebiete mit häufiger Eruptionsfolge. Bei der Einbettung ist weiterhin die Beschaffenheit des vulkanischen Materials von großer Bedeutung: Lava- und Aschenströme bewirken andere Erhaltung als Schlammströme oder Aschenfall. Einbettung in situ ist häufig. Temperatur, Chemismus, Viskosität und Gasinhalt im Einbettungsgestein sind von großer Bedeutung. Auch der Zustand der Vegetation bei der Einbettung ist wesentlich. Wasserreiche und feuchte Pflanzen hinterlassen bessere Abdrücke und Hohlformen als trockene. Organisches Material ist oft nicht oder nur schlecht erhalten, was nachteilig für die Bestimmung ist. Von Vorteil für die Stratigraphie in Vulkangebieten dagegen ist, daß absolute Datierungsmethoden z.T. recht gute Alter der Pflanzenfundstellen ergeben. Als Hauptregel gilt: War Vegetation in vulkanischen Gebieten zur Ausbruchszeit vorhanden, so lässt sie sich auch nachweisen.

Megafloren-Zonen aus dem Stefan/Autun der Süd- und Ostalpen (Stephanien/Autunian Megaflora-Zones of the Southern and Eastern Alps)

FRITZ Adolf

Die pflanzenführenden Schichten des Jungpaläozoikums in den Karnischen Alpen, in der Gurktaler Decke sowie im Drauzug werden erstmals anhand von Megafloren-Zonen des Karbons (WAGNER, 1984) stratigraphisch gegliedert. Danach ergibt sich sowohl für die Karnischen Alpen als auch für den NW-Teil der Gurktaler Decke eine durchgehende Schichtfolge, beginnend mit der Odontopteris cantabrica Zone (Nr.12) bis in die Callipteris conferta Zone (Nr.16), für den SE-Teil der Gurktaler Decke und für den Drauzug der Nachweis der Callipteris Zone.
For the first time Late Carboniferous/Early Permian sediments of the Carnic Alps, Gurktal Nappe and Drau Range are stratigraphically subdivided based on Megaflora-Zones (WAGNER, 1984). In the Carnic Alps as well as the NE-part of the Gurktal Nappe the sedimentary sequence ranges from the Odontopteris cantabrica Zone (Nr.12) up to the Callipteris conferta Zone (Nr.16), in the SE of the Gurktal Nappe and the Drau Range the Callipteris conferta Zone has been recognized.

FRITZ,A.(1991): Zur Altersfrage der jungpaläozoischen Megafloren im Süden Österreichs.-Carinthia II,Klagenfurt,181./101.(im Druck).
WAGNER,R.H.(1984): Megafloral Zones of the Carboniferous.-Neuvième Congrès International de Stratigraphie et de Geologie du Carbonifère, Vol.2:109-134.

ON THE LATE CARBONIFEROUS CUPULATE SEED GNETOPSIS ELLIPTICA RENAULT

GALTIER Jean

Permineralized plant deposits of the Upper Carboniferous (Stephanian) from Grand-Croix near Saint-Etienne, France, have yielded a rich flora where cordaites are more abundant than pteridosperms and ferns. However pteridosperm ovules show a surprising taxonomic diversity with more than 1/4 of the total number of genera in the assemblage. All these seeds are attributed to the Trigonocarpales (i.e. medullosan seed ferns) with two exceptions: Leptotesta should belong to the Callistophytales and Gnetopsis to the Lagenostomales. Original material of the latter species has been reinvestigated. This plant shows the unique example of a multiovulate cupule in Upper Carboniferous time. Relationships of this very specialized fertile structure are discussed considering that no vegetative remains (stems or leaves) referable to Lagenostomales have yet been found at Grand-Croix.

PLANT TAPHONOMIC CHARACTER OF THE LATE CARBONIFEROUS HAMILTON QUARRY, KANSAS, USA: PRESERVATIONAL MODES OF WALCHIAN CONIFERS AND IMPLIED RELATIONSHIPS FOR RESIDENCY TIME IN AQUATIC ENVIRONMENTS

GASTALDO, Robert A.

An Upper Pennsylvanian (Stephanian) Fossil-Lagerstätte in Hamilton, Kansas, USA, preserves a diverse biota of marine, euryhaline, freshwater, and terrestrial forms. It is confined to a paleochannel incised into a cyclothemic sequence during a sea level lowstand. The carbonate-rich infill was deposited during a subsequent marine transgression. Three fine-grained ostracod-rich wackestones separated by carbonate mudstone, cap the sequence. Rhythmic patterns of lamination-thickness variation in the limestones and carbonate mudstones are indicative of tidal influence within the paleochannel. Terrestrial floral elements are allochthonous and preserved within these laminated carbonates. Walchian conifers are the most numerous, most diverse, and best preserved terrestrial components. Specimens blanket bedding surfaces.

Megafloral remains are include *Walchia*, *Hermitia*, *Gomphostrobus*, *Cordaites*, and reproductive structures. Other gymnosperm elements include *Neuropteris* sp. and *Odontopteris* sp., fusainized stems and petioles of *Medullosa*, and the callipterid foliage *Autunia*, *Dichophyllum*, and *Arnhardtia*. Equisetaleans and lycopsids have also been recovered. Mesodetritus is comprised of isolated coniferous leaves of *Walchia*, *Hermitia*, and *Gomphostrobus*, coniferalean ultimate axes, charcoal, and unidentifiable plant parts. This size fraction accounts for the greatest number of plant parts distributed along any particular bedding surface. This dispersed allochthonous assemblage displays characters indicative of varied residency times for plant materials within the water column before emplacement at the sediment-water interface. The character of walchian conifer remains will be examined and a deterioration sequence will be discussed based upon fossil and experimental data.

An exceptional palaeobiotope from the upper Miocene in the West of Romania and its Palaeovegetation

GIVULESCU, Razvan

An exceptional palaeomedium and its palaeovegetation within the lower Pontian in the western part of Romania (eastern part of Paratethys) are presented. Starting with the beginning of the lower Pontian, the normal subsidence which deposited series of sediments in the Pannonian show signs of more or less pregnant stagnation or slowing down, respectively. As a result the Pontian lake was replaced,on the entire western part of Romania, by marshes or marshy woods, which are characteristic, their presence on such a big area adding a specific to this lower Pontian, a fact which has not been properly revealed yet. From N to S, these marshes are located in 4 large basins linked directly by the Pannonian Basin: the Baia Mare, the Oas, the Simleu and the Lugoj Basins.

As to the palaeomediums, it can only be deciphered through analogy with what we nowadays call the "swamps" in Florida, Georgia, North Carolina, or the Mississippi Delta and which represent large lacustrine areas of various depths eventually interrupted by land. The vegetation is typical and adapted to this biotope with specific parameters. We suspect the situation in the lower Pontian of being quite similar, but varying with the intensity of subsidence movements which conditioned water depth, and consequently the forthcoming type of palaeovegetation. Sometimes the oscillations were quite frequent from a short interval of swamping to the lake with normal sedimentation, or vice-versa. This specific sedimentation is present in all these basins.

These palaeomedia generated an entirely specific and exceptional palaeovegetation for the lower Pontian: it is characterized by a low number of taxons, as opposed to an unusually great number of individuals. This palaeoassociation contains first and foremost Glyptostrobus europaeus which is always present, then Alnus cecropiaefolia and Byttneriophyllum tiliaefolium, joined, from case to case, by other taxons. This association is strictly connected with the formation of marshy woods and with the coal facies of the lower Pontian.

The author points to the fact that although these taxons are known throughout the Miocene and coal facies have also been found in other Miocene levels, they do not appear in a great quantity and especially as forming this carbongenerating palaeobiocoenosis, except at this level of the lower Pontian. Consequently, one must admit to the existence, in these marshes and at that time, of some elements which favoured their exuberant development.

The author insists that one is prevented from deciphering the respective palaeomedium by the fact that out of the three taxons mentioned above, only one - Glyptostrobus europaeus - has a present correspondent, the other two disappearing at the end of the Pontian, and the Romanian, respectively.

Die Gattung *Cathaya* im rheinischen Jungtertiär

GOSSMANN, Rolf

Die Abietoideen-Gattung *Cathaya* ist ein Relikt des Tertiärs. Sie wurde rezent erstmals 1955 von einer botanischen Expedition in Bergwäldern der westchinesischen Provinz Guanxi (Kwangsi) mit einer Art gefunden, die 1958 von CHUN & KUANG als *Cathaya argyrophylla* beschrieben wurde. Die in dieser Arbeit als weitere rezente Art aus den Bergwäldern der südchinesischen Provinz Sichuan (Setschuan) vorgestellte *C. nanchuanensis* wird heute als Ökotyp von *C. argyrophylla* angesehen.

Aus dem mitteleuropäischen Tertiär sind nach Zapfen bisher zwei Arten beschrieben worden, die zunächst der Gattung *Keteleeria* zugeordnet wurden: *Cathaya loehri* aus der pliozänen Frankfurter Klärbeckenflora und *C. bergeri* aus dem sächsischen Miozän. Diese beiden Arten sind auch im rheinischen Jungtertiär nachgewiesen. Zapfen von *Cathaya bergeri* wurden zusammen mit einer kleineren Art, die als "*C. vanderburghi*" beschrieben werden soll, in einer rd. 80 Taxa umfassenden, in Driftschichten zusammengeschwemmten Flora der Tongrube Adendorf bei Bonn gefunden, die wahrscheinlich dem höheren Untermiozän bzw. dem Mittelmiozän zuzurechnen ist. *C. loehri* wurde mit einigen recht gut erhaltenen Exemplaren in den Ablagerungen eines Teiches oder Altwassers der oberpliozänen Reuvertone des Rheinbraun-Tagebaus Hambach entdeckt, die in vielen Exemplaren ebenfalls die kleinere Art enthielten. Sie war erstmalig von J. VAN DER BURGH in sandigen Ablagerungen der mittelpliozänen Rottonserie (Brunssumium) des Tagebaus Fortuna-Garsdorf gefunden und in zahlreichen Exemplaren, die den morphologischen Bau dieser Art und ihre Variationsbreite sehr gut zeigen, dem Verfasser zur Bearbeitung übergeben worden. Ein einzelner Zapfen dieser *Cathaya*, der aus dem Kohlebergbau St. Kathrein am Hauenstein in der Steiermark stammt (? Karpathien, ? Badenien, also oberes Untermiozän bis unteres Mittelmiozän) wurde vom Institut für Paläontologie der Universität Wien ebenfalls zur Bearbeitung zur Verfügung gestellt. Die neue Art mit einer Zapfenlänge von 25 bis 45 mm und die rezente *C. argyrophylla* differieren kaum; nur bei den Deckschuppen sind deutliche Abweichungen festzustellen. Im übrigen lassen sich alle Arten gegenüber *Keteleeria* und *Pseudotsuga* abgrenzen.

Zur Koniferenflora der Niederrheinischen Bucht im mittleren Pliozän

GOSSMANN, Rolf (Poster)

Eine ungewöhnlich reichhaltige Koniferenflora mit rd. 30 Arten ist seit Mitte der siebziger Jahre in den sogenannten Rottonschichten der Niederrheinischen Bucht im Westen der Bundesrepublik Deutschland gefunden worden. Überwiegend Zapfen, aber auch Samen, Kurztriebe, Nadeln und Hölzer wurden in küstennah gebildeten fluviatilen Schluffen, Sanden und auch Kohletonen (in Zwischenmitteln von Braunkohleflözen) geborgen. Sie gehören zur Rottonserie (Schichtenfolge 9 nach der Gliederung von SCHNEIDER & THIELE 1965) und sind ins höhere Unterpliozän bzw. das mittlere Pliozän einzustufen. Umfangreiche Koniferenfunde wurden bisher insbesondere in den Tagebauen der Rheinischen Braunkohlenwerke Frechen, Fortuna-Garsdorf, Bergheim, Hambach und Zukunft-West bei Eschweiler gemacht.

Die Koniferenflora der Rottonserie übertrifft in ihrer Artenfülle alle anderen Schichten des rheinischen Tertiärs wie des mitteleuropäischen Tertiärs insgesamt. Überwiegend handelt es sich um *Pinus*-Arten, aber auch die Abietoideen, Taxodiaceen und Cupressaceen sind mehrfach vertreten. Vorgestellt werden: *Cathaya* nov.sp., *Pseudotsuga* nov.sp., *Tsuga* nov.sp., *T. europaea*, *Picea omorikoides*, *P. latisquamosa*, *Pinus timleri*, *P. salinarum*, *P. spinosa*, *P. pinastroides*, *P. brevis*, *P. parabrevis*, *P. hampeana*, *P. urani*, *P. leitzi*, *P. peuce* foss., *Sequoia abietina*, *Taxodium dubium*, *Glyptostrobus europaea*, *Cryptomeria rhenana*, *Sciadopitys tertiaria*, *Taiwania paracryptomeroides*, *Cupressoconus rhenanus*, *Cupressoconus thomsonii*, *Chamaecyparis* nov.sp.

Zapfenfunde in autochthoner bzw. semiautochthoner Einbettung zeigen, daß zahlreiche *Pinus*-Arten mit *Cathaya*, *Pseudotsuga*, *Tsuga* und *Picea* sowie Cupressaceen auf überwiegend nährstoffarmen Sandböden heimisch waren. In den ausgedehnten meeresnahen Flußsystemen der Niederrheinischen Bucht mit einem humiden, ausgeglichenen Klima ohne starke Frostperioden bildeten diese Koniferenwälder auf trockengefallenen Sandbänken umfangreiche Bestände.

Pomáz, a representative flora of the zonal vegetation in Egerian

HABLY Lilla

In the area of Central Paratethys, Pomáz is a well dated flora, determined by nannoplankton. The layer, in which the leaf remains are preserved, belongs to the NP 25. The flora represents the zonal vegetation, because proportion of the riparian elements is very low, and there aren't any swamp elements. The zonal vegetation consists of thermophyllous elements including laurophyllous evergreen and deciduous ones. Daphnogene div. sp., Palaeocarya orsbergensis, Platanus fraxinifolia, Leguminosae div. sp. are characteristic and some of them are dominant too. Arctotertiary elements are rare, except Ulmus pyramidalis, which is dominant. All of the Arctotertiary elements are members of riparian vegetation. It means, their presence mainly depends on the edaphic conditions and not on climate. That's why the zonal vegetation refers to a subtropical, humid climate.

Paläobotanik in Landschafts- und Flussgeschichte

HANTKE, René

Schon OSWALD HEER hat Molassepflanzen neben der Alterszuweisung zur Rekonstruktion von Paläökologie und Paläoklimatologie herangezogen. Fossile Floren und jüngsttertiäre Reliktarten erlauben Rückschlüsse auf ihre Existenz und frühere Verbreitung. Zusammen mit flussdynamischen Fakten liefern sie gar Anhaltspunkte über das Paläorelief am Alpenrand und in dessen Vorland.
Trennende, wirr gelagerte Konglomerate mit groben Geschieben bekunden nicht Flussablagerungen, sondern kühlzeitlich Ausbrüche hinterstauter Schuttriegel. Erst distal und gegen Ende einer Schüttung beginnen sich die Gerölle zu berühren und regeln sich dachziegelartig -fluvial- ein.
Anhand von Frucht- und Samenfloren glaubt H.-J. GREGOR, daß im Tertiär innerhalb des generell kühler gewordenen Klimas nur kleine Schwankungen stattgefunden hätten. Längere Profile in Schweizer Molasse-Schuttfächer zeigen aber, daß in jüngeren Schichten wieder thermophile Gesellschaften auftreten. Wohl sind die von ihm zugestandenen Mikroklima -Effekte von Exposition und Standort zu berücksichtigen. Neben den Temperaturen ist auch den Niederschlägen Beachtung zu schenken. Vertreter der Auenwälder beziehen aber einen erheblichen Teil ihres benötigten Wassers aus dem hohen Grundwasser; die Niederschlagswerte lagen tiefer. Ebenso kommt der Nebelfeuchtigkeit nicht zu unterschätzende Bedeutung zu.
Fossile Assoziationen, meist Auenwälder, vermitteln sodann Hinweise auf einstige Flussläufe. Sie bekunden nicht nur eine artliche Konstanz; ihr Inhalt gestattet neben der Rekonstruktion von Ökologie, Klima und Relief auch eine solche von Talläufen. In Deckengebirgen wurde mit den Decken auch ein Relief mitverfrachtet. Sedimente ergänzen die Öko-Faktoren flächenhaft. Der meist bescheidene Fossilinhalt innerhalb von Konglomerat-Groblagen und das Fehlen eingedeckter Strünce an der Basis weisen auf lebensfeindlich gewordene Kühl- und Kaltzeiten hin. In Warmzeiten wurden in Altläufen feinkörnige pflanzenführende Sedimente abgelagert. Liegende und hangende Floren und Säuger ermöglichen eine relative, Bentonite eine absolut zeitliche Einstufung. Sukzessionen von Floren, ihre Verbreitung, Geröll- und Schwermineral-Inhalt erlauben mit Herkunft und Transportweg die Rekonstruktion von Fluss- und Landschaftsgeschichte.
Nur eine Kombination geologischer, morphologischer, paläobotanischer und -klimatologischer Fakten erlaubt ihr Nachzeichnen. Zugleich enthüllen sie Ungereimtheiten in den immer noch von Lehrmeinungen durchsetzten Erdwissenschaften, die es zu erkennen und zu korrigieren gilt.

ON THE EXINE OF SUBLAGENICULA NUDUS (NOWAK AND ZERNDT) DYBOVA-JACHOWICZ ET AL

HEMSLEY Alan and GALTIER Jean

Megaspores assignable to Sublagenicula nudus from the Lower Carboniferous (Viséan) of Esnost and Roannais, France, have been investigated by light microscopy, SEM and TEM. The exine, as seen by the light microscope, appears to possess a laminate structure, however, this is barely perceptible in ultra-thin section viewed by TEM. Spores from both localities demonstrate a disruption of the exine surface and internal structure resulting from the growth of crystalline material during preservation. Such alteration may be a consequence of preservation in a highly silicios matrix. The spores from the two localities are shown to be similar in most respects but to differ considerably in details of ultrastructure from Upper Carboniferous spores assigned to this species.

SOME ASPECTS ON THE CLASSIFICATION OF SALPINGOPORELLA PYGMAEA (CALCAREOUS ALGAE, DASYCLADACEAE)

HOFMANN, Thomas

Salpingpoporella pymaea was first described by Gümbel (1891) from upper jurassic limestones near Kehlheim (Germany), later this species was redescribed and emended by Pia (1925), who gave an exact definition of the characteristic parameters (outer diameter, inner diameter, number of branches) in addition to this he gave a reconstruction of the thallus with some drawings of thin sections.
In 1971 Dragastan descriped Pianella johnsoni from upper jurassic limestones of Romania, a form which was later transfered to the genus Salpingoporella, a compareable form just having smaller dimensions like S. pygmaea.
1984 Bernier described another two new species of Salpingoporella from the upper jurassic of France, having the same characteristic features, S. etalloni has dimensions between S. pymaea and S. johnsoni, whereas S. enayi is a much larger form.
Working with statistical methods on a large number of thin sections of the tithonian Ernstbrunn limestone from Lower Austria, it can be demonstrated, that the relation of the outer diameter to the inner diameter which was used from Bernier to create new species is not useful for classification. The homogenous distribution of the investigated material is interpreted as a variation of S. pymaea and not as different species.

Unbekannte Objekte in Pollenpräparaten - Tardigrada

JANKOVSKÁ Vlasta

In den pollenanalytisch verarbeiteten Sedimenten kommen ausser Pollen und Sporen noch weitere Objekte aus dem Pflanzen- und Tierreich vor. Viele konnten schon bestimmt und zur Rekonstruktion der Naturbedingungen genützt werden. Bis jetzt bleibt jedoch eine Reihe Objekte undeterminiert. Dies betrifft einige mikroskopische Organismen der Gruppe Tardigrada.Konkret handelt es sich um ihre Eier, die sind mit Ausläufern bedeckt, die verschiedene Skulpturen und Ornamente bilden. Das ist ein wichtiges systematisches Merkmal. Obgleich bei vielen Arten der Tardigrada eine kosmopolitische Verbreitung angegeben wird, gibt es Arten, die ausgeprägtere Standortsansprüche aufweisen. Ihrer Funde kann man sich dann zur Präzisierung der paläoökologische Rekonstruktion bedienen.In dieser Arbeit benützten wir hauptsächlich Pollenpräparate aus den West-Spitzbergen und einige Funde aus der Tschechoslowakei und aus West-Siberien. Analog wie die Pollenkörner, bzw. andere Organismen (cf. B.van Geel), wurden die bisherigen Funde der Tardigrada-Eier in einige Typen gruppiert: Macrobiotus ambiguus Typ, M.coronifer-islandicus T., M.areolatus-richtersi T., M.harmsworthi-echinogenitus T., M.hufelandi T., M.hibernicus T. und M. intermedius T. Künftig wird man diese Gruppierung präzisieren müssen, was eine Aufgabe für Spezialisten sein mag.

Equisetites arenaceus: three-dimensional leaf architecture and a further mode of vegetative propagation

KELBER Klaus-Peter

Equisetites arenaceus is the most frequently encountered horse-tail being represented by numerous specimens in the Lower Keuper (Triassic, Ladinian) of South Germany. Well preserved leaf-sheaths from Schleerieth (Frankonia) are very diverse in proportions and they are composed of up to 120 leaf-segments. As far as can be seen all distal leaf parts are folded forming an adaxial cuff. Raised pyramidal and thick-textured leaf-apexes terminate in spiny-like teeth which are often broken off. The multiple phenotypes of leaf tips are mainly caused by different states of fossil preservation.

An additional mode of vegetative reproduction is testified by small thin articulated twigs originally attached to abscission layers which are arranged in whorls emanating the node zone of the aerial stem. Shedded twigs indicate adventitious roots. In autochthonous situations dense package of shedded twigs built up patches of new sprouted rhizom-layers.

Die Fruktifikationen von Thinnfeldia ETTINGSHAUSEN

KIRCHNER, Martin

Nordöstlich von Nürnberg, in Großbellhofen,wurden in liassischen Tonmergeln weibliche und männliche Fruktifikationen gefunden, die zur Belaubung Thinnfeldia ETTINGSHAUSEN (kein Synonym von Pachypteris BRONGNIART) gehören.
Die Blüten lassen sich zwanglos zu den Gattungen Umkomasia und Pteruchus THOMAS stellen, so daß die Zugehörigkeit der Thinnfeldien zu den Corystospermaceae (= Umkomasiaceae) als gesichert gelten kann.
Teilweise eignete sich das Material zur Mazeration.
Von Umkomasia liegen nur leere Fruktifikationen vor, d.h. Achsen mit Cupulen, jedoch keine eindeutigen Reste von Samen.
Der zu Pteruchus gehörige Pollen kann als Alisporites thomasi (COUPER) POCOCK bezeichnet werden (der aber wegen seiner starken Variationsbreite als Sammelart angesehen werden muß.

THE MIOCENE FLORA OF THE CENTRAL JUTLAND, DENMARK, AND ITS ENVIRONMENT

KOCH, B.Eske

During two decennia the author with a group of collegues/ students studied the non-marine Miocene deposits of Central Jutland(Denmark) and their Fossil Flora.The lecture gives an account of this activity and its results. A survey is given on the Paleobotany,Browncoal Petrology, Stratigraphy and Facies(Environments), with an interpretation of the flora and their environments,in general ajusted to the information from the geological diciplins. The geological scenario is that of a coast with heavy tidal water, dominated by delta-building that interacting with basin subsudence produce alternating episodes of transgression and regression. Different environments existed contemporaniously from sand shore and muddy marshes, open waters, swamps and levees, while the large river branches were loaded with debris of the high forests uppstreams. On the river plains and sandy levees even semi-Xerophytes have grown.
Stratigraphical interpretation in relation to the North Sea region and the Lower Rhenian area as well as the Eastern Germany region has been attempted based on Megafossils, changing Geoflora, fossil Pollen, supporded by marine stratigraphy.

A comparison between the pollen and leaf content of a late Miocene site at southern Crete (Greece).

KöHLER, Juliana and MOHR, Barbara (Poster)

A well preserved pollen and leaf flora from the middle part of the marine Makrilia Formation (early Tortonian) was studied. A composite list of taxa was compiled from the mega and microfloral content of these plant beds. Comparison of quantitative pollen versus leaf abundances suggests differential representation of some of the taxa, caused by either differences in primary production or strong taphonomic effects.
The families represented in the micro- and megafloral records differ qualitatively and quantitatively. Among the Pteridophytes, Equisetaceae are represented by mega- remains only. Spores of Lycopodiaceae, Gleicheniaceae and Pteridaceae were, however, discovered. Foliage of Pinaceae and Taxodiaceae are found, as well as pollen. Aceraceae, Betulaceae, Fabaceae, Fagaceae, Myricaceae, ?Oleaceae, Salicaceae, and Ulmaceae are recorded by both pollen and leaves. In contrast, Caprifoliaceae and Mimosaceae are seen only in the microflora. In addition, for many pollen taxa the recent counterpart has not been determined yet. While the proportion of conifers in the megaflora makes up only about 2 to 3%, bisaccate pollen are represented between 50 and 60% in the microflora. Fagaceae (Quercus/Quercoids, Castanea/Castanopsis) and Juglandaceae (Engelhardia, Carya, Pterocarya) are well represented as pollen (ca. 4 to 5% each). With this high percentage of Engelhardia pollen and the undetermined "exotic" elements, the flora shows a more "warm aspect" than floras of the same age of Middle Europe (e.g. Rhineland).

An enigmatic Liassic microsporofyll, yielding *Ephedripites* pollen.

van Konijnenburg-van Cittert; Johanna H.A.

Re-examination of material described by Boersma (1985) as *Aphlebia lautneri* proved that this material was in part identical with microsporofylls described as *Piroconites kuespertii* Gothan (1914) from the Early Liassic of Franken (Germany). The microsporofylls are covered with synangia consisting of 3 adnate pollensacs, yielding *Ephedripites* pollen. The presence of synangia and of *Ephedripites* pollen suggests a possible relationship with the Chlamydospermae, hence the material is compared to members of this group of plants, both fossil and extant.

MEDIAEVAL AGRICULTURE IN SW POLAND

KOSINA Romuald

Archaeological data indicate for the VI–X c. A.D. an utilization of listers with two types of coulter, sickles having various shape of blade, semi–scythe, quern, and roaster. Findings of hoes are additionally presented from the younger period (X–XIII c.).

Millet, wheat, rye, oats, flax were main crop plants. Changes in exploitation of millet, rye, flax and oats have been ascertained over centuries. Cultivation of rye was probably most important in younger period . Forms of millet characterized by different colour of husks were cultivated separately. Horse bean, pea and cucumber prevail among findings of vegetables. Trends in the consumption of fruit have appeared for *Prunus cerasus*, *P. spinosa* and *P. domestica* – may be it is related to weather changes (spring frosts). There were some imports of crop plants from S Europe (*Lagenaria siceraria*).

NEW ASPECTS ON THE PALAEOVEGETATION IN THE EASTERN STYRIAN BASIN (AUSTRIA) DURING THE PANNONIAN (LATE MIOCENE)

KOVAR-EDER Johanna and KRAINER Bernhard

Within the eastern part of the Styrian Basin, limnic-fluviatile conditions caused the deposition of thick gravels (Kapfensteiner-, Kirchberger-, Karnerberger-, Schemmerl-Schotter) and intercalated finer clastic sediments originating from different fluviatile systems. Outcrops within the Kirchberger gravels have been investigated. Silts and clays yielding fossil plant assemblages are exposed at several of these outcrops. Most are poor in species and the plant remains are oxidized. A number of different, richer fossil plant thanatocoenoses are exposed in one vertical section at the outcrop Wörth near Kirchberg/ Raab. Carbonized leaf and fruit remains as well as palynomorphs are preserved in Reith near Unterstorcha/ Raab. Two new taxa have been identified by cuticular analysis: Fraxinus ettingshausenii and Salix holzeri.

The synthesis of detailed sedimentological and palaeobotanical investigations permits an insight into the palaeoenvironment: coarse-grained channel deposits usually lack plant remains. Such remains are preserved from floodplain, ox-bow-lake, back-swamp- and floodplain-lake stages. In addition, palynomorphs derive from the lowlands and from more distant elevated northern and northwestern regions the possible source areas of the clastic sediments.

Stratigraphy and correlation of shallow marine and continental Late Carboniferous/Early Permian sequences of the Southern and Eastern Alps based on plant fossils.

KRAINER Karl

Within the Late Carboniferous/Early Permian molasse sequence (Bombaso Formation, Auernig and Rattendorf Group) of the Carnic Alps (Southern Alps) the fossil flora changes significantly from base to top and all Stephanian megaflora zones (*Odontopteris cantabrica* Z., *Lobatopteris lamuriana* Z., *Alethopteris zeilleri* Z., *Sphenophyllum angustifolium* Z. and *Callipteris conferta* Zone), introduced by WAGNER (1984), have been recognized.
Additionally, biostratigraphy of the whole sequence is well established by fusulinids (KAHLER 1986, 1989): The Bombaso Formation is of Late Moscovian age, the Auernig Group of Kasimovian and Gzhelian age and the Rattendorf Group corresponds to the Asselian.
Nearly all taxa and all megaflora zones which have been recognized from the shallow marine Late Carboniferous/Early Permian sequence of the Carnic Alps have also been determined from the continental sequence (Stangnock and Werchzirm Formation) of the Eastern Alps, allowing a precise correlation of the shallow marine sequence of the Carnic Alps with the continental sequence of the Eastern Alps, although the range of the megaflora zones at present is not exactly known: The lower part of the Stangnock Formation (*Odontopteris cantabrica* and *Lobatopteris lamuriana* Zone) corresponds to the Late Moscovian and Kasimovian (Cantabrian, Barruelian), the middle part (*Alethopteris zeilleri* and *Sphenophyllum angustifolium* Zone) to the Gzhelian (Stephanian B and C) and the uppermost part of the Stangnock Formation (*Callipteris conferta* Zone) corresponds to the uppermost Gzhelian/lowermost Asselian of the Carnic Alps.
Coniferae (*Walchia*, *Ernestiodendron*) and *Callipteris conferta* within the lowermost part of the continental red bed sediments of the Werchzirm (and equivalent Laas and Kristberg) Formation also refer to the *Callipteris conferta* Zone, the sediments are most likely of Early Asselian age.
In the Eastern Alps the climatic shift from humid conditions to semiarid conditions was near the Carboniferous/Permian boundary (within the *Callipteris conferta* Zone).

Comparison of medieval and recent vegetation in Jihlava/Moravia/

KÜHN FRANTIŠEK

In 1976, I gathered in Jihlava, Židovská ulice,10 kg organic matter from a cistern,dated by B.Novotný from the middle of 13. century to the beginning of 15.century,probably soon after 1270. The vicinity of Jihlava has been colonized in the half of the 13.century.In the material I found seeds of 257 species and several subspecific taxons of plants.The commonest were Rubus idaeus,Fragaria vesca,Rubus plicatus,Ficus carica,Vitis vinifera, Prunus avium v.juliana,Scirpus sylvaticus,Chenopodium album,Malus domestica,Carex leporina,C.gracilis,Panicum miliaceum,Rumex acetosella,Prunus domestica.There was a rich assortment of field crops,Avena sativa,Triticum aestivum,T.dicoccon,Secale cereale, Hordeum vulgare,Panicum miliaceum,Setaria italica,S.glauca,Papaver somniferum,Beta vulgaris,Cannabis sativa,Humulus lupulus,Pisum sativum,Vicia sativa,Linum usitatissimum;especially a very rich assortment of fruits,Juglans regia,Corylus avellana,Ficus carica/probably import/,Ribes nigrum,R.uva-crispa,Fragaria vesca,Rubus idaeus,R.plicatus,R.caesius,Cydonia oblonga,Sorbus aucuparia,Pyrus communis,Malus sylvestris,M.domestica,Prunus avium v.juliana,v.duracina,P.cerasus,P.spinosa incl.ssp.megalocarpa,P.domestica ssp.insititia,ssp.italica v.vinaria,v.claudiana, ssp.prisca,ssp.bisacuminata,ssp.pomariorum,ssp.intermedia v.mamillaris,v.culinaria,v.oxycarpa,ssp.ovalis,Cornus mas,Vaccinium myrtillus,Vitis vinifera;vegetables,Cucumis melo,Anethum graveolens,Petroselinum crispum,Allium cepa,A.schoenoprasum;weeds,many of them thermophilous,Nigella arvensis,Glaucium corniculatum, In middle ages occured more thermophilous plants,more diverse.

Leaf and fruit compressions from the Bohemian Cenomanian

(Poster)

KVAČEK, Jiří

A new locality Hutě in Prague - Hloubětín (ČSFR) has yielded a well differentiated assemblage of Cenomanian plants (compressions of infructescenses and leaves with cuticles). It belongs to the Peruc Member and is situated nearby the previously described Velenovský´s locality Hloubětín. Tentative study of the plant material isolated partly by washing in hydrogene peroxid has revealed the following taphocenose: Gleichenites zippei (Corda) Sew., G. delicaltula (Heer) Sew., "Sequoia" heterophylla Velen., "S." major Velen., Cyparissidium sp., Cunninghamites elegans (Corda) Endl., Grevilleophyllum constans (Velen.) Velen., Proteophyllum araliopsis Velen. et Vinikl., P. minutum Velen. et Vinikl., Cocculophyllum cinnamomeum (Velen.) Velen., Myrtophyllum geinitzii Heer, Araliophyllum daphnophyllum (Velen.) Velen., cf. Myricanthium amentaceum Velen. and further indetermined fructifications.

History of Fagus in Central Europe - an attempt of new interpretation of Fagus evolution

KVAČEK, Zlatko; WALTHER, Harald

A comprehensive morphological and anatomical revision of the fossils attributed to Fagus from the Central European Tertiary has resulted in establishing four form species - Fagus saxonica Kvaček et Walther (late Oligocene to earliest Miocene), F. menzelii Kvaček et Walther (early to middle Miocene), F. silesiaca Walther et Zastawniak (late Miocene) and F. kraeuselii Kvaček et Walther (Pliocene). All of them share conformable epidermal structure (non papillate abaxial epidermis with incompletely cyclocytic stomata) and obviously represent one evolutionary lineage. Those traits found in the earliest populations - craspedodrome venation, higher number of secondaries, prominently toothed margin with intercalated teeth, smaller stomata- are considered for more primitive. In this respect and on the basis of additional anatomical and carpological data 4 groups of 15 extant species have been recognized.

Seed and fruit finds from Hungarian Upper Pannonian brown coal layers.

LASZLO, Jozsef

Since 1977 botanical remains have been collected continuously from the Upper Pannonian layers occurring together with the brown coal range in the NE part of Hungary. Besides a leaf-flora the four open cast mines yielded an important assemblage of seed and fruit finds, most of them are novelties within Hungarian palaeoflora.

Among leaf impressions Glyptostrobus, Alnus, Salix, Typha and Byttneriophyllum occur highly frequently. As for seed and fruit finds Glyptostrobus, Trapa, Alnus, Betula, Pterocarya, Stratiotes, Potamogeton and Spirematospermum occur with a medium or higher frequency.

The only tropical element of the flora is Spirematospermum; this is the first known occurence of it in Hungary.

Taxodium, Zelkova, Pterocarya, Byttneriophyllum and Parthenocissus are the thermophylous elements of the flora while the recent relatives of Ulmus, Alnus, Fagus, Betula, Acer, Aesculus, Populus and Salix are living under a temperate climate. The role of aquatic, paludal plants, like Ceratophyllum, Trapa, Stratiotes, Potamogeton and Carex is less relevant as climatic indicators still their seed finds extend our knowledge of Upper Pannonian flora considerably. There are no plants within the assemblage the occurrence of which would suggest a definitely cold climate.

The collected seed and fruit finds extend our knowledge especially as regards aquatic and paludal plants.

The flora of the studied 4 localities proved to be identical with and similar to the flora of the Vienna Basin (KOVAR-EDER, 1988) and to that of Bohemia (BUZEK, 1985).

PREHISTORICAL CEREAL FINDS IN S FINLAND

Lempiäinen Terttu (Poster)

Macrofossil, pollen and phosphorus analyses are presented from the Neolithic dwelling place near Turku, SW Finland, dated to the period of the Kiukainen Culture. Abundant charred cereal grains, including grains of Hordeum vulgare var. nudum, and field weeds were found. The accelerator age of the original grain find (3200±170 B.P.), corresponding to 3620-3260 cal BP, and confirmed by the presence of Cerealia pollen grains of the Hordeum type, makes it the oldest grain indicating cultivation so far found in Finland. For the comparison, macrofossil cereal grain finds in S Finland studied by several authors are also presented.

Lake Agras (Macedonia) as a model of coal formation

LOH, HARTMUT; VELITZELOS, EVANGELOS; RIEGEL, WALTER (Poster)

Peat formation is currently taking place to various extents around a number of karst or tectonically controlled lakes in Greece under topographic, hydrologic and climatic conditions which may be closely comparable to those leading to the major lignite deposits of the Pliocene and Pleistocene in SE Europe and the Eastern Mediterranean. Lake Agras in Western Macedonia is a karst lake representing a stage of lake development in which peat formation has nearly closed the open lake surface. Five peat forming environments can be distinguished: open lake environments with a dense submersed vegetation, dense stands of Phragmites, sedge reed, hummocky reed and environments with a degraded peat surface. The various peat types formed in these environments were characterized petrographically and traced to a depth of 12 m. This way, a number of lake level fluctuations can be reconstructed for the Holocene. In addition, microtome sections of these peat types were analysed microscopically in order to study the early diagenetic development of coal macerals. It can be shown that the general habitus of brown coal lithotypes is not merely controlled by primary conditions existing during peat formation but significantly altered from peat by secondary processes. Compaction and dehydration may exert a considerable influence on the appearance of macerals and may be important factors in the transformation of peat to lignite.

Ober die ausgestorbenen Mastixiaceae (Cornales) in Europa

DIETER H. MAI

Bei der karpologischen Bearbeitung von Tertiärfloren in Europa überrascht die Häufigkeit und der Formenreichtum der Mastixiaceae. Die Familie der Cornales besteht heute nur aus den Gattungen Mastixia BLUME (19) und Diplopanax HANDEL-MAZZETTI (1).

Die Erforschungsgeschichte fossiler Mastixiaceae im europäischen Tertiär begann mit der Entdeckung der Steinkerne von Mastixia BLUME (10) durch C. & E.M. REID 1910. KIRCHHEIMER bezeichnete fossile Floren mit Mastixiaceen - Gattungen als "Mastixioideen - Floren". Sie bestehen aus einer Anzahl von ausgestorbenen Gattungen, die sich karpologisch unterscheiden lassen. Die Revisionen von MAI, GREGOR, HOLÝ von 1964 bis 1987 führten zu einer starken Reduktion der Gattungszahl, aber zu einer Erhöhung der Artenzahl. Unterscheidbar sind die ausgestorbenen Gattungen Beckettia REID et CHANDLER (2), Eomastixia CHANDLER (7), Mastixicarpum CHANDLER (4), Mastixiopsis KIRCHHEIMER (2), Retinomastixia KIRCHHEIMER (3) und Tectocarya KIRCHHEIMER (3).

Fossil nachweisbar sind die Mastixiaceae in Europa von der Oberkreide bis in das Obermiozän, regional vom Atlantik bis zur Ägäis, oft in Massenvorkommen in laurophyllen Paläofloren. Als Relikt kommt Tectocarya im Pliozän des Kolchis- und Rheinrefugiums vor. Als bedeutsame Elemente subtropischer Vegetation in Europa zeigen die Mastixiaceae eine überraschend mannigfaltige Entwicklung und Familiendominanz. Biostratigraphisch sind alle fossilen Arten von Bedeutung.

Palaeofloristic and Palaeoclimatic Changes in Paleogene of the Kazakhstan and Mongolia.

MAKULBEKOV, Nurgali

Paleocene floras of Western and North Kazakhstan (Romankol', Tykbutak, Karakol', Maysk) belong to the subtropics of Gelindenian-Kamyshinian type. Extinct genera of Ushia, Dewalgea, large-leaved Neolitsea, Daphnogene and Ficus prevail in their composition. There also occur solitary ferns and conifers. Taxa with smooth edged leaves are not very important; mainly toothed forms being predominant. The climate was, probably, humid subtropical at that time.

Paleocene floras of Eastern Kazakhstan (the Zaysan Depression) consist mainly of warm-temperate taxa and belong to the ecotone region of the development of boreal and subtropical floras of northern hemisphere.

Paleocene floras of Southern Mongolia (Naran-Bulak, Tsagan-Khushu, Khaychin-Ula) and North China belong already to temperate floras with predominant Taxodium, Gobia, Trochodendroides, Trochodendrocarpus. The climate in Central Asia was semiarid at that time. The age of Paleocene floras in those regions is well dated by various faunas of invertebrates and vertebrates.

Eocene flora of Kazakhstan, except for its eastern part, had the subtropical Poltavian type with predominant smooth edged leather-like leaves of the Fagaceae and Lauraceae families. There are various xeromorphic bushes of the Ericaceae, Sapotaceae and Proteaceae families. Ferns were rare. The conifers were represented by subtropical forms. The presence of Palmae was characteristic.In southern areas of Kazakhstan, the importance of xerophytes increased. The climate was, probably, arid subtropical. In eastern parts of Kazakhstan and South Mongolia, the Eocene floras belonged to the temperate subtropics; Palmae being indicators of real subtropics, were absent from their composition. The climatic optimum of the Paleogene was in the middle of the beginning of the Late Eocene. At the end of the Eocene, there was a cooling of the climate, which led to a change of the subtropic floras to warm-moderate ones. That could be well observed on the boundary Eocene-Oligocene floras of Kazakhstan (Schandinsk graben, Romanovsk, Akzhar, Zhamantuz, Schiderti, upper Kiin-Kerich).

From the second half of the Early Oligocene, on the whole of the territory of Kazakhstan, except for southern regions, there was a prevailing temperate forest vegetation of the Turgayan ecological type with the dominants Alnus, Quercus, Fagus, Betula, Populus, Juglans, Hibiscus. The climate was becoming moderate-warm. Southern Kazakhstan, Middle and Central Asia partially remained in the region of the development of the sclerophyllous defoliatious subtropics. The climate was semiarid in that territory. At the end of the Oligocene, the importance of moderate-warm taxa was increasing here, but sclerophyllous vegetation complexes remained predominant, as before.

Spores et pollen du passage du Crétacé au Tertiaire à Brazos River, Texas, USA.

MEDUS,Jacques

Les résultats de l'analyse sporopollinique des prélèvements effectués le long de la coupe du Crétacé au Tertiaire sur le bord de la rivière Brazos au NE de Austin au Texas sont présentés en un diagramme des pourcentages relatifs.
Tout au long de la séquence des fluctuations cycliques sont observées sans qu'il apparaissent des renouvellements palynofloristiques.
Les taxons déterminés permettent de relier ces fluctuations à des variations de la ligne de rivage.

Samen und Früchte aus dem Köflach-Voitsberger Braunkohlenrevier - erste Ergebnisse

MELLER, Barbara

Aus der miozänen Braunkohle des Köflach-Voitsberger Braunkohlenrevieres (West-Steiermark) gab es bisher, außer einer durch ETTINGHAUSEN (1857) bearbeiteten Blatt-Flora und der palynologisch-biostratigraphischen Untersuchung von KLAUS (1954) keine paläofloristischen Untersuchungen. Die braunkohlenführenden Schichten galten als fossilarm. Seit 1982 wurden jedoch Blätter und Fruktifikationen aus dem Ende der 70er Jahre begonnenen Tagebau Oberdorf/Bärnbach gesammelt. Der 1990 neu aufgeschlossene Tagebau West in Köflach und weitere Aufschlüsse im Westrevier im Bereich ehemaliger Abbaue ergänzen das Oberdorfer Material. Auffallend ist bisher der Reichtum an Koniferen, und zwar neben Sequoia ENDL. und Glyptostrobus ENDL. auch das gehäufte Auftreten von Cephalotaxus-Samen. Mastixiaceen und Rutaceen gehören dagegen zu den seltenen Elementen.

Xerophytic plant forms in the Paleogene floras of Yugoslavia.

MIHAJLOVIC, Dorde

A large number of plant species, defined as xerophytes, were determined already in the earliest palaeobotanical works (UNGER, ETTINGSHAUSEN) from Yugoslavia. Subsequent investigations, to the present day, have registered, occasionally numerous, xerophytic plant elements in many localities all over Yugoslavia.

A dominant number of xerophytic "species" have not the final taxonomic classification. Many fossil remains (leaves mostly) were identified, in the early stages of investigation, with similar species of the present time. The earlier determinations are critically analysed, and the importance of modern criteria for recognition of xerophytic plant forms is considered.

Studies of Late Eocene and Early Oligocene floras from Yugoslavia have resulted in the establishment of many xerophytic and sub-xerophytic plant forms, and some xeromorphic forms which have their Neogene and recent congenial forms existent in subtropical and wet climates. The most conspicuous xerophytic element of Late Paleogene floras is the species Zizyphus zizyphoides which, together with various small-leaved forms (dominantly of Leguminosae type) and other different, marginally determined, forms, constitutes a significant component of both Paleogene floras of Yugoslavia and many synchronous floras of Southern Europe and Central Asia, prevailing in archipelago- dominant regions and on the rugged continental margin (Tethyan phytogeographic province).

A late Miocene leaf flora from southern Crete (Greece).-

MOHR, Barbara, KöHLER, Juliana and ADAMEK-JACOBS, Elizabeth

Plant fossils occur in late Miocene strata (early Tortonian) of southern Crete (Ierapetra region, Makrilia Formation). During the 1991 field season, about 190 specimens were collected, and are being described. The flora, comprising mostly fragments of foliage, but also well preserved leaves and fruits, is found in marine strata which are dated with forams and nannofossils (N 16, NN 10, age: about 9 m.y.). Since well dated paleofloras are rare, this megaflora is of special importance for understanding late Miocene forest environments in the Eastern Mediterranean. The outcrop is located in the middle part of a more than 300 m high sequence, consisting of late middle Miocene to early Pliocene sediments. These had accumulated during the subsidence and fracturing of the southern continental margin of the Aegean land mass.

The flora is moderately diverse, with about 40 different taxa. The following families are recognized: Equisetaceae, Pinaceae, Taxodiaceae, Cupressaceae, Aceraceae, Betulaceae, Fabaceae, Fagaceae, Lauraceae, Magnoliaceae, Myricaceae, ?Oleaceae, Salicaceae, Sapindaceae, Ulmaceae, and Vitaceae. The leaf flora can be classified as microphyll, with an average length of about 4 cm. The proportion of specimens with entire margins is about 55 to 60%, and lobate leaves make up about 4%. The highest number of leaves can be classified as lanceolate (35-40%), followed by ovate and elliptic shapes (each about 15%). The high percentage of small leaves is probably mostly caused by taphonomic effects, such as long transport and redeposition. The high number of leaves with narrow shapes might represent environmental conditions, namely riverine or coastal environments.

Rekonstruktion der miozänen Klimaverhältnisse im Bereich der Niederrheinischen Bucht

MOSBRUGGER,V., SCHILLING,H.-D., UTESCHER,T. (Poster)

Paläoklima-Rekonstruktionsmethoden für das Pleistozän sind soweit fortentwickelt, daß Proxi-Daten verschiedener Herkunft und die numerische Klimamodellierung sich kontrollierend zu Aussagen ergänzen, die eine auf diesem Gebiet bisher nicht gekannte Konsistenz erreichen. Diese Entwicklung sollte auch für das Tertiär eingeschlagen werden, da der paläontologisch-geologische Ansatz (sog. Proxi-Daten für Klimavariable) allein bisher zu sehr unscharfen und teilweise widersprüchlichen Folgerungen für das vorherrschende Klima geführt hat. Hinzu kommt allerdings, daß die sehr wenigen bisherigen Klima-modellierungen für das Tertiär (ausnahmslos globale Domäne) wegen der unsicher geschätzten Randbedingungen nur bedingt informativ sind. Für das Gebiet des Niederrheinischen Braun-kohlereviers ist die Datensituation prinzipiell besser, sodaß eine regionale Klimarekonstruktion in Frage kommt -die numeri-sche Rekonstruktion mit einem regionalen Klimamodell einschlie-ßend.

Reconstruction of the Neogene paleoenvironment in Hungary.

NAGY, Eszter

The paleoenvironment for the Hungarian Neogene were sketched up upon palynology. In the Egerian holostratotype sandy shore were significant with tropical fernery. In the Eggenburgian the sporomorphs showed a terrestrial environment in South Hungary, and in north open water coast with swamp forest. In the Ottnan-gian there were rich riparian forest in South Hungary, and in the north brown coal-forming swamp forest. In Karpatian time in South and Middle Hungary there were very rich riparian and hillside forests, and in the north a poorer vegetation was for-med by the transgression. In the Early Badenian the present-day geographical pictures appeared. In the Late Badenian hill-side forest turned to be characteristic. In the Sarmatian a contact with the East Europeen sea came into existence, and the flora became poorer. In Pannonian and Pontian time a hil-ly land surrounded the brackish-water inland sea. The mixed deciduosus and hillside forests were composed of warm-tempera-rate and temperate elements.

Zur Besiedlung des mittleren Alpenraumes während der Bronze- und Eisenzeit: Die Vegetationsverhältnisse

OEGGL Klaus

Jüngere pollenanalytische Untersuchungen und paläoethnobotanisch erfaßte Einzelfunde von verkohlten Pflanzenresten aus archäologischen Grabungen erlauben erste Einblicke in die Umweltverhältnisse und Nahrungswirtschaft im mittleren Alpenraum während der Bronze- und Eisenzeit.

Am Beginn der Bronzezeit werden die Haupttäler, deren Mittelgebirgsterrassen und die tieferen Lagen in den Seitentälern stärker besiedelt. Rodungen in den montanen Wäldern dienen als Siedlungsraum und Ackerflächen. Pollenfunde von Spitzwegerich (*Plantago lanceolata*) oberhalb der Waldgrenze zeigen eine Hochweidenutzung der alpinen Grasheiden ab der frühen Bronzezeit an. Mit einer Almwirtschaft im eigentlichen Sinn ist ab der frühen Eisenzeit zu rechnen. Dafür sprechen Brandrodungen in den subalpinen Wäldern zu dieser Zeit.

Einzelinformationen über Kultur- und Nahrungspflanzen geben verkohlte Pflanzenreste aus archäologischen Grabungen. An Getreide sind Einkorn (*Triticum monococcum*), Emmer (*Triticum dicoccum*), Gerste (*Hordeum vulgare*) und Rispenhirse (*Panicum miliaceum*) angebaut worden. Hafer (*Avena* sp.) und Roggen (*Secale cereale*) waren nach den vorliegenden Funden als Feldfrüchte in der Bronze- und Eisenzeit im mittleren Alpenraum unbedeutend. Eine wichtige Proteinquelle war die Saubohne (*Vicia faba*). Sie dominiert neben Erbse (*Pisum sativum*) und Linse (*Lens culinaris*) unter den nachgewiesenen Leguminosen. An Wildpflanzen wurde Haselnuß (*Corylus avellana*), Buchecker (*Fagus sylvatica*), Eichel (*Quercus* sp.), Kornellkirsche (*Cornus mas*), wilde Birne (*Pyrus pyraster*), Erdbeere (*Fragaria* sp.) Himbeere (*Rubus idaeus*), Hollunder (*Sambucus nigra*) und die Weinbeere (*Vitis vinifera*) für Erbährungszwecke gesammelt.

DIATOM BIOSTRATIGRAPHY AND COMPARATIVE CORE CORRELATION WITHIN SOFIA BASIN, BULGARIA

OGNJANOVA-RUMENOVA, Nadja (Poster)

The investigated sediments belong to the Novi Iskar Formation, Sofia basin (Kamenov, Kojumdjieva, 1983). The Formation is dated as upper Miocene - lower Pliocene by contained vertebrate faunas and mollusca. 115 samples from four core-drills and one axial section have been studied.

Rich and interesting diatom flora has been establisned - 365 species, varieties and formae. The characteristic diatom assemblages are found out.

Diatom biostratigraphic zones have been determed on the basis of multivariate analysis.

A reconstruction of the paleoecological conditions at the time of sediment formation has been made.

Some angiosperms of the Bohemian Cenomanian - palaeoecology and evolution

PACLTOVÁ, Blanka

Fossil remains of angiosperms - inflorescence axis - from the Bohemian Upper Cenomanian have been analysed. Some badly preserved triporate pollen with poral thickening has been found in the fossil flower of Myricanthium amentaceum Velen. The latter character suggests the primitive Normapolles pollen. Tracheids with spiral thickening as well as primitive cuticles have been isolated from the floral axis. The palynospectrum suggests see shore - fluviatile environment.

ON TWO FORGOTTEN SARMATIAN FIXED FLORAS FROM YUGOSLAVIA AND BIOSTRATIGRAPHICAL IMPORTANCE AND THEIR PALEOPHYTOGEOGRAPHICAL

Nikola Pantić

Two fossil floras (Radoboj, Sused) of accurately defined age, both Sarmatian, that were known in the last century, are considered by the autor.

The two important fixed floras have long been neglected in the Central European literature, because the composition of their "associations" did not fit the general picture of the Sarmatian floras of Europe. Because of the extremely hot-climate character of these floras, many authors maintained that they could not be Sarmatian but older.

The inclusion of Sarmatian fossil flora from the two localities into the system of Central and Southeastern European fixed floras will contribute to a clearer interpretation of paleoclimatological situations during the Sarmatian, and will establishing a more reliable base for phytostratigraphic correlations.

Late Carboniferous Floras of Yugoslavia and their Plaeobiogeographical Significance.

PANTIC, Nikola and DULIC, Ivan

Balkan peninsula, and the territory of Yugoslavia in particular, has localities of Late Carboniferous fossil land floras, which can be very important for the reconstruction of palaeophytogeographic provinces of the Late Palaeozoic. Macrofloras have been studied so far, and now the microfloral studies are in progress.

The provenience of macrofloral remains are 3 areas distant from each other in the Carboniferous:

- Macrofloras (and microfloras) from Late Carboniferous limnic series which existed in the Eurasian land (eastern Serbia, Bulgaria);
- Macrofloral remains (preliminary also microfloras) from Late Carboniferous paralic series of the calcareous Dinarides (Velebit Mt.), which are supposed to have belonged to a land vegetation similar to that of the Southern Land - Gondwana; and
- Macroflora from Bosnia and Slavonia (Middle and Upper Carboniferous age) commonly contained in deep-sea (partly flysch?) deposits of the Palaeozoic Tethys.

The authors consider the significance of these Late Carboniferous floras for palaeobiogeographical reconstructions of the Carboniferous and for interpretation of the subsequent geodynamic events.

Fossil evidence for ancient food plants in Ukraine

PASHKEVICH Galina

Archaeobotanical research in Ukraine of all ages / Neolithic, Eneolithic,Bronze and Iron ages,Old Rus/is reviewed.The finds of archaeological plant remains in Ukraine are from 200 sites. The oldest cultivated plants are connected with the neolithic Linear Pottery culture /about 5000 years bc/.Plant remains include emmer,einkorn,barley and millet.Barley /hulled form/ played an important role during the Eneolithic Tripolyan culture and Bronze Age.The hulled wheat were most common from neolithic time to the 10-th century.Bread and club wheat became a separate crop as late as Late Middle Ages.Rye must have been cultivated in mono-culture at the end of the 1st millenium.Millet was a typical crop of the Scythian tribes and was present in almost all younger cultures.Most popular cultivated plants in Ancient Rus were rye and naked wheat /among cereals / and pea / among pulses/.The typical palaeoethnobotanical complex of Old Rus /10-13 century/ consist from naked wheat,hulled wheat /less commonly/,barley /hulled variety/, millet,rye,oat and pulses:Pisum sativum,Lens culinaris,Lathyrus sativum.Other crop plants included flax /Linum usitatissimum/,hemp /Cannabis sativa/,opium poppy /Papaver somniferum/. Traces of Brassica campestris and Camelina sativa were also found.Finds of fruits and nuts are scarce in Ukraine.Vine seeds were common in material from Crimea /in Greek and Scythian sites/.

Répartition du genre mésozoïque Xenoxylon (Gymnospermes).

PHILIPPE marc

Le genre Xenoxylon regroupe des bois secondaires d'anatomie bien caractérisée. Il est connu uniquement au Mésozoïque et dans l'hémisphère nord.

Sa répartition géographique est circumpolaire au sens large. Elle est d'autant plus étroite que la période est chaude. Les cartes paléoclimatologiques montrent que les bois de ce genre ne se rencontrent que dans des zones relativement bien arrosées.

Sa répartition sédimentologique en Europe occidentale au Jurassique montre que le genre est lié aux épisodes terrigènes et aux hauts niveaux-marins relatifs.

Xenoxylon n'existerait en Europe occidentale au Jurassique qu'à l'occasion de périodes froides et/ou humides. Ces observations interviennent dans le domaine controversé des relations entre climat et eustatisme. Elles montrent également l'existence de pulsions climatiques au sein du Jurassique.

Miocene seeds of Melastomataceae from Central Europe with a review of the fossil history of the family

PINGEN Maria and COLLINSON Margaret

Fossil seeds of the Melastomataceae are described. They were recovered from a middle (?) Miocene deposit of the Lower Rhine Basin in West Germany. Differences to morphologically similar seeds of other families are discussed. Whether these seeds are conspecific with Polish and Russian material is being investigated.
Additionally, the literature on fossil Melastomataceae s.l. and the revision work that has been done subsequently are reviewed. Records are known from all continents apart from Australia, but most citations are from Europe and North and Latin America.
Fossil remains of the family are recorded as flowers, pollen, fruits, seeds, leaves, and wood. Most of the flowers, fruits, and leaves were revised afterwards or rejected because of bad preservation. No leaf identification was based on modern methods but only on morphological details. The single leaf which was re-investigated by cuticular analysis turned out to be a Lauraceae. In contrast to the poor leaf record, other fossil organs caught attention previously: pollen, seeds, and wood. These are rarely obtained but seem to provide more secure evidence of the presence of the family in the past.
The occurrence of fossil remains of the family in Europe is discussed against the hypothesis of a probable migration of Recent Melastomataceae ancestors from a centre of evolution in the "Gondwana" continent to the present pattern of distribution as proposed by NAYAR (1972).

Palynological study of slightly metamorphosed Palaeozoic rocks in West-Carpathian Region.

PLANDEROVA, Eva

Palynological data on the Palaeozoic of the West-Carpathian region mostly concern metamorphosed sediments. I have studied Early Palaeozoic metasediments in the Malé Karpaty Mts., the Nizke and the Vysoké Tatry Mts. I have found out, that on the metamorphosis to the green-schist facies some palynomorphs were preserved, indicative of the age of crystalline schists. The age of metasediments in all the areas studied ranged from the Late Silurian to the Early Carboniferous.

The age of most metasediments is Late Silurian - Lower Devonian: Cymatiosphaera nebulosa DEUNF., Duvernaysphaera tenuicingulata STAPLIN, Cymbosporites conatus BHARADW. Palynological research resulted in data denying the Proterozoic age of the metasediments.

Palynological data on the Late Palaeozoic mostly result from the study of anchimetamorphosed sediments, particularly of dark shales. Microflora from profiles in the Nizke Tatry Mts. proves the Stephanian A-C to Permian age of these sediments.

Late Permian sediments in profiles and wells offered plentiful microflora for palynological research. Basing on correlation with Late Permian microflora of Hungary (BARABAS - STUHL, GOCZAN) we (I and GOCZAN) have distinguished microfloral zones, also indicated by fauna. Following is a brief description of 6 West - Carpathian microfloral zones:

Zone 1: Potonieisporites div. sp., Florinites div. sp., Striomonosaccites div. sp. (Early Permian - Autunian)

Zone 2: Lueckisporites virkkiae, Nuskoisporites dulhunytyi, Vittatina div. sp., Protohaploxypinus sp. (Late Permian - Late Saxonian)

Zone 3: Jugasporites delasaucei, Gardenasporites, Lueckisporites virkkiae, Lunatisporites (Late Permian - Early Thüringian)

Zone 4: Lueckisporites virkkiae, Klausipollenites minimus, Jugasporites delasaucei, Paravesicaspora (Thüringian)

Zone 5: Klausipollenites div. sp., Gutullapollenites, Crucisaccites sp. (Late Permian - Late Thüringian)

Zone 6: Karpatisporites div. sp., Klausipollenites minimus, Gnetaceaepollenites, Cycadopites sp. (Latest Thüringian).

The microfloral zones are widely correlable. Sporomorph assemblages 4 - 5 are correlable with assemblages from the upper part of the Upper Rotliegendes and Zechstein.

Microflora of the zone 6, different from Late Thüringian microflora in Hungary comprises an assemblage indicative of the Permian catastrophe. Sporomorphs are extremely small and their generic composition is mostly monotypical (Karpatisporites, Cycadopites, Gnetaceaepollenites). It is probable, that the reduction of disaccate pollen dimensions and empoverished species composition of flora are due to unfavourable climate by the end of the Permian and at the beginning of the Triassic.

Paleoethnobotanical study of the Yunatsite Bronze Age Settlement Pazardzhik Area, Southern Bulgaria

POPOVA, Cvetana

A great quantity of carbonized plant materials collected in the course of 11 years at the Yunatsite settlement located in Southern Bulgaria has been the subject of study in this paper. The settlement dates back to the Early and Middle Bronze Age (3000 B.C.). Of interest is the established fact that the main cultivated cereal plants during the Bronze Age have been the following species: Triticum monococcum L., Triticum dicoccum SCRANK., Hordeum. The latter has been represented by Hordeum vulgare L. and Hordeum vulgare var. nudum. The six - row Hordeum vulgare prevails. With a very few exceptions no naked-grain wheats have been found in the materials under study. Grains and hulls of the speltoid type have been found so Triticum spelta L. has probably been an admixture to the crops of other wheat species.

Leguminous plants are represented by Lathyrus sativus L., Lens culinaris MEDIK., Pisum sativum L. and Vicia ervilia WILLD.. Fruits of Quercus and seeds of Sambucus nigra L. have been found.

Results of different explored horizons of the settlement under study have been summed up and compared in the paper. Comparisons with plant material of other nearby sites have been made.

The results show an analogical species composition of cultivated plants over that period, as well as the stability of agricultural traditions of the producing economy in the region of South Bulgaria.

Two conifers from the Liassic flora from Odrowąż in Poland

REYMANÓWNA Maria

Elżbieta Wcisło-Luraniec and Jadwiga Ziaja tell us about the composition of the megaflora and microflora from Odrowąż and about the distribution of similar megafloras in Europe. I am to present some details about two extinct conifers - Hirmerella muensteri and Swedenborgia sp. - from this flora in order to give us a better idea about the Liassic vegetation.

Both conifers have unusual, lobed seminiferous scales. Hirmerella, similarly as in Franconia from where it was described, is represented by well preserved female cones, characteristic separate seminiferous scales, male cones with pollen and shoots covered with small scaly leaves. Though the plant is well known thanks to the work of several authors, mainly on the material from Franconia, there are still unsolved questions concerning e.g. its pollination biology. As the single seed is completely enclosed in the seminiferous scale, it is not clear in which way occurred the pollination by the unusual Classopollis pollen grains.

Swedenborgia sp. has characteristic seminiferous scales with five lobes, each bearing a rounded scar where the seed was attached. The scale appears fleshy and is covered with a thin cuticle. Other parts of the plant are not known, though its leaves were possibly of the Podozamites type.

Conifers similar to Hirmerella and Swedenborgia occurred frequently in Mesozoic floras of different age.

Ecological aspects of coal formation in Neogene basins of Greece

RIEGEL, WALTER; KAOURAS, GEORGIOS; VELITZELOS, EVANGELOS

Coal formation in Neogene basins of Greece is closely associated with lacustrine sedimentation and may result from peat formation along lake margins during phases of lake level rise and transgression or during phases of stable lake level and subsequent encroachment of the vegetation fringe and lake closure. During the Miocene peat formation seems to be initiated and terminated by reed marshes and aquatic fringes, but the main peat forming environment is dominated by taxodiaceous swamp forests (e.g. Aliveri, Vegora). During the Pliocene (e.g. Ptolemais) and also during the Pleistocene coals originate from a repeated change of open lake, floating leaf aquatic and reed marsh environments and are frequently characterized by a close alternation of marls and coal beds. The observed difference between Miocene and Pliocene coals in Greece indicates that the Messinian event exerted considerable stress on the azonal vegetation in the Mediterranean region.

In applying high resolution petrographic, palynological and sedimentological analysis it is possible to reconstruct a detailed history of events and the successions of plant communities commonly observed in lacustrine environments. This can be considerably enhanced by comparisons with modern peat forming environments in lakes of the region.

The environment of the Pavlovian - palaeoecological results from Bulhary, South Moravia.

RYBNICKOVA,Eliska & RYBNICEK, Kamil

The reconstruction of palaeovegetation and palaeoenvironment of the Palovian (Gravettian) in the Pavlovske vrchy Hills (region South Moravia, Czechoslovakia) is presented. Pollen and macroscopic analyses of buried peat, dated back to about 25 000 years B.P., from the Bulhary core indicate existence of park-forest vegetation with an unusually rich herb-layer (Pinus sylvestris, Pinus cembra, Larix europaea, Picea abies, Juniperus communis, Salix, grasses, sedges). The composition and structure of this past vegetation is similar to the present-day vegetation at the alpine forest limit in the Carpathians or in the Alps and indicates also similar climatic (and edaphic?)conditions.

MORPHOLOGY OF THE FAGUS POLLEN FROM THE MIDDLE MIOCENE SEDIMENTS OF BYELORUSSIA

RYLOVA, Tatyana (Poster)

Palynological investigations of the Middle Miocene broun coals on the territory of Byelorussia testify to a considerable diversity of the flora existed at that time (Manykin, 1966; Burlak, 1977; Rylova, 1988).Morphological peculiarities of nearly 100 fossil pollen grains of Fagus from the Middle Miocene profile Smolarka of Byelorussia were studied under light and scanning electron microscopes. Six new, in all probability, extinct species of Fagus was determined. Formerly two species of Fagus (F.aff.sylvatica L. and F.cf.japonica Maxim) were described from these sedimente (Manykin, 1966). Diagnostic features taken as a principle of the species definition are: shapes of pollen grains and their dimensions; diameter of the ora and its correlation with the width of colpus;depth of the ora immersion; diameter of apocolpia; width of mesocolpia; configuration of the exine near the margin of colpus; thickness of the exine and of its surface structure. The comparative morphological analysis of fossil pollen grains with the pollen of 11 recent species of Fagus showed their visible difference in some features and didn't allow to identify them to any specific species of the recent flora. Fossil pollen grains differ mainly by the considerably smaller dimensions, the thinner exine and the pattern of its surface structure.

Miocene/Pliocene boundary problem as arisen from palynostratigraphic studies of sediments from Gnojna /South-Western Poland/.
SADOWSKA Anna

Palynological investigations of the youngest Neogene sediments /Gozdnica series/ from eastern part of Fore-Sudetic Block show that mixed mesophilous forests were dominating during the time of their sedimentation. Such trees as Ulmus, Fagus, Quercus, Carpinus, Alnus, Betula, Carya, Pterocarya, Pinus /mainly P. silvestris type/, Taxodiaceae-Cupressaceae, Abies and Picea prevailed. They were accompanied by Acer, Liquidambar, Tsuga, Sciadopitys, Parrotia, Ostrya, Engelhardtia and low amount of shrubs. Among herbaceous plants Polypodiaceae, Labiatae and Gramineae dominated. The changes of vegetation in the profile correspond with the lithostratigraphic and sedimentologic investigations, showing the deepening of the basin in the upper part of profile.
The predominance of the Quaternary taxons over Tertiary, particularly Carpinus, Ulmus, Quercus and Fagus, considerable amount of Abies, Picea and low proportion of the thermophilous Miocene taxons prove the Pliocene age of flora. The remarkable quantities of Taxodiaceae-Cupressaceae and low percentage of herbaceous plants point to the Earliest Pliocene. The picture of vegetation is very similar to that from the well known Sośnica locality and indicates that Mixed and Broad-leaved Deciduous Forests were wide spreaded in all South-Western Poland during this time. The problem of the age of such floras up to now included to Pannonian-Pontian, in the light of new Neogene chronostratigraphic stage system must be considered.

Verkohlte Pflanzenreste aus neolithischen Siedlungsschichten in Asparn a.d. Zaya und Rekonstruktion prähistorischer Nutzpflanzenkulturen

SCHNEIDER Marianne

Seit 1983 laufen in Asparn archäologische Ausgrabungen im Bereich eines ovalen Grabensystems, das ins frühe Neolithikum datiert wurde.
Es wurden bandkeramische Hausgrundrisse mit dazugehörigen Speicher- und Abfallgruben, Backöfen und Arbeitsgruben entdeckt.
Mit einer systematischen archäobotanischen Probenahme und -aufbereitung wurde erst 1990 begonnen. Das Erdprobenmaterial aus den verschiedenen Objekten und Kulturschichten wurde direkt am Grabungsort flotiert (insgesamt über 6000 l). Obwohl die Funddichte allgemein gering und der Erhaltungszustand - wie bei fast allen neolithischen Pflanzenresten - schlecht war, ließ sich bisher das gesamte landwirtschaftliche Kulturpflanzenspektrum der Bandkeramik nachweisen: Einkorn, Emmer, Gerste, Erbse, Linse, Lein. Die Artenkombination der identifizierbaren Unkrautarten läßt auf frische, nährstoffreiche Ackerböden in diesen frühen Besiedlungsphasen schließen. Die archäobotanische Probenahme und - auswertung wird im Sommer 1991 fortgesetzt und soll zur Beantwortung von Fragen nach der Wirtschaftsweise unserer ältesten Ackerbaukulturen beitragen (Anbauformen, Bodenbearbeitung, Bodenqualität, Düngung, Erntemethodik, Getreideaufbereitung, andere Ressourcen).
Anschließend werden laufende Aktivitäten in Bezug auf Anbau und Rekonstruktion von prähistorischen Nutzpflanzenkulturen vorgestellt, sowohl für wissenschaftliche Zwecke, als auch für die Lehre und für museumspädagogische Beiträge.

Koniferen-Cuticulae der miozänen Flöze der Niederlausitz

SCHNEIDER, Wilfrid

In den vergangenen 25 Jahren gelang es, im Rahmen der Flözerkundung eine umfassende Inventur der Cuticulae dispersae der miozänen Braunkohlenflöze der Niederlausitz durchzuführen. Als nutzbringend erwies sich dabei die Anwendung morphographischer Taxa für bestimmte Gruppen von Cuticulae, insbesondere auch der Koniferen. Einige Koniferen-Cuticulae können synthetischen Taxa problemlos zugeordnet werden (Sciadopitys, Cunninghamia). Für die Mehrzahl der Cuticulae werden Species der morphographischen Gattungen Enormicutis, Verrucosicutis und Pinicutis benutzt.

Die neogene Koniferenflora Mitteleuropas ist von ihrer Platznahme nach der Regression des Rupelmeeres bis zu ihrer Vernichtung durch die Eiszeit in unterschiedlicher Quantität und Qualität an den periodischen palustren Verlandungen beteiligt. Die sensiblen Anforderungen der Arten an den Standort äußern sich in der Bindung der Fossilien an bestimmte Sediment- und Kohlenfazies:

1. Standorte im Moor:
1.1 Glyptostrobus-Swamp ("K-Fazies"): Glyptostrobus
1.2 Angiospermen-Buschmoor ("A-Fazies"): Cunninghamia, Taiwania
1.3. Pinus-Moor ("P-Fazies"): Pinus spinosa, Cryptomeria
1.4 Sciadopitys- (bzw. Sequoia-)-Hochmoor: Sciadopitys, Sequoia, Cathaya.

2. Mooren benachbarte Standorte:
2.1 Auenwälder: Tetraclinis, Tsuga
2.2 Nyssa-Taxodium-Sumpfwald (nicht torfbildend): Taxodium
2.3 Dünen: Pinus thomasiana

Unabhängig von der faziellen Bindung sind die Lausitzer Flözhorizonte durch spezielle Eigenarten der Koniferen-Flora unterschieden, die klimatische oder epirogene Ursachen haben. Die Phasenhaftigkeit der Flözbildung wirft die Frage nach den Refugien auf, in denen die palustren Coenosen unverändert überleben konnten.

New finds of the Lower Devonian from Roragen, Norway.

SCHWEITZER, Hans-Joachim & HEUMANN, Georg

New plant-fossils are described from Roragen, southeast of Trondheim, Norway. They were collected by O.SELLING (Stockholm, Sweden). The rocks of Early Devonian age (presumably Emsian) contain the folllowing plant remains:
Pachytheca sp., Sporogonites exuberans, Zosterophyllum myretonianum, Sawdonia ornata, Drepanophycus spinaeformis, Psilophyton burnotense, Psilophyton arcuatum, Aphyllopteris sp., Hostinella sp. A and B.

The genus Zosterophyllum is for the first time recorded from Roragen. All fossils previously determined as Psilophyton princeps belong to Sawdonia ornata, of which plant the first fertile specimens from Roragen are described. The stele of some specimens is structurally preserved and shows some new details. Fertile remains of Drepanophycus spinaeformis also occur in Roragen. Psilophyton burnotense, an older synonym of P.goldschmidtii, can certainly not be assigned to the genus Margophyton as suggested by ZAKHAROVA (1981). As already suggested by SCHWEITZER (1989) Psliophyton (Dawsonites) arcuatum is identical with Psilophyton forbesii from USA. The systematic position of Aphyllopteris is still uncertain. Two different species of Hostinella are represented by a rather complete structurally preserved material.

Tertiary woods from Southern Germany (Bavaria).

SELMEIER, Alfred (Poster)

More than 6000 wood fragments, partly big logs (600 kg weight), have been collected in Tertiary sediments N of the Alps (Private collections HABERDA and HOLLEIS et al.). Most of the material is deposited in the Bavarian State Collection of Palaeontology and Historical Geology, Munich. In April (1991) more than 2000 silicified wood pieces (Collection LANG) from classical localities near Wagenhofen (FELIX 1982) have been cut and prepared for further investigation.
Many wood fragments varicolored by iron mineral stain show often a very good anatomical structure.In the following list only the family and the corresponding Modern comparable taxa are specified, not the fossil genus (-oxylon). Identification due xylotomic features with thin-sections:
Gymnospermae: Cupressaceae, Pinaceae (Pinus), Podocarpaceae (Dacrydium), Taxodiaceae (Sequoia). - Palmae.
Dicotyledonae: Anacardiaceae (Anacardium), Bombacaceae (Bombax), Ebenaceae (Diospyros), Euphorbiaceae, Fagaceae (Castanea, Castanopsis, Lithocarpus, Quercus) Juglandaceae (Carya, Juglans, Pterocarya), Lauraceae, Leguminosae (Acacia-type, Albizzia, Dichrostachys, Robinia), Loranthaceae (?), Meliaceae (Carapa, Cedrela), Platanaceae (Platanus), Rosaceae (Crataegus, Prunus), Rutaceae (Zanthoxylum), Salicaceae (Populus), Sapotaceae (Bumelia), Tiliaceae (Grewia; tile cells), Ulmaceae (Celtis, Ulmus). Special information concerning the above mentioned taxa, see Selmeier,A.(1989): Funde verkieselter Hölzer aus dem nordalpinen Molassebecken und einigen Randgebieten. - Geologica Bavarica, 94: 409 - 446; München (124 references).
The wood anatomists under the palaebotanists, organised in the International Association of Wood Anatomists (IAWA), have already established - preparation of the joint project 2 years - a computerised FOSSIL WOOD DATABASE. More than 1000 references and many thousand different anatomical features of silicified dicotyledonous woods are available since March 1991.

Landscape-Forming Oaks of the Tertiary Colchis

SHAKRYL, Alexandra K.

In the Tertiary floras of Colchis both the evergreen and deciduous oaks are observed, which are attached to the coastal lowland, lower and middle mountain zones and form the broad-leaved forests beginning from Miocene up to Pliocene. Five species are of the Sect. Cerris - Quercus cerris fossilis KOLAK., Q.kubinyi (KOV.ex ETTINGSH.) CZECZ., Q.pseudocastanea GOEPP., Q.cerrisicarpa KOLAK., Q.microcerrisicarpa KOLAK.; of the Sect. Quercus - Q.kodorica KOLAK., Q.pseudorobur KOV.; of the Sect. Heterobalanus - Q.sosnowskyi KOLAK. and Q.mediterrana UNG. of the Sect. Ilex.
Quercus kodorica KOLAK. in pair with Carya denticulata (WED.) ILJINSK. are the bright examples of the absolute dominance of the lower coastal forest in the vegetable formation.
A quite unique type of the hard-leaved oak forest formation with domination of the Q.sosnowskyi KOLAK. is observed in the Kodor Pont. Some genera of the hornbeams appear here as co-dominants. It is floristically the richest forest formation, having the considerable admixture of the typically Mediterranean hemixerophyllous complex and the undergrowth of the "Colchidian" type.
In the Miocene-Pliocene of Colchis in the structure of the landscape-forming formations oaks are observed which have been wide-spread in the Tethys region, such as Q.kubinyi (KOV. ex ETTINGSH.) CZECZ., Q.pseudocastanea GOEPP., Q.pseudorobur KOV., Q.mediterrana UNG. and Q.cerris-fossilis KOLAK. The last was the absolutely characteristic edificator of the west Mediterranean mountain type of forests and apparently played a significant role in the Colchidian flora. It is a younger formation in which the exotic elements disappeared and the elements of the contemporary Colchidian forest turned out to be characteristic.
Only in the Pontic flora of Kodor representatives of the ancient evergreen oaks were inhabited such as Cyclobalanopsis kryshtovichii (KOLAK.) KOLAK., Lithocarpus longifolia (KOLAK.) KOLAK., L.palaeouncinata KOLAK., similar to the species of subtropical Indo-Malaya mountain flora.
It should be noted that the ties of relationship of the Colchidian oaks does not exceed the bound of the Mediterranean mountain region. The presence of these oaks and some species of Castanopsis also testifies the possible ancient unity of the subtropical flora in the whole space of the Eurasian part of the Mediterranean mountain region.

LIVING TOGETHER - A MICROECOLOGICAL STUDY

SKARBY, ANNIE (Poster)

The Upper Cretaceous fluviolacrustrine sequence preserved at Åsen in northeastern Scania, Sweden, comprises sediments from the whole range of environments along the lower reaches of a meandering river: Gravel from the active channel, sand or clayey sand from point bars, and overbank flood-plain deposits. Many layers contain exquisitely preserved plant fossils and associations of pollen, spores and other acid-insoluble microfossils. One brownish-black, fine-grained lens, 10 cm long and 3 cm high, is interpreted as the bottom sediment of a small pool of standing, humus-rich water. It has yielded different type s of zygospores produced by zygnemataceous algae, Sphagnum spores, megaspores and microspores of Selaginella and Isoetes, spores of Club mosses and ferns, all of which may have been growing in or immediately around the pool. The tricolpate and tricolporate angiosperm pollen and the Normapolles forms present were probably wind-transported.

Biomechanics and maximum height of some devonian land plants

SPECK, Thomas

As fossil plant stems cannot be tested experimentally, other non-experimental approaches have to be employed. First one has to calculate the geometrical parameters (cross-sectional area, axial second moment of area), which together with structural parameters determine the bending stability of a plant stem resp of its tissues. Then, the elastic modulus (a structural parameter) of the different tissues has been estimated quantitatively, using experimental data for tissues of living plants with similar cell wall structures. If plant stems are seen as composite materials, these parameters allow to calculate the contribution of the different tissues to the bending stability and the flexural stiffness of the whole stem. For some early land plants without hypodermal steromes (*Aglaophyton major, Asteroxylon mackiei, Drepanophycus spinaeformis, Horneophyton lignieri, Rhynia gwynne-vaughanii*) these calculations prove that parenchyma, when fully turgescent, is by far the predominant contributory factor towards the bending stability of the upright axes. In taxa with hypodermal steromes (*Gosslingia breconensis, Leclercqia complexa, Psilophyton dawsonii*), these steromes contribute most to the bending stability. In *Cooksonia* and *Zosterophyllum* calculations have been done for both cases, i.e. with or without hypodermal steromes. Furthermore the parameters mentioned above allow to estimate the maximum height these plants could reach before their axes fail by mechanical instabilities. Using the tapering of stem fragments, for some taxa the length of the axes has also been geometrically estimated.

The "relative conducting area" of some early devonian land plants

SPECK, Thomas (Poster)

The transpirating surface of early devonian land plants in first approximation corresponds to the surface of the branched axes plus (if existing) the surface of the enations resp microphylls. It is assumed that the surfaces of aerial axes and enations resp microphylls have the same transpiration rate. This assumption holds for the herbaceous early devonian land plants in which as well axes as enations resp microphylls (if existing) have been photosynthetically active and the differentiation of organs was relatively poor. Taking into consideration mechanical properties, maximum diameter of stems, tapering mode, branching mode and (if existing) size, shape and phyllotaxis of the enations resp microphylls of early land plants, enables one to calculate maximum height, volume and total transpirating surface of these plants. The ratio of a plants total transpirating surface in [mm^2] to the cross-sectional area of its water conducting tissue in [mm^2] yields a dimension-less number, called "relative conducting area". The "relative conducting area" is calculated for some early devonian land plants (*Aglaophyton major, Asteroxylon mackiei, Drepanophycus spinaeformis, Rhynia gwynne-vaughanii*) under the assumption of various branching modes and branching frequencies. The results of these calculations are compared with data from recent plants from ecologically different habitats. Then potentials and problems of this method are discussed, especially in connexion with conclusions concerning the ecology of fossil plant taxa.

RESULTS OF POLLEN ANALYSIS OF THE LATE GLACIAL IN THE MORAVIAN KARST

SVOBODOVÁ Helena

The problems of resistance of sporomorphes in cave sediments has been subject of discussions for many years. Pollen analysis of cave sediments in the area of the Moravian Karst yielded new results from the period dated by stratigraphy and archaeology to the Late Glacial. One of the key sites is the Barová cave in the central part of the Karst area. It was possible to correlate the pollen analytical and malacozoological results in the time span from the cold Pleniglacial (layer 14) to the end of Late Glacial (layer 10 a). By palynological approach we estimated three warmer oscillations with forestation (Barová 14, Barová 12b and Barová 10a). Other results from next sites in the Moravian Karst, especially from Kůlna and Kolíbky, correspond to the colder periods of the Late Glacial. Palaeobotanical reconstruction based on data of the Karst may be supplemented and compared with data from peat profiles in other parts of the South Moravia.

Earliest Upper Cretaceous palynomorphs of basal (transgressive) strata in Blansko Graben (Moravia, Czechoslovakia)

SVOBODOVÁ MARCELA

Excelently preserved plant microfossils, till the present unknown in northern part of Bohemian Cretaceous Basin, were found in basal non-marine and shallow-water marine sediments of probably Albian (?) and or Cenomanian age in four boreholes drilled in Blansko graben. The Blansko graben represents SE tip of the Bohemian Cretaceous Basin, which is a tectonic zone extended in NW-SE direction with an average width of 4 km and a length of 30 km, in which sediments of the Cenomanian-Lower Turonian were preserved. An unusual thickness, approximately 150 m of the non-marine and marine deposits have been regarded as Cenomanian. Both lateral and vertical changes of facies, as well as distribution of flora and fauna document transition from non-marine to shallow-water marine condition. The sedimentary rocks can be correlated with three formations - Peruc, Korycany and Bílá Hora and for more detail, litological units A-L have been distinguished in the Peruc and Korycany formations. Ten of them (A-J) provided sporomorphs, marine microplankton, fungal spores, foraminifers, scolecodonts, woody debris, enabling the description ten palynofacies types from marine and non-marine settings. Among palynoflora Tethyan (Neo-Evrope) elements have been observed.

THE VEGETATION AND VOLCANISM IN THE NEOGENE OF THE TRANSCARPATHIANS

SYABRYAJ SVETLANA V.

The explosive volcanism was one of the important factors under influence of which the plant cover of the Transcarpathians had changed during the Neogene. The local climate became more cold in the periods of active explosive volcanism which had been the most intensive in the Transcarpathians. The cold spell was more contrasting in the mountain region. These changes were rather weaker in the lower plant zones. The thermophilic elements disappeared and the role of thermotemperate ones increased in the plant assemblages; displacement of the boundary of mountain plant zones had taken place. In the end of the Early-the beginning of the Middle Miocene there were the mastixian flora in the Carpathian region, and in the Transcarpathians, where the first phase of orogenic volcanism was exstremely intensive, the rests of the mastixian flora hadn't found out. The plant assemblages were more temperate. The second phase of orogenic volcanism had some subphases. The first ones were not intensive. The decrease of temperature, especially in upper mountain zones had gone after the acid explosive eruption of the second phase (the Pontian). The expansion of dark-coniferous mountain taiga elements had taken place in these zones at that time. The third and forth phases of volcanism were rather weaker and its influence had expressed only in plant associations of high mountain zones. The periods of the development of more thermophilic vegetation in the Transcarpathians had corresponded to periods of relaxation of volcanism, and periods of more temperate vegetation had conformed to periods of activity of volcanism.

LE DEVELOPPEMENT DES FLORES DE L'UKRAINE ET DE SIBERIE: L'ASPECT COMPARATIF

TESLENKO, JURY V.

Les territoires comparés appartenaient aux phytochories differentes. Les changements climatiques communs provoquaient les changements adequats en vegetation. Avant le jurassic moyen, au Toarcien, l'eclat des xerophyles Cheirolepidiaceae a eu lieu ici, et beaucoup des fougeres thermophyles, characteristiques pour l'Ukraine et pour le region de l'Europe-Synia, ont pénétré à Siberie. Cette pénétration a été causé par une augmentation de la temperature et l'aridisation du climat en générale. Au Aalenien-Batonien en Ukraine les vegetaux tropicals et subtropicals (Filicales, Bennettitales, Cycadales), aus lignes de partage des eaux xerophyles Cheirolepidiaceae continuaient à exister. En Siberie les phytocenoses chaud-moderés se developpaient (Filicales, Ginkgoales, Czekanowskiales, Podozamitaceae). A la fin du Bajocien-Batonien en Ukraine aux lignes de partage des eaux les coniferes de la famille Podocarpaceae (?) se developpaient, dans les phytocenoses les Ginkgoales jouaient un rôle important, parmi les Cycadophyta on a remarqué une grande diversité systematique. En Siberie à la fin du Batonien-début du Callovien les Cycadophyta ont pénétré aux regions du cercle Polaire; on a registré l'augmentation progressive de la quantité des pollens Cheirolepidiaceae. C'est un temoignage de l'humidification du climat en Ukraine, de l'augmentation de la temperature et de certain aridisation en Siberie. Selon la quantité des pollens de Cheirolepidiaceae, au Callovien une aridisation considerable a déjà gagné l'Ukraine et Siberie.

Die Niederrheinische Bucht (BRD) im Neogen - Faziesentwicklung und räumlich-zeitliche Differenzierung der Vegetation

UTESCHER, T. ASHRAF, A.R. & MOSBRUGGER, V.

Die Niederrheinische Bucht zwischen Bonn - Aachen - Düsseldorf (BRD) ist ein bereits im Alttertiär angelegtes Riftbecken mit einer bis 1200 m mächtigen, überwiegend neogenen Sedimentfüllung. Sie umfaßt mit insgesamt 55 Milliarden Tonnen Braunkohlen Europas größte zusammenhängende Braunkohlenlagerstätte. Für das vorherrschend terrestrisch ausgebildete Neogen der Niederrheinischen Bucht sollen in einem interdisziplinären, langfristigen Forschungsprojekt die Entwicklung der Ablagerungsräume, der terrestrischen Ökosysteme und des Klimas in ihrer räumlichen Differenzierung und wechselseitigen Abhängigkeit untersucht werden. Hier wird über erste Ergebnisse dieses Vorhabens berichtet. Für sieben ausgewählte Zeitscheiben im Miozän und Pliozän werden Fazieskarten vorgestellt, die die räumliche und zeitliche Entwicklung des Ablagerungsraumes mit seiner Verzahnung von biogener und klastischer Sedimentation dokumentieren. Parallel dazu werden für die einzelnen Horizonte die räumliche Differenzierung der Floren anhand von Diagrammen dargestellt, die auch verschiedene ökologische Parameter der jeweiligen Vegetation (z.B. Wuchsform, Bestäubungs-, Ausbreitungsbiologie etc.) berücksichtigen. Weitere Ergebnisse des Forschungsvorhabens werden in den Vorträgen ASHRAF et al. und BELZ et al. vorgestellt.

Chemofossils from "Baltic Amber" - a contribution to the biochemistry of the "amber tree"

VAVRA, Norbert

Modern laboratory techniques of analytical chemistry (gas liquid chromatography/mass spectrometry) have largely extended our possibilities to study the chemistry of fossil resins ("ambers"). Results thus achieved can be used for characterization of resins as mineral species, for studies of the botanical origin ("paleo-chemotaxonomy") of the diagenesis of "chemofossils" and of the biochemistry of resin-producing trees.

By application of computer-aided GLC/MS techniques to soluble fractions of different varieties of Baltic Amber (=Succinite) a number of compounds could be identified by their mass spectra: fenchyl alcohole, caryophyllanoxide, methylisopropylbenzene, different substituted naphthalenes, tetrahydro-naphthalenes etc. These products, being the result of diagenesis, yield valuable informations concerning terpenes from which they had been formed. In respect to the oxidation of amber new data are available too: isopropylbenzaldehyde and cresol show the way in which oxygen may start the degradation of amber.

Our results in respect to resin acid patterns also confirm earlier finds published by GOUGH & MILLS (1972): the "amber tree" had a rather "strange" biochemistry which closely resembles the chemistry of Araucariaceae.

Lit.: GOUGH, l.J. & MILLS, J.S. (1972): The Composition of Succinite (Baltic Amber).- Nature, 239, 527-528.

THE GENUS BRASENIA IN THE EUROPEAN PLEISTOCENE

VELICHKEVICH, Felix (Poster)

Fossil seeds of the genus Brasenia were known from the past century as Holopleura, Cratopleura, Carpolithus and only thank to A. Weberbauer (1893) their belonging to Brasenia was ascertained. Several species and varieties were described in different time from the Pleistocene sediments of Europe. However there was no complete clarity about their number and age ranges till the presen. Author has studied the Brasenia seeds from the Eemian sediments of the profile Bogatyrevichi (the former profile of Samostrielniki) on the Niemen near Grodno where two species (B. nehringii and B. schroeteri) were described by W. Szafer (1925), as well as those from the Klinge profile near Cottbus in East Germany and from several profiles of the Early and Middle Pleistocene of Byelorussia. Results of detailed morphological, biometrical and anatomical investigations of the Brasenia fossil seeds showed that one polymorphic species its priority name being B. holsatica (Web.) Weberb. was widespread in the Late Pleistocene of Europe and European part of USSR. The genus Brasenia had the more complicated history in the Early and Middle Pleistocene. The polymorphic species of B. borysthenica Wieliczk., represented by special taxa in the range of variety in the different age interglacials was mostly widespread. Except of this species, B. belorussica T.V.Jakub. with an unclear taxonomy and B. interglacialis Dorof. with a doubtful species range were described from the Pleistocene of Byelorussia.

EARLY CRETACEOUS PALYNOFLORES OF THE UKRAINE

VORONOVA MARGARITA A.

The analysis of taxonomical composition of Early Cretaceous palynocomplexes of the Ukraine has allowed to single out two botanical-geographical zones. They can be observed all over the European palynofloristic province. The southern zone being under the influence of the Mediterranean basin, is characterized in the Neocomian by considerable occurrence of Cheirolepidiaceae, Bennettitaceae, Cycadaceae, Caytoniaceae, as well as of ferns Schizaeaceae, Dicksoniaceae, Matoniaceae. The vegetation of the northern zone was influenced by transgressions of the Boreal-Atlantic basin. Due to elevated climate humidity Lycopodiales, Selaginellales and different ferns were widely spread here. From the end of Barremian-Aptian times the reduction of surface of epicontinental seas took place, both of Boreal and those near the northern boundary of Tethys. This factor influenced the climate changes and restructuring of vegetation complexes. Previously predominant ferns Schizaeaceae were substituted by the representatives of Gleicheniaceae. Among gymnosperms the disappearance of Cheirolepidiaceae is observed, instead Pinaceae became widely distributed and the most ancient representatives of Angiospermae appeared. This marks a new stage in the Early Cretaceous evolution of floras. The taxonimic composition of Neocomian palynofloras is renewed up to 20-25% every century. A somewhat larger percentage of renewal was registered at the above mentioned stage, i.e. 30-35%.

The flora from Odrowąż in Poland – a typical Lower Liassic European flora.

WCISŁO-LURANIEC Elżbieta

The late Professor V.A. Vakhrameev /1964/ distinguishes in Eurasia two phytogeographic areas i.e. the Siberian area and the Indoeuropean area which consists of four provinces: The European, Middle-Asiatic, East-Asiatic, and the Indian Province. In Liassic times the European Province contained the floras of Europe and East Greenland. One of the characteristic components of the Lower Liassic flora of Europe is the conifer Hirmerella muensteri which occurs in Franconia /Germany/, in Northern France and in South Wales. Recently H. muensteri was found in Odrowąż in Poland, accompanied by a few other species such as Sphenophyta: Neocalamites sp. 1, Neocalamites sp. 2; Pteridophyta: Phlebopteris angustiloba /Presl/ Hirmer et Hoerhammer, and other not yet determined fern species; Pteridospermophyta: Pachypteris sp.; Cycadeoidophyta: Otozamites sp., Pterophyllum sp.; Coniferophyta: Hirmerella muensteri , Swedenborgia sp., Podozamites sp.1, Podozamites sp. 2 ; Fructifications incertae sedis: Stachyopitys preslii Schenk. Not far from Odrowąż are the localities with Liassic floras described by Raciborski /1891, 1892/ and Makarewiczówna /1928/ which contain about 90 other Liassic species. In the North of the European Province, in Sweden and in Greenland there are similar Liassic floras, but without H. muensteri.

Eine neue Gattung von Bennettiteenblättern aus der Trias von Nordamerika. Ein Beitrag zur Untergliederung von *Zamites* BRONGNIART.

WEBER, REINHARD

Neben Farnen sind Bennettiteenblätter in der Flora der Santa-Clara-Formation (Karn-/? Nor, Sonora, NW-Mexiko) häufig und artenreich. Die gefiederten Formen, früher meist als *Pterophyllum, Otozamites* oder *Zamites* bezeichnet, schließen einen Artenkreis ein, der dem heute üblichen Gebrauch dieser Namen entsprechend zu *Zamites* gestellt werden kann, aber nicht zwanglos. Anders als die typischen *Zamites*-Arten mit ihren lanzettlichen Fiedern haben sie mehr oder weniger parallelrandige, gestutzte und am Grund oft beiderseits deutlich geöhrte Fiedern. Als bekannteste Art gehört zu diesem Formenkreis auch die bisher als *Zamites powelli* FONTAINE bezeichnete Art aus der Obertrias der USA. Aus Sonora werden vier Arten beschrieben, von denen drei neu sind. Die Gruppe wird zu einer neuen Gattung gestellt, die zumindest in der Trias auf Nordamerika beschränkt war.

Scanning electron stereo-micrographs of pollen and spores.
WEISS, Roseline Huguette (Poster)

Stereo-micrographs represent 3-dimensional images of micro-objects allowing a very realistic view of the specimen under examination.
Using the scanning electron microscope a 3-dimensional image can easily be obtained by producing two 2-dimensional micrographs of the same object, each of those taken from a different definite viewpoint. The two micrographs are then mounted as a stereopair.
The stereo-micrographs of the poster were obtained using a scanning electron microscope equipped with a goniometer stage. In each case the single specimen was mounted in the centre of the stub. The longest dimension of the specimen has been arranged parallel to the y-axis, thereby directed towards the electron detector to achieve the same kind of illumination for the two pictures. Between the two micrographs the specimen was tilted around the y-axis for 10°, preferably for 5° to either side of the zero position. The x-axis has been kept horizontally at 0°.
Stereo-micrography furnishes additional information on surface topography of microfossils, especially when forms with considerable relief or with details in concavities are concerned.
In order to obtain a maximum of information it is advantageous to compare scanning electron stereo-micrographs with images obtained from the same specimen with transmitted light microscopy.

Some remarks on the taxonomy of Fagaceae from Sośnica and Malczyce (Western Poland), the type localities by Heinrich Robert Goeppert

ZASTAWNIAK Ewa, WALTHER Harald

The revision of macrofossils of the family Fagaceae from the Neogene floras of Sośnica and Malczyce in Lower Silesia, derived from original materials of H.R.Goeppert and a new collections was carried out. Based on morphological and cuticular analysis it was found that the leaves of Fagaceae belong to the genus Fagus (F. silesiaca Walther et Zastawniak sp.nov. and Quercus (Q.gigas Goepp. emend. Walther et Zastawniak, Q. pseudocastanea Goepp. emend. Walther et Zastawniak) . Fruits of oaks occur as cupules of Quercus sapperi (Menezel)Mai ex Hummel and Q. microcerrisaecarpa Kol., as well as acorns of Quercus sp. div.

BEITRÄGE ZUR BESTIMMUNG TERTIÄRER ERICACEEN-POLLENKORNTETRADEN.

ZETTER, Reinhard

In den meisten europäischen tertiären Palynofloren, finden sich Tetraden von Pollen aus dem Ericaceae-Verwandtschaftskreis. Vielfach wurden diese Funde nur ungenügend bestimmt und bestenfalls der Familie der Ericaceae zugeordnet oder zum fossilen Generotypus Ericipites WODEHOUSE gestellt. Andererseits wurde darauf hingewiesen, daß man Tetraden von Ericaceae, Empetraceae, Epacridaceae und einigen Gattungen aus der Familie der Clethraceae nicht unterscheiden könne. Neuere Arbeiten über rezente Ericaceae bestätigen die Ansicht des Autors, daß auch fossile Ericaceae-Pollenkorntetraden insbesondere durch Details der Skulpturierung unterschieden und bestimmt werden können. Speziell mit Hilfe des Rasterelektronenmikroskops können diese Informationen auch an fossilem Material gewonnen und dargestellt werden. So ließen sich auf diese Weise aus vielen miozänen Fundstellen Österreichs die Gattungen Erica, Leucothoe und Rhododendron (Viscinfäden !) nachweisen. Derzeit durchgeführte umfangreiche Untersuchungen an Pollenmaterial rezenter Ericaceae-Gattungen erwecken die Hoffnung, daß in weiterer Folge noch weitere biospezifische Zuordnungen von fossilen Ericaceen-Pollenkorntetraden möglich sind.

The Lower Liassic microflora from Odrowąż in Poland

ZIAJA Jadwiga

The composition of the microflora from Odrowąż suggests a Jurassic age, the presence of Aratrisporites minimus /Isoetales/ indicating the Lower Liassic /Rogalska 1976/.

Parallel investigations of the megaflora from the same sediment were carried out by M.Reymanówna and E.Wcisło-Luraniec.

The dominant component of the microflora are Classopollis pollen grains, while the dominant component of the megaflora is their parent plant, the conifer tree Hirmerella muensteri /Cheirolepidiaceae/ which probably formed a local forest. Quite frequent are spores /about 10 taxa/ of Filicales among others of Matonisporites, Cyathidites, Contignisporites and Conbaculatisporites and fern leaves /about 5 taxa/. Calamitales are represented by Calamospora and in the megaflora by Neocalamites. There occur two pollen taxa with air sacs, Alisporites - perhaps the pollen grains of Pachypteris /Pteridospermales/, and Vitreisporites pallidus /Caytoniales/ with no corresponding megafossil in the sediment from Odrowąż. The very few grains of Monosulcites may derive from Bennettitales represented by leaves of Otozamites and Pterophyllum. It appears therefore that major plant groups of the microflora correspond with plant groups represented in the megaflora. This seems possible, as it is generally accepted that inside forests the pollen spectra represent more or less the local vegetation, although in general pollen grains and spores may be carried long distances.

Eine fossile Pilz- und Flechtenflora aus dem Keuper Unterfrankens?

ZIEGLER, Rolf

Die Erforschung der mainfränkischen Keuperflora hat lange Tradition (z.B. SCHENK 1864 oder KELBER 1990). Fossile Pflanzenreste mit Cuticularerhaltung sind aus der Keuper-Formation seit langem bekannt (z.B. BORNEMANN 1856). Die neuerliche Untersuchung feinsandiger Keupertone Unterfrankens brachte neben zahlreichen Epidermisresten höherer Pflanzen (Schachtelhalme, Farne, Koniferen) auch Reste von Lagerpflanzen mit hyphenartigen Gewebestrukturen. Die Möglichkeit, daß es sich um fossile Pilze handeln könnte, war der Anlaß zu intensiver Suche und führte schließlich an eine Fundstelle, die derartige Organismen in größerer Anzahl und beträchtlicher Formenfülle enthält. Inzwischen liegen ca. 250 Fundstücke teilweise auch vollständig erhaltener Individuen vor. Morphologische, anatomische und histologische Merkmale geben Anlaß zu der Vermutung, daß es sich zumindest bei einem Teil dieser Organismen um Flechten handeln könnte. Poster und Referat haben zum Ziel, auf die mögliche Pilz- bzw. Flechtennatur dieser Fossilien hinzuweisen. Dies wird versucht durch Vergleich entsprechender Merkmale zwischen fossilem und rezentem Material.

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