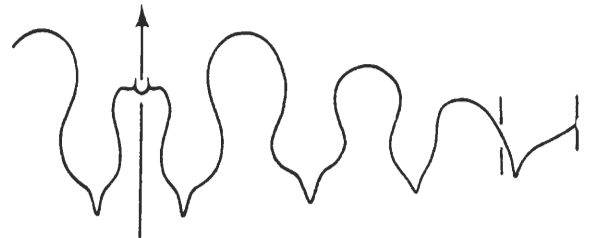
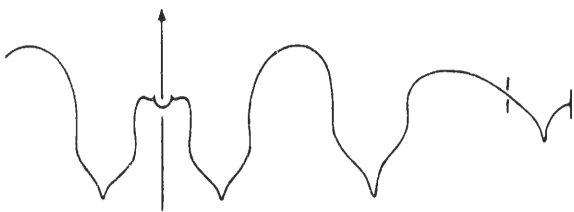


Permianiles

No. 16 June, 1990

A NEWSLETTER OF SCPS



SUBCOMMISSION ON PERMIAN STRATIGRAPHY

INTERNATIONAL COMMISSION ON STRATIGRAPHY

INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)

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Cover:

Daubichites fortieri (Harker) (left illustration) and *Sverdrupites amundseni* (Nassichuk) (right illustration) from uppermost Lower Permian (Roadian) strata in the Sverdrup Basin Canadian Arctic Archipelego. Original photographs provided by W.W. Nassichuk.

1. CHAIRMAN'S NOTE

Dr. Menning (DDR) and Professor Cassinis have been nominated as new Titular Members to the Permian Subcommittee. In addition three colleagues have been invited to become corresponding members, they are: Dr. Scott M. Ritter (U.S.A.), Dr. J. Schneider, (DDR), and Professor C.A. Landis (New Zealand).

Jin Yugan

2. SECRETARY'S NOTE

I should like to thank those members who sent contributions for this Newsletter. Please do not hesitate to submit reports concerning research in progress; short notes and details of recent publications will be gratefully received as well as longer articles.

Thank you to all those members who let me know of recent address changes.

J. Utting

3. REPORT OF THE UPPER PERMIAN WORKING GROUP

At our last meeting now some time ago at the Carboniferous Congress at Beijing, we decided that the charts prepared for this meeting should be reconsidered and another set prepared with a view to reaching some consensus and publication. Since this time, some material has appeared in Permophiles.

The main correlation charts which are being considered are those prepared by the USSR Working Group (Dr. G.V. Kotlyar), the Japanese Working Group (Dr. K. Nakazawa), the Indian Working Group (H.N. Kapoor) and the Australian, New Zealand Working Group, (Dr. J.M. Dickins). These charts are based on a two fold subdivision of the Permian with general agreement on a five fold subdivision for the Upper Permian. It is agreed that the five-fold subdivision will approximate the stages Ufimian, Kazanian, Midian, Dzhulfian and Dorashamian (or Changhsingian). The group is working towards elaboration of the five-fold subdivision. Some rather "wild cat" schemes are in circulation for the Upper Permian, whose use is not encouraged. Further discussion on this scheme will be possible during Shallow Tethys 3, to be held in Sendai, Japan on the 22nd-23rd September 1990. Major problems to be discussed will include the relationships of the Midian, now formally defined.

During the course of the study it has become apparent that the Dzhulfian and Changhsingian, together represent a major development in the Permian and, therefore, a more exact definition of the base of the Dzhulfian is necessary. We cannot accept there is any real basis for concluding that the Dzhulfian and Changhsingian are coeval.

Comments are welcome on the schemes which have appeared in Permophiles and can be sent to the address below.

J.M. Dickins
(On behalf of Working Group)
Bureau of Mineral Resources, Geology & Geophysics
Cnr Constitution Avenue & Anzac Parade, Canberra

12th April 1990

J.M. Dickins

**4. IGCP 272 - LATE PALAEOZOIC AND EARLY MESOZOIC CIRCUM-PACIFIC EVENTS
AUSTRALIAN AND NEW ZEALAND MEETING**

(a) Newcastle NSW, 30/1/90-2/2/90

This part of the meeting was attended by 10 scientists from Australia, USSR, Japan, China and Thailand. It comprised three days field activities and one day discussion. The field geology was shown to us by Professors B.A. Engel and C.F.K. Diessel and Dr. Noreen Morris of the Department of Geology of the University of Newcastle. Examination was made of the Carboniferous sequence in the southern part of the New England Fold Belt. A variety of sedimentary types from shallow to deep water were seen, composed predominantly of intermediate and acidic detritus and including much pyroclastic volcanic material. The rocks are very different in appearance from the Permian. Various Lower and Upper Permian localities were examined and considerable time spent on the Newcastle Coal Measures, illustrating their tectonic and volcanic provenance. Main features of interest to the project were the major regression of the Upper Carboniferous, the difference in sedimentation between the Carboniferous and the Lower Permian, the character of the sedimentary changes and the tectonic activity at the boundary of the Lower and Upper Permian and the Permian-Triassic boundary sequence. Formal papers were held over until the New Zealand meeting.

(b) New Zealand, 9/2/90-14/2/90

The group with the exception of the Newcastle University scientists moved on to New Zealand. A formal scientific and business meeting was held in association with the International Brachiopod Congress and sponsored by the University of Otago on the 9th February 1990. This meeting was attended by eighteen scientists from twelve countries from different parts of the Circum-Pacific region. Formal papers given at this meeting are to be published. In addition to the meetings already proposed for the project, a meeting in Thailand, probably in 1991, was discussed and plans put in hand. In addition, a meeting in the Soviet Far East is being considered.

IGCP participants then took part in the Southland excursion, 10th-14th September, with Drs. J.D. Campbell, H.J. Campbell and D.A.B. MacFarlan as leaders. Features of interest to the project included examination of the Upper Permian and its possible relationships with the Lower Permian, the Middle and Upper Triassic sequences and their relationships with Jurassic. Marked changes, apparently, associated with the ophiolites, occur in the mid-Permian. The nature of the Permian to Triassic boundary sequences remains obscure. Important events are associated with the beginning of the Anisian and the Carnian and the Triassic Jurassic boundary.

18th April 1990

J.M. Dickins
Project Leader

5. **INTERNATIONAL CONGRESS PERMIAN SYSTEM OF THE GLOBE (FIRST CIRCULAR)**

The international congress PERMIAN SYSTEM OF THE GLOBE devoted to the 150th anniversary of the establishment of the Permian system in Priuralye will take place in August, 1991 in the city of Perm, the Urals (USSR). Russian and English are the official languages. The program will consist of a 5 day session with reports covering the following topics:

- Historic study of the Permian system in various regions of the world.
- Stratigraphy, paleontology, evolution of the organic kingdoms and paleobiogeography.
- Sedimentology, paleogeography, mineral resources.
- Magmatic processes.
- Tectonic and paleotectonic reconstructions.

Geological field trips will be held in the Urals and European part of the USSR. The number of participants per excursion is limited to 30-50, the duration is from 3-5 to 12 days. In the event, of very high demand one or both of the trips could be organized both before and after congress.

The excursions will include:

I. **SOUTH URALIAN EXCURSION - STAGE BOUNDARIES OF THE LOWER DIVISION OF THE PERMIAN SYSTEM IN SOUTHERN URALS:**

It is planned:

- a) to show paleontological-stratigraphical validation of the Carboniferous-Permian boundary in stratotypical locality and possibility to trace it in different regions of the earth;
- b) to discuss principles serving as a basis for dividing the lower part of the Permian system into stages and the possibility to trace stage boundaries in various facies and beyond the limits of stratotypical locality;
- c) to show stratotypical and parastratotypical sections of the Orenburgian, Asselian, Sakmarian and Kungurian stages in terrigenous and reefogenic facies. Total route is 600 km long; its duration is 12 days.

II. **MIDDLE URALIAN EXCURSION-PERMIAN DEPOSITS OF PERMIAN PRIKAMYE AND PERMIAN PRIURALYE FOREDEEP:**

- a) demonstration of sections of upper part of the Artinskian stage in reefogenic facies and of the classical Kungurian stage in carbonate-sulphate facies near Kungur town on the Silva River;
- b) demonstration of Upper Carboniferous and Lower Permian sections in carbonate facies on the Kosva River near the town of Gubakha;
- c) demonstration of Kungurian, Ufimian and Kazanian sections on the Kama River (between the Perm and Berezniki cities) and visit the well-known occurrence of Permian vertebrates on the Kama River near the town of Ocher;
- d) demonstration of a salt-bearing section of the Kungurian stage in mines of the Berezniki potassium works.

III. POLAR-URALIAN EXCURSION - PERMIAN DEPOSITS OF ARCTIC URALS
will include:

- a) demonstration of transition Carboniferous-Permian deposits in clay facies;
- b) demonstration of reefogenic Asselian - Sakmarian section on the Kozhim River;
- c) demonstration of a complete Sakmarian, Artinskian and Kungurian succession in terrigenous facies and the Ufimian stage (in coal-bearing facies).

IV. THE VOLGA EXCURSION - UPPER PERMIAN DEPOSITS OF POVOLZHYE
- it is planned to show stratotypical Kazanian and Tatarian sections in riverside exposures of the Volga River.

We are inviting you to participate in the Permian congress in the city of Perm and would appreciate your early reply. We are also looking forward to hearing from you about which trip you prefer. The Second Circular formulating terms of participation and payment as well as invoices would be sent in the summer of 1990 to everyone who replies to the First Circular.

The Organizing Committee is planning to publish a volume of contributions. They should be submitted in English (or Russian and English for Soviet participants), typewritten, doublespaced and should not exceed two pages. Your contributions will be accepted up to 1 December 1990.

They should be sent to either:

Dr. W. Kanes
Earth Sciences and Resources Institute (ESRI)
Columbia, S.C. 29208 USA

or

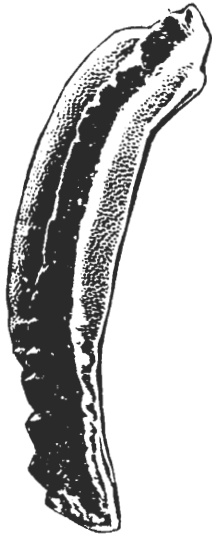
Dr. Boris Chuvashov
Institute of Geology and Geochemistry of the Urals
Branch of the USSR Academy of Sciences, Pochtovyi per. 7
620219 Sverdlovsk, USSR

For information apply to:

Dr. Boris Chuvashov
telephone 44-00-80

B. Chuvashov

6. THE GUADALUPIAN SYMPOSIUM



ANNOUNCING

THE GUADALUPIAN SYMPOSIUM

2-3 days during the week of March 11-15, 1991
at Sul Ross State University, Alpine, Texas

For oral presentations on the Guadalupian and
field excursions on the Guadalupian of the
Glass and Del Norte Mountains

Organizers:

Bruce R. Wardlaw, U.S. Geological Survey
MS 970, National Center, Reston, VA 22090
(703) 648-6916

Richard E. Grant, E206, Paleobiology Department,
National Museum of Natural History
Smithsonian Institution, Washington, D.C. 20560
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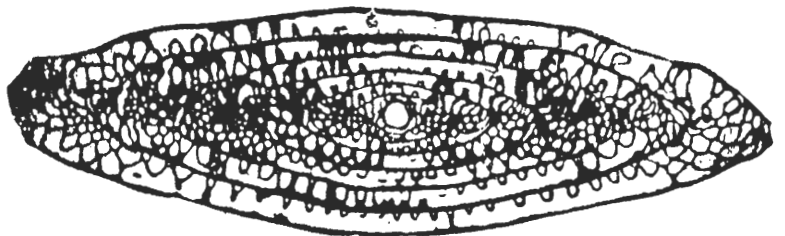
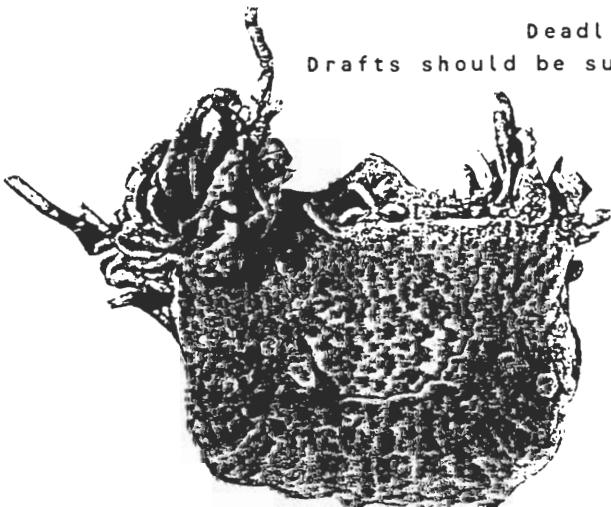
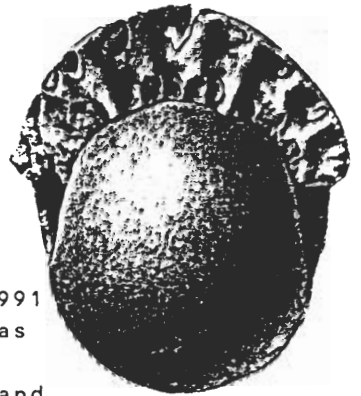
David M. Rohr, Geology Department, Box C-139
Sul Ross State University, Alpine, TX 79832
(915) 837-8167

Selected papers to be published in a volume of the
Contributions to Paleobiology series
of the Smithsonian
Edited by R. E. Grant and B. R. Wardlaw

Deadline for titles of proposed abstracts and papers
(statement of participation):
September 30, 1990

Deadline for abstracts:
November 16, 1990

Deadline for manuscripts:
Drafts should be submitted by time of the symposium,
March 15, 1991



B.R. Wardlaw, R.E. Grant and D.M. Rohr

7. RESEARCH ON THE ITALIAN PERMIAN

Since the Meeting on the "Permian and Permian-Triassic boundary in the south-Alpine segment of the Western Tethys" (July 4-12, 1986, Brescia, Italy) work on the Permian of the Southern Alps includes further research on the Permo-Triassic and Carboniferous-Permian boundaries, and attempts to settle the problem of the age of the beginning of the "Val Gardena" and of the "Bellerophon" Formations [Middle(?) and Late Permian].

At the present time however, the more interesting new data on the Italian Permian come from a deep well drilled in the Southern Tuscany (Central Italy) (1) and from the research on the Permian allocthonous rocks found within the Triassic Apennine sequences outcropping in Central Italy (2)(3).

The well drilled in Tuscany crossed, at the depth of 3.000 m, some carbonate beds with a Fusulinid association, referable to the *Cancellina* Zone (or at the most to the *Neoschwagerina simplex* Zone), containing forms belonging to the genera *Praeparafusulina* (reworked ?), *Eo(?) polydiexodina*, *Yangkienia*, *Pseudodoliolina*, *Misellina*, *Cancellina* (and one small primitive *Neoschwagerina* ?). Some Italian geologists think that these beds are overthrust on a younger basement.

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- (1) Pandeli, E. and Pasini, M.-1990-Fusulinidi Permiani nella successione metamorfica del sottosuolo del M. Amiata, Toscana meridionale, Italia). Riv. It. Paleont. Strat., v. 96 (1), in press, Milano.
 - (2) Panzanelli-Fratoni, R., Limongi, P., Ciarapica G., Cirilli, S., Martini, R., Salvini-Bonnard, G., and Zaninetti, L.-1987-Les Foraminifères du Permien supérieur remaniés dans le "Complexe Terrigène" de la Formation Triasique du Monte Facito, Apennin meridional. Revue de Paléobiol., v. 6(2), pp. 293-319, 12 pls., Genève.
 - (3) Engelbrecht, H., Klemm, D.D. and Pasini, M.-1988-Preliminary notes on the tectonics and lithotypes of the "Verrucano s.l." in the Monticiano area (Southern Tuscany, Italy) and the finding of Fusulinids within the M. te Quoio Fm. (Verrucano Group). Riv. It. Paleont. Strat., v. 94 (3), pp. 361-382, 1 pl., Milano.

M. Pasini

8. STEPHANO-PERMIAN CLASTIC BASINS IN THE SCHWARZWALD-VOSGES AREA (UPPER RHINE REGION, CENTRAL EUROPE)

STEPHANO-PERMIAN CLASTIC BASINS IN THE SCHWARZWALD-VOSGES AREA (UPPER RHINE REGION, CENTRAL EUROPE)

by E. Sittig & M. Löffler (Karlsruhe, FRG)

The Stephanopermian rocks of the Schwarzwald-Vosges area are the aim of intensive geological investigations by the Karlsruhe research group (Gerold, Löffler, Sittig, Smykatz-Kloss and co-workers) since several years. There are many unresolved problems connected with the different rock formations of this region.

1. Structural setting

The area mentioned above forms part of a late Hercynian mid-european basin-and-range province (Ménard & Molnar, 1988). As was recently shown by a french group working in the Montagne Noire (Massif Central, southern France, Echtler & Malavielle, in press) the permian basins developed by the collapse of an overthickened variscan crust. As a result of this evolution we find concentrated the continental geological record of Stephanopermian times in large elongate troughs which trend roughly parallel to the former variscan chain. It seems that individual basins formed as asymmetric graben systems closely resembling the structures found e.g. in the Rio Grande Rift (Mack & Seager, 1990) although it may be very difficult to find the bordering faults. In most cases

they acted as synsedimentary normal fault systems and beyond that are obliterated by onlapping late permian (Zechstein ?) to early triassic fanglomerates. To unravel nature, history and age of this bordering structures is one of the aims of recent investigations done by the Karlsruhe group.

2. Stratigraphic record

The stratigraphic subdivision of the whole continental rock sequence is still based on a very rough scheme, comprising four or five lithostratigraphic units (Stephanian, Lower Rotliegend, "Middle Rotliegend", Upper Rotliegend, Karneolite Dolomite beds; Eck, 1884). Till now no stratotypes were selected and there exist no subdivisions of the mentioned rock units although the local sequences often yield a lot of particular horizons which possibly could serve as stratigraphic markers — at least within areas of limited extent.

The urgent task of our group is to evaluate the suitability of such lithologically remarkable beds for stratigraphic purposes (tephra beds, carbonate horizons, disconformities, paleosoils, sedimentation breaks marked by subaerial alteration products like silcretes,

ferricretes etc., residual gravel accumulations). Some results already have been obtained though they are disappointing to some degree as the stratigraphic value could not be affirmed in every case (Suttor, Smykatz-Kloss & Sittig, 1988). These uncertainties concerning the exact stratigraphic position of the Stephanopermian outcrops within the region prevent correlation of the different sections thus inhibiting further progress in modelling the late Hercynian development of the central European crust.

3. Character of occurrences

All Stephanopermian rocks in the Schwarzwald-Vosges area belong to a continental suite comprising clastic sediments deposited in intramontane basins. However a large amount of the rocks under consideration is of volcanic and volcanoclastic origin (rhyolites with their pyroclastic equivalents and some ignimbrites). Although their present distribution doesn't confirm it there is evidence of a formerly broader if not continuous but thin cover of Stephanopermian sediments on Hercynian basement rocks. If so there must have been intra- to post-Permian erosion which largely removed these deposits except the thick sedimentary fillings of the large intramontane basins s.s. and scattered remnants of Stephanopermian age on the ridges and other uplifted areas. It is just these remnants which to the writers opinion prove a formerly more

widespread distribution of the Stephanopermian. Despite their highly condensed thickness these limited occurrences seem to have stored a good deal of the original depositional history of the region inasmuch as the different sections present nearly all facies types known from all over the investigation area. In comparison to the more complete depositional record within the intramontane basins s.s. these reduced sections apparently are rich in sedimentation breaks and erosional gaps the stratigraphic significance of which is still a matter of serious controversy.

For the near future we try to prepare some stratigraphical means for correlating these remnants with a revised standard succession of the Schwarzwald Stephanopermian; this is one of the projects of our running research program in the Schwarzwald-Vosges area. First results are being published (Sittig & Löffler, in press).

4. The Baden-Baden basin

As for the intramontane basins s.s. our primary interest focus on the Baden-Baden basin as a case study for sedimentation history, facies distribution and stratigraphic record of Stephanopermian times in the Upper Rhine region. This occurrence forms part of the southern border of the large Kraichgau-Main (-Saale) trough (e.g. Falke, 1976). The depositional record of the Stephanopermian is rather complete

in this particular case and the transition into the Triassic is also documented by the conformably overlying beds of Lower Bunter. The marginal position of the Baden-Baden basin with regard to the intramontane basins yields a good basis for studying some aspects of tectonic importance that is the structural conditions for the basin formation as well as their tectonic development (Löffler, in prep.).

The Stephanopermian rock suite starts with coarse clastics of granitic origin (arkoses, conglomerates) with intercalated tuffitic beds locally interfingering with lacustrine shales rich in organic matter. This part of the succession probably represents the Stephanian and Lower Rotliegend and currently was renamed "Staufenberg beds". The thick pile of Upper Rotliegend deposits (renamed "Michelbach beds") comprises alluvial fan deposits coming from a volcanic source area (of assumed "Middle Rotliegend" age) and red silt-

and mudstones representing a playa environment. Within this sequence fossils (e.g. conchostracans) are known enabling us to attempt a biostratigraphic subdivision (Kozur & Sittig, 1981a). The fauna contains *Megasitum tenellum* (BRONN) which is restricted to a lower part of the Upper Rotliegend sequence. Different species apparently replacing one another follow higher up thus indicating evidence of a conchostracan zonation.

With regard to the insufficient situation in correlating the continental Permian rocks with the marine standard succession the mentioned biostratigraphic attempt may deserve some interest insofar as the fossil group used here is widespread throughout the world and possibly also occurs in those sections with interfingering continental and marine strata. In any case the Karlsruhe research group will continue the investigations just started on this topic (amongst others) with special interest.

5. References cited

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- Ménard, G. & Molnar, P. (1988): Collapse of a Hercynian Tibetan Plateau into a late Paleozoic European Basin and Range province.— Nature, **334**: 235-237.
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- Sittig, E., 1983, Eine Geröllbestandsaufnahme im grobklastischen Oberrotliegenden der Senke von Baden-Baden. Oberrhein, geol. Abh., **32**:45-68.
- Sittig, E., 1988, Rotliegendes of the Schwarzwald Mountains, A Reappraisal. Z. geol. Wiss. Berlin, **16**:(10), 1003-1012.

E. Sittig and M. Löffler

9. "STRATIGRAPHY OF THE CONTINENTAL PERMIAN" IN WESTERN EUROPE

International Working Group, Stratigraphy of Continental Permian. Meeting of the Permian Geological Association (AGP) in Paris June 1989.

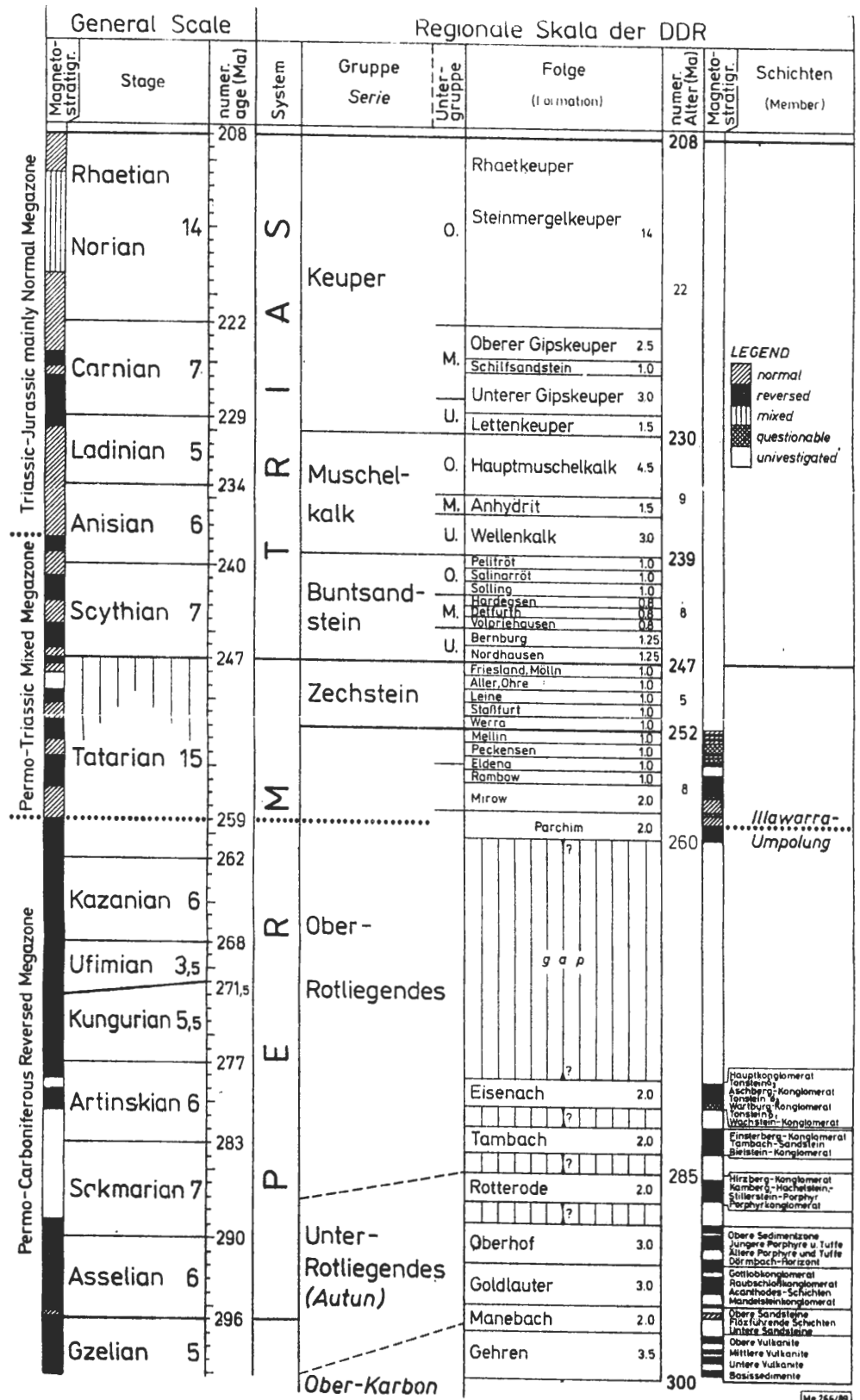
At the 1989 Paris meeting, the formation of three groups was proposed by French participants. The first group, coordinated by J.J. Chateauneuf (B.R.G.M., France), should essentially "manage" the Autunian stage; the second, of which H. Lützner (East Germany) was proposed as coordinator, would examine and discuss the problems of the Saxonian; the third, coordinated by C. Virgili (Spain) and the writer, would be engaged in the study of the Thuringian.

The general coordination of the work will be undertaken by Dr. N. Toutin-Morin (University of France, Nice) and by the writer, while the General Secretary will be Dr. J. Broutin (University of Paris VI, France). Dr. G. Gand (University of Bourgogne, France) will provide the necessary liaison between the three working groups.

The next meeting will be held June 12th, 1990 in Paris when future activities of the group will be discussed. Persons interested in receiving further information or participating in the working group should contact the writer.

G. Cassinis

10. A NEW SCHEME FOR THE PERMIAN AND TRIASSIC SUCCESSION OF CENTRAL EUROPE



M. Menning

11. **FACIES DEVELOPMENT AND SEQUENCE STRATIGRAPHY OF THE UPPERMOST ZECHSTEIN AND LOWERMOST BUNDSANDSTEIN IN POLAND - ITS RELATION TO THE PERMIAN/TRIASSIC BOUNDARY**

The specific tectonic position of the Zechstein sedimentary basin in Poland between the edge of an old platform and the Variscan folding front made possible a deposition of a 1500-m series of evaporites and associated facies. The uppermost Zechstein in the axial zone of this basin features a unique, anomalously thick (up to 400 m) terrigenous-saliferous-zubers series. In the marginal area of the basin the terrigenous red beds were deposited (Wagner, 1987).

Towards the end of sedimentation of the younger rock salts of cyclothem PZ3 (Leine) the climate turned from very dry to slightly more humid. The humidification of climate together with a limited access to the Upper Permian sea caused substantial changes in the sedimentation of evaporites which developed and became dominant in cycle PZ4. Unlike in the older carbonate-evaporite cyclothem, in the PZ4 cyclothem there are no carbonate rocks (except for diagenetic carbonate cement), and anhydrites comprise a slight portion of the succession. In the depocentre of the Permian basin in Poland the zuber lithofacies is developed. The term "zuber" is applied to complexes of terrigenous-saline rocks formed under conditions of simultaneous precipitation of rock salts and deposition of clays transported to the basin by surface waters. It is noteworthy, that the uppermost part of zuber lithofacies comprises only descendent salts, i.e. salts which were dissolved from older Zechstein salts and transported by surface waters. Zuber lithofacies zone is surrounded by clayey-saline lithofacies (featured by the clear differentiation between terrigenous and evaporite horizons) and terrigenous red beds named as the Rewal Formation or in other regions as the Top Terrigenous Series.

Detailed sedimentological studies (Pienkowski, 1989) of the Rewal Formation, Top Terrigenous Series and lowermost Bundsandstein (Baltic Formation) were based on twelve fully cored boreholes. The studies have shown, that in the latest Zechstein times entirely continental, arid-climate sediments (red beds) were formed. In the depocentre in NW Poland the zuber lithofacies was deposited in a large, hypersaline/saline inland playa basin. To the peripheries fluvial facies (mainly ephemeral stream facies) prevailed. One may find also some aeolian deposits. In the course of time, more coarse and high-energy fluvial facies shifted gradually towards the basin centre. It resulted in creation of coarsening-upward, progradational continental megasequence which comprises (in full development) the following environments - from the bottom to the top: inland playa (zubers facies), distal fluvial zone (mudstones with sulphate concretions and fine sandy intercalations), middle fluvial zone (sandstones with subordinate fluvial-plain mudstones, some aeolian sandstones may occur), proximal fluvial zone (conglomerates and sandstones of braided rivers and alluvial plains). In the central part of the basin the uppermost two facies zones are missing. In contrast, successions from the peripheries of the basin do not contain zubers and fluvial-plain/playa mudstones are subordinate or absent. Sporadic finds of megaspores indicate Uppermost Permian age of these sediments (Dybova-Jachowicz, Orłowska-Zwolinska, Wagner 1984). The same age is confirmed by magnetostratigraphical investigations, but the uppermost few metres of the succession

of this continental sequence belong to the Triassic (Nawrocki, pers. comm). The whole sequence cannot be directly defined in the terms of sequence stratigraphy, because it is of continental origin.

The uppermost Zechstein continental sequence is covered by brackish marine heteroliths and nearshore sandstone/oolitic deposits (Pienkowski 1989). Palynostratigraphical data indicate the lowermost Triassic age of these deposits, with good correlation to successions from Greenland (Orlowska-Zwolinska 1984). Also magnetostratigraphy (Nawrocki pers. comm.) indicates the Triassic age of these transgressive deposits. The marine character of the lowermost Buntsandstein is proven by the presence of poorly preserved foraminifers and acritarchs. This transgression may be correlated with the global eustatic sea-level rise at the beginning of Triassic times (Haq, Hardenbol & Vail 1987).

The transgression invaded the Polish basin slightly later than the Permian/Triassic boundary. Above the Transgressive Surface (TS) a Transgressive Systems Tract (TST) with superimposed maximum flooding surface (mfs) developed as offshore mudstones occur. A stable, almost isochronous position of the Transgressive Surface (TS) is proven by magnetostratigraphy (Nawrocki, pers. comm.). It means, that the sequence stratigraphy (Haq, Hardenbol & Vail 1987) may be used here as a very useful correlative tool.

The studies of Permian/Triassic transitional deposits have also shown that in the central part of the Polish basin the succession contains the youngest series of Zechstein evaporites (zubers with descendent salts), having no equivalents in the European Basin. These youngest evaporites have their facies counterparts in various lacustrine/fluvial/aeolian deposits (Rewal Fm., Top Terrigenous Series). There is also reliable evidence of continuous sedimentation between the Upper Permian and the Lower Triassic. Lithostratigraphical, sedimentological, palynostratigraphical and magnetostratigraphical studies enable one to define the Permian/Triassic boundary in Poland in a broad chronostratigraphical and palaeoenvironmental aspect.

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12. RECENT RESEARCH IN SOUTHEAST ASIA

This year (last February), limestones with the *Palaeofusulina-Colaniella* assemblages have been found in Peninsular Malaysia in two new areas. This assemblage was previously known in a single locality. In one of the two areas, the passage from the Permian to the Triassic appears to be within a limestone sequence. A report will be ready by the fall of 1990 and submitted to the Geological Survey of Malaysia.

Fontaine, H. et al. - 1988 - Late Palaeozoic and Mesozoic fossils of West Thailand and their environments. *CCOP Technical Bulletin*, 20, 217 p. 46 pl.

Fontaine et al. - 1989 - The pre-Tertiary fossils of Sumatra and their environments. *CCOP Technical Publications*, 19, 357 p. 77 pl., 1 map.

Fontaine et al. - 1990 - Ten years of CCOP research on the pre-Tertiary of East Asia. *CCOP Technical Publications*, 20, 375 p.

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