ALBERTIANA

SUBCOMMISSION ON TRIASSIC STRATIGRAPHY

150

2 MAY 1984

Editor: Dr. M. Boersma
Laboratory of Palaeobotany and Palynology
Heidelberglaan 2
3584 CS Utrecht, The Netherlands

ALBERTIANA

The primary intention of ALBERTIANA is to promote the interdisciplinary collaboration and understanding among the members of the I.U.G.S. Subcommission on Triassic Stratigraphy. Within this scope, ALBERTIANA serves both as a newsletter for the announcement of general information and as a platform for discussion of new developments in the field of Triassic stratigraphy. ALBERTIANA thus encourages the publication of announcements, literature-reviews, progress-reports, preliminary notes, etc. - i.e. those contributions in which information is presented relevant to current interdisciplinary Triassic research.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

CONTENTS

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Non-members of the Subcommission on Triassic Stratigraphy can obtain ALBERTIANA at the cost of US $ 2.50 per issue (bank-cheque to Mr.A.J.Goslinga,Laboratory of Palaeobotany and Palynology, Heidelberglaan 2, 3584 CS Utrecht, The Netherlands).

1834-1984: 150 YEARS OF CHRONOSTRATIGRAPHICAL SUBDIVISION OF TRIASSIC ROCKS

H. VISSCHER

"Whoever examines more closely the foregoing analysis and tabulates all the fossils of the three hitherto separate formations; whoever examines, further, the transition of the different forms one into the other, and, indeed, considers the entire structure of the mountains and the markedly different character of the fossils of the Zechstein from those of the Lias, will realize that the Bunter sandstone, Muschelkalk and Keuper are the result of a single period, their fossils, to use Elie de Beaumont's words, being the thermometer of a geological period; that their separation to three formations is not appropriate,and that it is more in accord with the concept of a formation to unit them into a single formation, which I shall provisionally name Trias."

In this way, 150 years ago, the Triassic was introduced by Von Alberti as an interpretative division of the geological time scale. In the following years the new unit rapidly lost its "provisional" character. It remained without serious opposition and became accepted throughout the world.

The first 25 years of the Triassic also show the acceptance of Von Alberti's subdivision of the system. The classic terms Buntsandstein, Muschelkalk and Keuper - or orthographic variants - acquired a time-connotation. They became widely introduced in the classification of sequences in the extensive areas in Europe where the Triassic shows a lithological development identical or similar to the situation in Germany. Moreover, apart from being used as practical units for subdividing this "Germanic" Triassic, there were many attempts to apply the terms in the classification of successions from strongly contrasting depositional realms. Terms such as "Alpine Buntsandstein","Alpine Muschelkalk" and "Carpathic Keuper" have lingered into today's stratigraphical classification and remind us of the early tendency to take the "Germanic" units as a standard for Triassic classification and correlation.

Gradually it became apparent, however, that the "Germanic" classification could not be realistically applied in essentially marine Triassic sequences. Moreover it was felt that - similar to other systems - a chronostratigraphical subdivision ought to be based on the marine faunal record. Thus the following 50 years of Triassic research were largely characterized by elaborate strati=graphical and palaeontological studies in the Alps and other parts of the Tethyan Triassic. The proposed schemes of subdivision of this "Alpine" Triassic into stages and substages generated vigorous debate among stratigraphers. Ultimately, however, the discussion resulted in the recognition of six successive stages: Scythian, Anisian, Ladinian, Karnian, Norian, Rhaetian. Ammonoid biostratigraphy has played an important role in the individualization of these units but frequently other groups of organisms appeared to be equally or more important in the practice of classifying marine Triassic rocks.

At the turn of the century it was accepted that the correlation of the Germanic and Alpine Triassic was hampered by the absence of a reliable biostratigraphical background. So it happened that, halfway the history of the Triassic System, two fundamentally different schemes of chronostratigraphical subdivision could be firmly synthesized in influential stratigraphical text books. The Alpine classification became the world standard, but at least in Europe the essentially nonmarine Triassic remained subdivided in terms of the original scheme of Von Alberti.

Then, despite the constant flow of new information from many parts of the world, concepts of Triassic subdivision remained relatively stable during the next 50 years. There were some attempts to introduce new chronostratigraphical subdivisions. French and British stratigraphers pleaded in favour of the inclusion of the Rhaetian Stage in the Jurassic. There was even a proposal to discard the Triassic as an independent system. However, no radical departures from the established classification found acceptance in wide circles.

During the last 25 years, Triassic chronostratigraphy became again subject of animated discussion. Next to a general revival of the study of ammonoids from many parts of the world, the explosive widening in application of a variety of microfossils resulted in a reconsideration of classic chronostratigraphical subdivision. Moreover, the dogma of the impossibility of correlating Alpine and Germanic facies became gradually unsettled. Especially the study of plant microfossils proved the inapplicability of the Germanic subdivision as a basis for interregional chronostratigraphical subdivision, and, alternatively, paved the way for recognizing Alpine stages and substages in essentially nonmarine sequences. Many new classification schemes were proposed. Notably with respect to the subdivision of the Lower Triassic new stages were introduced based on sequences in North America and Asia. In the U.S.S.R. a twofold subdivision of the Lower Triassic became generally accepted; the Induan and Olenekian completely replaced other stage nomenclature. Ammonoid zonation in North America resulted in the recognition of four stages within the Lower Triassic: Griesbachian, Dienerian, Smithian, Spathian. Also a considerable number of combinations between North American and Asian stages have been proposed to serve as a standard for subdividing the Lower Trias.

With respect to the Anisian, Ladinian, Karnian and Norian, discussions remained mainly restricted to the boundary problems and the recognition of substages. In these discussions the status of the Rhaetian became a major issue. Although the Subcommission on Triassic Stratigraphy has recommended to maintain the Rhaetian Stage, many ammonoid workers still feel that the Rhaetian should be either discarded as a standard unit for chronostratigraphical classification or considered to represent a substage of the Norian. This controversy certainly remains the most fundamental problem in the current attempts to subdivide the Triassic System.

In the meanwhile the activities of the I.G.C.P. Project No. 4 (Triassic of the Tethys Realm) had started. The newly established Subcommission on Triassic Stratigraphy could strongly rely on the outcome of the varied activities of this successful multidisciplinary project. Research within Project No. 4 resulted in a proposal for Triassic classification which formed a sound basis for further considerations (see ALBERTIANA 1).

SUBCOMMISSION ON TRIASSIC STRATIGRAPHY

				~204 ± 4
TRIASSIC	UPPER	RHAETIAN		~(210 ± 5)
		NORIAN		~220 ± 8
		KARNIAN		~229 ± 5
	MIDDLE	LADINIAN		~233 ± 4
		ANISIAN		~239 ± 5
	LOWER	SCYTHIAN	OLENEKIAN	
			INDUAN	~245 ± 5

Within the I.G.C.P. Project No. 133(Geochronology of Mesozoic and Cenozoic deposits in Europe) attention was paid to a better insight in radiometric ages of Triassic stage boundaries. Despite many uncertainties there has been considerable progress in this respect. The 1981 Triassic time scale strongly suggests that the successive stages of the Triassic System are of very different durations. Consequently, this also applies to the classic systemic subdivision in terms of Lower, Middle and Upper Triassic. The relatively short duration of the Lower Triassic has been one of the arguments in favour or re-introducing a single stage, the Scythian, embracing three or four substages. Alternatively, in the U.S.S.R. a twofold subdivision of the Lower Triassic is firmly maintained.

Today, at the 150th anniversary of the Triassic System, it is gratifying to see that throughout the world Triassic stratigraphical classification and correlation is being more critically considered than has ever been done in the past. There is, of course, still a remarkable lack of uniformity in nomenclature and placement of boundaries. Much work has to be done before a synthesis of recent research can be given. Therefore, it seems appropriate to emphasize that our 1984 scheme of Triassic subdivision on a stage level, to be presented to the 27th International Geological Congress, should be regarded as a progress report rather than representing a formal proposal.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

All members are requested to give their further comments on the 1984 scheme of Triassic Subdivision. It is particularly important to include alongside the column the major tectonic, magnetic and significant biological events. The information is necessary for the production, by the International Commission on Stratigraphy, of a wall chart depicting the Geological Column with standardized divisions into series and stages.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

BRIEF COMMENTS ON THE IGCP-4 TIME SCALE

M. GAETANI

Copies of the article on the new ammonoid and stratigraphic scale have been sent to some 20 Italian stratigraphers, who are interested to review the scale. My personal comments on the proposal are the following:

(1) The brackets for the Ageiceras ugra Zone for the Aegean. I would delete them. The Aegean is a substage not yet well understood in the Tethys and there are undescribed faunas which must be inserted between the topmost Spathian and the Anisian. Aegeiceras ugra should be one of the zones.

(2) Is not so, but the graphic disposal seems to suggest that the Anisian in the Tethys is dubdivided in three parts: Lower, Middle and Upper. The Lower Anisian corresponds to the Aegean, the Middle to the Bithynian and Pelsonian, the Upper to the Illyrian. I personally prefer a subdivision in Lower and Upper, with the boundary drawn at the Bithynian/Pelsonian boundary. In case of a tripartition Lower must be the Aegean and Bithynian, Middle the Pelsonian, Upper the Illyrian. The state of correlation between Canadian and Tethyan faunas should be improved for the Anisian.

(3) Karnian is an uncorrect spelling, the correct being Carnian.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

THE "GERMANIC" TRIASSIC

In the past years, national bodies have concentrated efforts on a re-evaluation of the "Germanic" Triassic in various European countries.

The STS is now considering to take initiatives with regard to the development of a unified scheme of interregional classi=fication and correlation of the "Germanic" Triassic. Please contact the Secretary General when you have interest in partici=pating in a "Germanic" working group.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

COMMENTS ON THE PROPOSED TRIASSIC TIME SCALE

S. KOVÁCS

First of all I would like to emphasize, that the proposed scheme more accurately should be called as "Proposal for a Triassic ammonoid time scale", which will serve as basis to define the chronostratigraphical subdivision of the Triassic in Hedberg's terms. However, this work has still to be done. In the Triassic, continuous dating by ammonoids is possible only in exceptional cases, even in pelagic facies. In the equally or even more widespread carbonate platform and continental deposits, which should also be involved in a "global stratigraphical scheme", one has no chance to find them (except rare specimens swept in reef lagoons). A real Triassic chronostratigraphical time scale should be based on complex biostratigraphical investigations carried out in continuous sections, first of all, besides ammonoids, on conodonts in basinal facies, dasycladaceans in carbonate platform facies and palynomorphs in continental or detrital sediments, but other fossil groups may also give help. This should be the main task of Triassic stratigraphers for the next few decades, for which the necessary framework is given by the present ammonoid time scale. Stage and substage boundaries should be defined there, where the most remarkable changes in the evolution of different fossil groups can be recognized and they are the nearest to each other.

The Anisian/Ladinian boundary

In Hungary, since the establishment of the chronostratigraphical subdivision of the Triassic, the base of the Ladinian has always been drawn at the base of the *"Ceratites" reitzi* zone, introduced by Böckh (1872). This zone is, however, considered now as being of local importance along with the time-equivalent (or nearly time-equivalent) *Aplococeras avisianum* and *Ticinites polymorphus* zones. The rich *reitzi*-fauna of the Balaton Highland has the advantage, that here the boundaries of both the *Paraceratites/Parakellnerites* (where the Anisian/Ladinian boundary lies according to the traditional Hungarian view) and *Parakellnerites/Nevadites* zones can be defined in continuous, non-condensed sections. This problem is under intense study in newly made artificial exposures by a working group.

By conodont biostratigraphy both the base of the *Parakellnerites* and *Nevadites* zones can be recognized in the pelagic intrashelf basin facial environment of the Balaton Highland, though the latter is more remarkable. In the true pelagic basinal facies of Northeastern Hungary, however, only the second one is recognizable at present by the appearance of *Gondolella trammeri* (which would mark the base of the Ladinian according to L. Krystyn, 1983). In epicontinental sequences, as concluded by Nicora and Kovács (in press) in Nevada, the most remarkable change in the conodont fauna can be recognized at the appearance of the *Nevadites* fauna (= base of *Frechites occidentalis* zone). At the same time, no change in conodonts can be recognized at the boundary of *occidentalis/subasperum* - zones, where the Anisian/Ladinian boundary is proposed by Silberling and Tozer (1968) and Tozer (1967).

It is still premature to give a final proposal for the Anisian/Ladinian boundary, but it should then be defined, as stressed above, by complex biostratigraphical methods in that way, that it should be recognizable in practice and in all major facies types.

The problem of the Cordevolian substage

The recently arosen problem of the existence of the Cordevolian substage is only because of its original definition, which has turned out to be wrong (cf. Krystyn, 1978). Because this time-interval is represented by a characteristic and distinct assemblage in many fossil groups, it should be maintained in the Triassic chronostratigraphical subdivision, at least in the Tethys. The new ammonoid zonal scheme proposed by L. Krystyn offers a satisfactory new difinition of the Cordevolian and Julian substages in terms of ammonoid biostratigraphy (*Trachyceras aonoides*, resp. *Austrotrachyceras autriacum* zones with 2-2 subzones.

In terms of conodont-biostratigraphy, in pelagic, deep-water Triassic developments not interrupted by the "Raibl event", beginning of Julian substage can be easily recognized by the massive appearance of the *Gondolella auriformis*-group and the substage itself can be defined by the *auriformis*-zone (cf. Krystyn, 1983).

In carbonate platform facies, also not interrupted by the detrital "Raibl event" the Julian substage can probably be recognized and distinguished from the Cordevolian by the unique dasycladacean flora with *Physoporella heraki*, *Poikiloporella brezovica* and *Uragiella supratriassica*, described by Bystrický, 1967 form Silická Brezová, Inner West Carpathians.

The problem of the Rhaetian stage

This problem is similar to that of the Cordevolian: the Sevatian and the Rhaetian need a new definition (again by complex biostratigraphy) and the traditional chronostratigraphical subdivision should not be changed. In conodont biostratigraphy they can easily be distinguished: at the end of the former all Norian *Metapolygnathus* (or *"Epigondolella"*species and probably also *Gondolella steinbergensis*) disappear. *Rhabdoceras suessi* (similarly to *Aplococeras avisianum*, *Ticinites polymorphus* and *"Ceratites" reitzi*) should be abandoned from the Triassic standard ammonoid biozonation and the Sevatian, as upper substage of the Norian, should be defined with *Sagenites quinquepunctatus* and *Sagenites reticulatus* (cf. Krystyn, 1980). The Rhaetian should be used further as an independent stage, at least in the Tethys.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Contributions for the next issue of ALBERTIANA should reach the Editor or the Secretary General before October 1st., 1984.

The lay-out of contributions should be preferably comparable to that of the contributions in the present issue of ALBERTIANA.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

BRIEF COMMENTS ON THE TRIASSIC TIME SCALE PROPOSED BY I.G.C.P. - PROJECT NO. 4.

H. KOZUR

LOWER TRIASSIC

The Gangetian Stage is characterized by the *Otoceras woodwardi* Zone only. The *Ophiceras tibeticum* is not to be included. The *Ophiceras connectens* Zone, in the Salt Range, corresponds with the *Otoceras woodwardi* and the *Ophiceras tibeticum* Zones, based on conodont information.

With regard to the Nammalian, which is to be abandoned, the base can not be defined by other fossils than ammonoids. The base may lie anywhere within the *Claraia* beds.

The boundary between the Griesbachian and Dienerian is considered by ammonoid specialists in the U.S.S.R. of subordinate importance. The Griesbachian and Dienerian are to be abandoned.

Both in marine and continental sediments, a distinct boundary appears to be present at the top of the *Vavilovites* and time-equivalent beds in the northern and southern hemispheres. This event may be correlated by Conchostracs from marine to continental sediments, and corresponds with the base of the Brahmanian Stage. The latter may be divided into the Ellesmerian and Gonderian Substages.

The "Nammalian"/Spathian Boundary is of a substage level only. Preference is given to the Olenekian Stage, divided into two substages.

MIDDLE TRIASSIC

The *Keyserlingites subrobustus* Zone, an equivalent of the *Neopopanoceras haugi* Zone, is considered as the base of the Anisian Stage. This zone is considered to contain a mixed Scythian/Anisian ammonoid and conodont fauna.

The Anisian/Ladinian Boundary is, for priority reasons, to be placed between the *Paraceratites trinodosus* and the *Protrachyceras reitzi* Zones.

It may be remarked that the *Aploceras quisianum* Zone may be younger than the *Protrachyceras reitzi* Zone in some areas in the Southern Alps.

UPPER TRIASSIC

The *Frankites sutherlandi* Zone is to be placed within the Karnian, as the lowermost ammonoid zone of the Cordevolian, which is to be maintained as a substage. For an argumentation see Kozur, 1979, p. 756-757).

With regard to the Cordevolian and Julian Substages in the subdivision in Lower and Middle Karnian by Mojsisovics (1892) the "lens" with "*Trachyceras*" *austriacum* was placed at the base of the Middle Karnian (Julian), whereas the

Trachyceras aonoides Zone was used in a very broad unsuitable sense. Kozur (1976) has separated the beds above the *Trachyceras aon* Zone into three zones: the lowest one with *Trachyceras* only, the middle with *Trachyceras* and *Sirenites* and the upper one without *Trachyceras* , but with *Sirenites*. These three zones coincide exactly with the *Trachyceras aonoides*, *"Trachyceras" (= Austrotrachyceras) austriacum* Zones and the *Sirenites* Subzone as redefined by Krystyn (1978). These designations are accepted, but the subzones are regarded as zones.

The base of the Julian is to be placed at the base of the *Austrotrachyceras austriacum* Zone. The base of this zone is well traceable by ammonoids and many microfossil groups.

The Cordevolian is considered to contain the *Frankites sutherlandi*, the *Trachyceras aon* and *Trachyceras aonoides* (sensu strictu) ammonoid zones. The Cordevolian posesses a microfauna with typical Karnian elements, together with the last typical Ladinian elements. The latter are often higher evolved than in the Langobardian (as conodonts, holothurian sclerites, ostracodes, radiolarians, foraminifera).

The *Tropites subbulatus* Zone of the Tuvalian Substage is to be replaced by two zones (see subzones of Krystyn, 1980).

The *Halorites macer* Zone is to be placed within the Sevatian Substage, and possibly the *Himavatites hogarti* Zone also.

The *Rhabdoceras suessi* Zone is to be substituted by three zones: (1) the *Sagenites giebeli* Zone, (2) *Cochloceras suessi* Zone, and (3) the *Choristoceras haueri* Zone. The first two are placed within the Sevatian (Upper Norian), the latter is considered as the base of the Rhaetian.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

THE STATUS OF THE RHAETIAN

The Rhaetian controversy is still not definitively solved. Notably ammonoid workers prefer to regard the Rhaetian as a local development of the Norian rather than a suitbable unit for standardized subdivision of the Triassic System. Consequently, the unit is either discarded or applied on a substage level. Alternatively, on the basis of other groups of fossils, the classic concept of an independent Rhaetian Stage finds strong support in many parts of the world. At present one may note that the controversy has in increasing impact on the practice of classifying and correlating latest Triassic successions. Modern literature is becoming rather confusing and various bodies and individuals have urged the STS to take a formal decision. There= fore the problem will have ample attention in the coming years. It is intended to establish a special working group.

Those members of the STS who are interested in joining a Rhaetian working group are requested to contact the Secretary General.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

CONTRIBUTION TO THE PROBLEM OF THE CORDEVOLIAN SUBSTAGE

A. ORAVECZ SCHEFFER

According to the Foraminifera investigations of the outcrops in Balaton Highland and of the cores of several deep-drillings in the Bakony Mountains (Bakonyzücs-1., Bakonyzücs-3., Balatonfüred-1, penetrating the so-called Veszprém Marl Formation), in my opinion the Cordevolian has a distinct, special Foraminifera and Roveacrinidae association, very close to the wellknown "Cassian" microfauna: *Pachyphloides klebelsbergi* (Oberhauser), *Pseudonodosaria obconica* (Reuss), *Agathammina austroalpina* Kristan, *Turritellellea carnica* Dager, *Gsollbergella spiroloculiformis* (Oravecz Scheffer), *Mesodiscus eomesozoicus* (Oberhauser), *Lamelliconus biconvexus* (Oberhauser), *Variostoma exile* Kristan, *Variostoma praelongense* Kristan, etc. .

This special microfauna was found with *Trachyceras aon* in the outcrop of the highway near Balatonszöllős (locality investigated by I. Szabó).

The Foraminifera composition is well distinguishable from that of the Julian because of the presence of the taxons already present in the Ladinian (*Turritellella*, *Pachyphloides*, *Cyclogyra*, etc.), which disappear at the end of the Cordevolian.

Therefore, based on Foraminifera associations, I propose:
(1) to consider the Cordevolian as a distinct substage belonging to the Carnian;
(2) to separate the substage from the Julian because of its Ladinian elements.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

BUSINESS AND SCIENTIFIC MEETINGS OF THE S.T.S. AT THE MOSCOW CONGRESS

Members who will attend the International Geological Congress in Moscow, will have opportunities for business/ scientific meetings at the following times:

Date	Place	Time
August 10	University Building 2, room 5	13.00 - 15.00
August 10	University Building 2, room 5	18.30 - 21.00
August 13	University Building 2, room 5	18.30 - 21.00

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

"PALAEOFLORA OF SOUTHERN AFRICA", A NEW PROJECT

M. BOERSMA

As a companion to the "Flora of Southern Africa", dealing with the extant flora, a project has been initiated, entitled "Palaeoflora of Southern Africa". Drs. John and Heidi Anderson (Botanical Research Instute, Pretoria) have accepted the responsibility for a series of six volumes on the Triassic Molteno Formation. The publication plan envisages that the six volumes, altogether in 10 parts, will be brought out in the next five years.

The reason why the Triassic Molteno Formation has been chosen as the first research object is explained by the Director of the Botanical Research Institute, Dr. B. de Winter, in his foreword to volume I, that has just come out:

> "The Molteno must rank as the most productive megaplant bearing formation of any age in southern Africa as well as of the Triassic of Gondwana; when the extent of outcrop and exposures, the number of localities and the taxonomic diversity and clarity of preservation are considered together."

The first volume comprises two parts: an introduction and a treatise on *Dicroidium*. The choice of this taxon is explained by the authors in the preface:

> "The genus *Dicroidium*, being the most abundant diverse element in the Gondwana Triassic Realm, and displaying the most complex evolutionary history, provides an ideal opportunity for experimentation into taxonomic approach."

The introduction part deals with the Gondwana Triassic megaplants in general and the Molteno Formation in particular. It is illustrated with 30 high quality plates holding pictures of megaplant fossils, acritarchs and pollen/spores from the Gondwana Triassic. The bibliography on Gondwana Triassic megaplants is extensive and occupies five pages. The introduction includes a figure on Gondwana Triassic reconstructions (topography, vegetation) and two maps, on Gondwana Triassic megaplant occurrences and topographic position of the Molteno sites, respectively. Besides, a large correlation chart for the Gondwana Triassic is presented. Seven tables are given:

- one on productive degree squares
- a chronological reference list (showing a "literature boom" from 1962 onwards)
- a geographical reference list (very useful)
- a classified megaplant checklist)
- a classified palynomorph checklist) Molteno Formation
- a general synopsis of the megaflora)
- a table on the species composition per assemblage)

It becomes clear in the *Dicroidium* part that the authors study "populations" (palaeodemes) rather than single specimens. It must have cost an awful lot of time and energy to collect and study the amount of material here described and figured.

On pp. 90-121 information is given on each taxon including the worldwide geographic distribution.

On pp. 188-192 results of cuticular analysis are presented.

The *Dicroidium* part holds seven tables:

- nomenclatural chronology (including basionym references, type material)
- hypodigm list (aiming at documenting all the illustrations of *Dicroidium* fronds available in the literature, including geographic and stratigraphic occurrences
- sub-generic classification
- diagnostic features (of the species only)
- literature review (of cuticle literature)
- cuticle samples and illustrations (referring to pls. 89-108)
- cuticle characteristics of taxa within one assemblage and for the Gondwana Triassic as a whole

The five figures in this part are the following:

- *Dicroidium* phylogeny (in which it is tried to unravel the possible phylogeny of *Dicroidium* starting with *Dicroidium zuberi* in the Smithian of Australia)
- Pictograph, resp. pictograph composite (of the 142 *Dicroidium* palaeodemes recognized in the 46 Molteno assemblages yielding the genus)
- pictograph series (being a set of reduced pictographs, one for each of the 46 *Dicroidium* assemblages, illustrating the limits and character of each palaeodeme recognized. See also the photographic catalogue: pls. 31-86)
- cuticular characteristics of LIT 111 palaeodemes (beautiful drawings).

To be complete: pls. 87 and 88 illustrate aberrant fronds and mode of attach= ment of fronds, respectively; on pp. 224-225 a general bibliography is given.

This impressive work is beautiful on the one hand, and strange on the other. It takes your time to fully comprehend the information given. It is not a book, since the actual text comprised not 227, as suggested by the bibliographical information, but only 19 pages. The plates are of high quality; the ones on cuticles include fine illustrations made with the Scanning Electron Microscope. If some minor remarks are permitted (1) for some plates you need a hand-lens to study the stamp-size photographs, (2) as far as the Gondwana Triassic correlation charts are concerned: one should realize in using them that a compiler is dependent on the available information. For instance: why is the Kingriali Stage (Salt Range) (p. 14) placed in the Norian? From a palynological point of view it should be placed at a much lower level in the stratigraphical column.

Bibliographical information:

Anderson, J.M. & Anderson, H.M., 1983. Palaeoflora of Southern Africa - Molteno Formation (Triassic). I.1. Introduction. 2. *Dicroidium*. Balkema, Rotterdam, 227 pp., 6 figs., 110 pls., 14 tables. ISBN 90 6191 283 0.

The work is an obligatory reference work for all workers in the Triassic palaeontology and stratigraphy. Highly recommended.

CLIMATE OF THE TRIASSIC AS SEEN FROM THE PERMIAN

J.M. DICKINS

The Lower Permian is noted for the provincialism of its faunas reflecting the distinctive climatic differentiation. The Permian opens with widespread glaciation in the Asselian. Evidence of the action of glaciers is seen in Africa as far north as Ethiopia, Arabia, India and Tibet, Australia, South America, Antarctica and possibly Siberia. Although evidence for glaciers is absent from the Sakmarian onwards, the faunal provincialism persists through the Lower Permian and into the Upper Permian.

The striking cosmopolitanism of the Lower Triassic is as though looking at another planet, e.g. the bivalves from Western Australia (Dickins and McTavish, 1963) are virtually cosmopolitan in their occurrence - a feature quite unknown in the Lower Permian.

During the Upper Permian the faunas become more cosmopolitan and I have associated this with worldwide warming of climate and indeed I have been bold enough to suggest the drastic changes of fauna (and flora) at the Permian-Triassic boundary reflect a worldwide very hot climate which together with the world regression at the time were the main factors in the change in life at this time (Dickins, 1983).

The cosmopolitan nature of the fauna of the Lower Triassic is shown for example for conodonts (Sweet et al., 1971) and the ammonoids (Kummel, 1973). This fits other climatic data such as the widespread occurrence of fine-grained red beds and desert conditions (Waugh, 1973). Although some amelioration of the hot climate may have taken place in the Middle Triassic, the nature of the fauna indicates a worldwide warm climate. This persists in the Upper Triassic and is shown, for example, in the distribution of the monotids (Westermann, 1973).

The Triassic therefore in its climate was totally different to the present. For example, to say that a high latitude indicated a cold or temperate climate would be quite misleading. The climate has had a very important place in defining the special features of the System. There are also other special features such as the peculiar tectonic and magmatic development of the System on which I shall not elaborate here.

Taking into account the climate, one could then ask whether the latitudinal weather patterns were quite different to the present, e.g., did a single weather cell extend from the Equator to the Poles, not two as at present? Was there a wide belt or belts of dry climate? Many lines of enquiry are opened up. Does the difference in climate have anything to do with the supposed different positions of the continents? Has a belief that high latitude was associated with cool climate in the Triassic led some authors into a series of complicated manipulations of world palaeogeography to explain the faunal distributions, e.g. Tozer (1982) ? Almost certainly the kind of water temperature differences apparent in the Permian are not present in the Triassic. The widespread nature of the zones of the Triassic does little to bear out recognition of restricted low, middle and high latitude faunal provinces.

References

Dickins, J.M., 1983. Permian to Triassic changes in life. Memoir Association of Australian Palaeontologists, 1: 297-303.

Dickins, J.M., qnd McTavish, R.A., 1963. Lower Triassic marine fossils from the Beagle Ridge (BMR 10) Bore, Perth Basin, Western Australia. Journal of the Geological Society of Australia, 10: 123-140.

Kummel, B., 1973. Lower Triassic (Scythian) molluscs. In: A. Hallam (Ed.), Atlas of Palaeobiography, Elsevier, Amsterdam, London, New York, 225-233.

Sweet, W.C., Mosber, L.C., Clark, D.L., Collinson, J.W., and Hasenmueller, W.A., 1971. Conodont biostratigraphy of the Triassic. Geological Society of America, Memoir, 127: 441-465.

Tozer, E.T., 1982. Marine Triassic faunas of North America: their significance for assessing plate and terrane movements. Geologische Rundschau, 71(3): 1077-1104.

Waugh, B., 1973. The distribution and formation of Permian-Triassic red beds. In: A. Logan and I.V. Hills (Eds.), The Permian and Triassic Systems and their Mutual Boundary. Canadian Society of Petroleum Geologists Memoir, 2: 678-693.

Westermann, G.E.G., 1973. The Late Triassic bivalve *Monotis* . In: A. Hallam (Ed.), Atlas of Palaeobiogeography, Elsevier, Amsterdam, London, New York, 251-258.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

On August 30, 1983, the Netherlands Subcommission on Stratigraphy was installed as a subcommission of the Royal Academy of Arts and Sciences of The Netherlands.

Chairman: Dr. W.H. Zagwijn
Secretary: Dr. P.J.Hoedemaeker, Rijkmuseum van Geologie en Mineralogie, P.O.Box 9518, 2300 RA Leiden, The Netherlands

The newly established subcommission wishes to maintain contacts with the STS and in case combine efforts.

The current concept of stratigraphical subdivision of the Triassic of The Netherlands is reproduced on p.16 of the present issue of ALBERTIANA.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

UPPER CARNIAN BRACHIOPOD FROM SPITI, INDIA

V.J. GUPTA

The present note records the occurrence of an Upper Carnian brachiopod *Austriellula angulifrons* (Bittner, 1890) from the succession exposed near Lilang (32° 99' 00" N : 78° 14' 29" E) along the Lingti River, Spiti. The carnian succession at this locality is represented by thickly bedded grey, white and brown crystalline limestone which at places is intercalated with bands of calcareous shales. The brachiopod species being recorded in the present paper has been collected from the limestone beds lying immediately above the horizon yielding ammonites corresponding to *Tropites subbulatus* Zone (Krystyn, 1982).

Austriellula angulifrons (Bittner, 1890) from the Lilang section is represented by several specimens and most of these specimens are recrystallised. The specimens have been identified after making serial sections and comparison of the material with the type specimens housed at the Department of Geology and Geotechnics, CSSR Academy of Sciences, Prague, National Museum, Prague; Hungarian Geological Survey, Budapest; Palaeontologisches Institut, University of Vienna and Natural History Museum, Vienna, and Natural History Museum, Paris. The specimens from the Himalaya show great variability and the character of the linguiform extension present in them confirms their identification beyond doubt as *Austriellula angulifrons* (Bittner, 1890). Diener (1906) recorded the occurrence of one specimen with robust beak and lesser angularity of the linguiform extension as *Rhynchonella angulifrons* Bittner from Byans. This specimen needs to be restudied and properly identified as the description given by Diener (1906) does not agree with the original description given by Bittner (1890).

The occurrence of brachiopod genus *Austriellula* has been widely recorded from Slovakia (Balogh, 1940; Siblik, 1982), Timor (Krystyn and Siblik, 1983) and Nepal (Siblik, 1976).

Acknowledgements

The author expresses his grateful thanks to Dr. M. Siblik, Institute of Geology and Geotechnics, CSSR, Academy of Sciences, Prague for useful discussions during his visit to Prague. The author also expresses his sincere thanks to the University Grants Commission, New Delhi, Ministry of Education, Government of India, New Delhi and Ministry of Education, Government of Czechoslovakia, Prague for arranging my visit to Prague under the Indo-Czech Cultural Exchange Programme in Sept.-Oct. 1983, which enabled completion of this short paper.

References

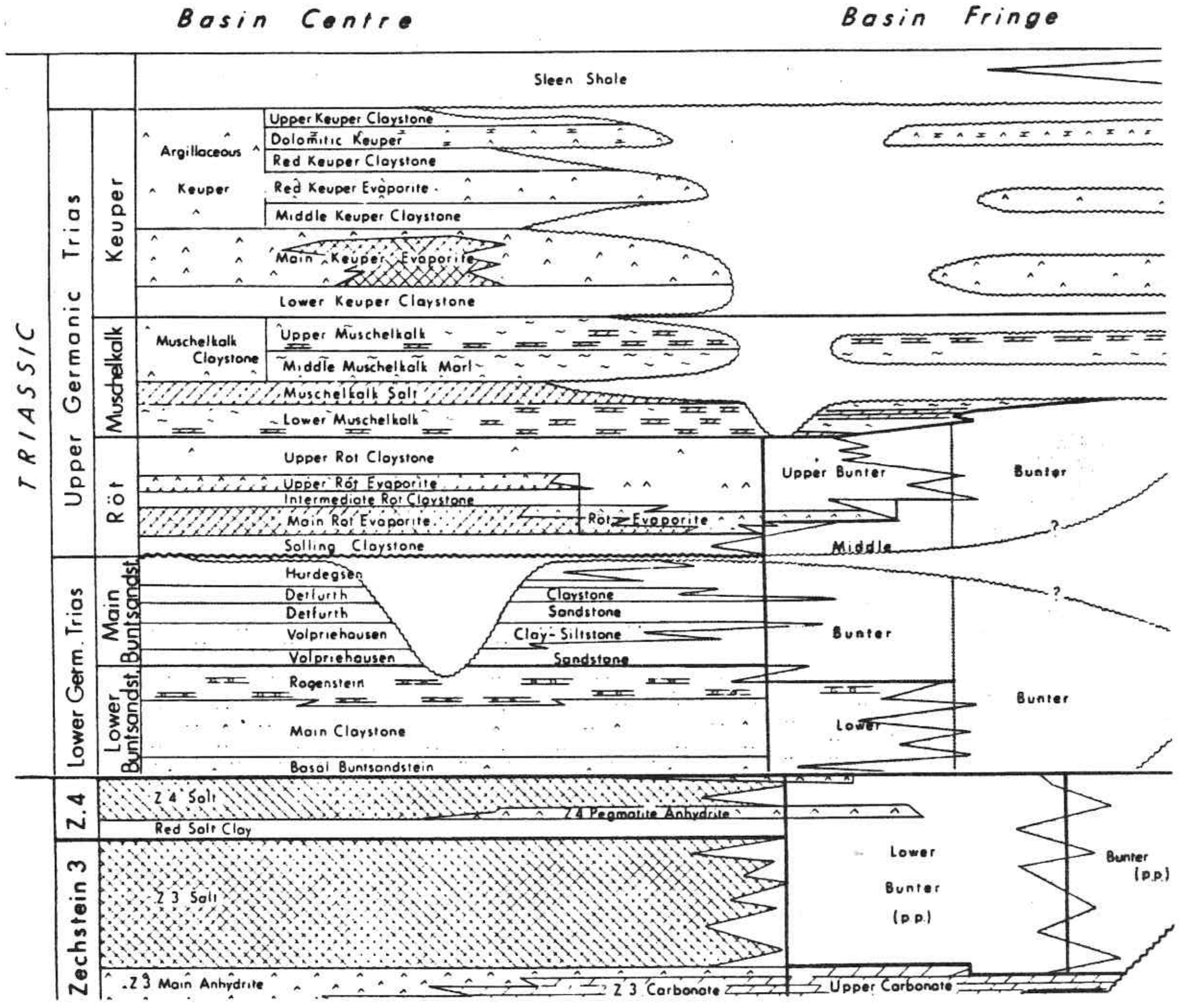
Balogh, K., 1940. Daten zur geologischen Kenntnis der Umgebung von Pelsöcardó - Abh. miner-geol. Institut. St. Tisra-Univ., 19: 157-200.

Bittner, A., 1980. Brachiopoden der alpinen Trias. Abh. K.K. geol. Reichsanst. Wien, 14: 1-135.

Diener, C., 1906. Himalayan fossils. The fauna of the Tropites Limestone of Byans. Pal.Ind., Geol. Surv. Ind., 15, Pt. 5(I): 1-201.

Krystyn, L., 1982. Obertriassische Ammonoideen aus dem Zentralnepalischen Himalaya (Gebiet von Jomsom) - Abh. Geol. B. - A. 36: 1-63.
Krystyn, L. and Siblik, M., 1983. *Austriellula robusta* n.sp. (Brachiopods) from the Upper Carnian Hallstatt Limestone of Timor (Indonesia). Schrift. Erdwissen Komm. Österr. Akad. Wiss., Wien, 5: 259-266.
Siblik, M., 1976. Triassic brachiopods from Nepal. Riv. Ital. Paleont., 81: 133-160.
Siblik, M., 1982. Genus *Austriellula* Strand, 1928 (Brachiopods) from the Upper Triassic. Západné Karpaty Séria Paleontólogia, B.: 41-70.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx



Subdivision of the uppermost Permian (Zechstein 3, 4) and Triassic in the subsurface of The Netherlands as adopted in the "Stratigraphic Nomenclature of The Netherlands" (Nederlandse Aardolie Maatschappij B.V. and Rijks Geologische Dienst, 1980, Verh. Kon. Ned. Geol. Mijnbouwk. Gen., vol. 32).

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

THE TRIASSIC - JURASSIC BOUNDARY IN BRITAIN*

G. WARRINGTON

The Triassic - Jurassic boundary is placed, in British sequences, at the lowest occurrence of ammonoids of the genus *Psiloceras*; this marks the base of the lowest (*planorbis*) Zone of the Hettangian Stage and, therefore, the base of the Jurassic and its boundary with the Triassic (Cope et al., 1980, Warrington et al., 1980). The system boundary, as so defined, usually occurs a few metres above the base of the Lias facies, the basal beds of which are thus assigned to the Triassic. The procedure adopted in placing this boundary is an extension of the principle applied in the definition of chronostratigraphic units within the Jurassic; such units are defined only at their base, the top of any unit being automatically marked by the base of the next succeeding unit.

The Lias rests upon the Penarth Group (formerly the Rhaetic; Warrington et al., 1980) which, in turn, overlies the Mercia Mudstone Group (formerly the Keuper Marl; Warrington et al., op.cit.). The sequence of beds from the upper part of the Mercia Mudstone Group to the basal part of the Lias represents a change from a largely continental environment of playas or supratidal sabkhas to an epicontinental marine environment. This sequence is well exposed in coastal outcrops in Glamorgan, South Wales (Ivimey-Cook, 1974), in west Somerset (Whittaker and Green, 1983), and in east Devon. Palynomorph assemblages from the highest beds of the Mercia Mudstone Group and from the Penarth Group in those sections are of Rhaetian character and those beds are, with the Lias succession below the horizon marking the base of the Hettangian, regarded as Rhaetian in age. Changes observed in the palynomorph assemblages and macrofossil associations from this sequence correspond largely with facies changes and are partly, at least, related to environmental changes connected with the onset and progress of a marine transgression which, entering the region during Rhaetian times, resulted in the establishment of an open marine environment throughout much of the British Isles by Hettangian times (Warrington, 1981). No change occurs in the palynomorph associations at the level in the Lias sequence corresponding with that defined, on ammonite evidence, as the base of the Jurassic succession.

* Abstract of a contribution presented at the meeting of the IUGS Subcommission on Triassic Stratigraphy held in Vienna, 8 July, 1982.

References

Cope, J.C.W., Getty, T.A., Howarth, M.K., Morton, N. and Torrens, H.S., 1980. A correlation of Jurassic rocks in the British Isles. Part One: Introduction and Lower Jurassic. Geological Society London, Special Report No. 14, 73 pp.

Ivimey-Cook, H.C., 1974. The Permian and Triassic deposits of Wales. Pp. 295-321 In: Owen, T.W. (Ed.) The Upper Palaeozoic and post-Palaeozoic rocks of Wales. University of Wales Press, 426 pp..

Warrington, G., 1981. The indigeous micropalaeontology of British Triassic shelf sea deposits. Pp. 61-70. In: Neale, J.W. and Brasier, M.D. (Eds.) Microfossils from Recent and fossil shelf seas. Horwood, Chichester.

Warrington, G., Audley-Charles, M.G., Elliott, R.E., Evans, W.B., Ivimey-Cook, H.C., Kent, P., Robinson, P.L., Shotton, F.W. and Taylor, F.M., 1980. A correlation of Triassic rocks in the British Isles. Geological Society London, Special Report No. 13, 78 pp..

Whittaker, A. and Green, G.W., 1983. Geology of the country around Weston-super-Mare. Mem. Geol. Surv. G.B..

This contribution is published with the approval of the Director, British Geological Survey (N.E.R.C.).

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

FORMATION	MEMBER	STAGE	SERIES
Muli Group			JURASSIC
T_3g Galedesi Fm		NORIAN or NORIAN to RHAETIAN	UT
T_3a Atasi Fm	Upper Mb Lower Mb	CARNIAN	
T_2^1j Junzihe Fm	$T_2^1j^q$ Qierma Mb $T_2^1j^d$ Dajialian Mb	ANISIAN	MT
(T_1yk Yangkang Fm)			
T_1^2j Jianghe Fm	$T_1^2j^2$ Limestone Mb $T_1^2j^1$ Clastic Mb	OLENEKIAN	LT
T_1^1x Xiahuancang Fm	$T_1^1x^2$ Green Sandstone Mb $T_1^1x^1$ Purple Sandstone Mb	INDUAN	
			UPPER PERMIAN

Litho- and chronostratigraphy of the Triassic of the South Qilian Mts (from YANG et al., 1983).

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

I.G.C.P. PROJECT 203 BUSINESS MEETINGS

YANG ZUNYI, project leader

The first meeting of Project 203 "Permo-Triassic events of E. Tethys an their intercontinental correlations" was held in the People's Republic of China, 1-10 March 1984.

Business Meeting, Friday, 2 March 1984 - Beijing, Temple of Sleeping Buddha (Chairman - Yang Zunyi)

1. Co-leaders

   After considerable discussion it was decided to elect Dr. J.M. Dickins of the Bureau of Mineral Resources, Canberra, Australia, as co-leader and to invite Professor W.C. Sweet of Ohio State University, USA, also to be a co-leader.

2. Members of Project 203

   The following were selected: R.L.Batten (USA), A.Baud (Switzerland), D.W.Boyd (USA), J.D.Campbell (NZ), M.Gaetani (Italy), B.F.Glenister (USA), R.E.Grant (USA), J.A.Grant-Mackie (NZ), H.M.Kapoor (India), H.Kozur (Hungary), J.Marcoux (France), K.Nakazawa (Japan), N.D.Newell (USA), A.Nicora (Italy), R.A.Paull (USA), J.K.Rigby (USA), E.T.Tozer (Canada), C.Virgili (Spain), H.Visscher (Holland), H.Zapfe (Austria), Yu.D.Zakharov (USSR).

   An approach would be made to Grant-Mackie to seek his help in getting nominations from Thailand and perhaps Malaysia and Indonesia. Professor Nakazawa would be invited to be a member and if he was not able to nominate an appropriate person from Japan. The need for participation of the scientists from Nanjing Institute of Geology and Palaeontology was indicated.

3. Future Meetings of Working Groups

   a. After discussion about the possibility of having a meeting at the Gondwana Symposium in August 1985 at Ohio State University this was left until later. (At Chongqing it was decided to arrange at least an informal meeting at Ohio).

   b. A meeting would be held at the International Geological Congress at Moscow in August 1984. Dr. Dickins would write to Dr. Tozer seeking a joint meeting of the group with the Permian-Triassic Boundary Working Group.

   c. The possibility of having a meeting in New Zealand at the time of the meeting of the Australasian Association of Palaeontologists probably in late 1985 would be explored.

   d. The next separate meeting of the Group would be held in Italy in 1986 as set out in the invitation outlined by Dr. Nicora.

   e. The possibility of having a meeting in Kashmir in 1987 would be explored.

f. The final meeting would be held in China, timed to fit in with the meeting in Kashmir if this becomes possible.

Business Meeting, Saturday, 10 March 1984 - Chongqing (Chairman - J.M. Dickins)

This meeting was mainly concerned with future scientific work. Professor Newell suggested that the group should look for the best section in China which would be recommended as an appropriate boundary stratotype based on accessibility, good fossils and good exposure. Although excellent work had been done already, more work was needed, for example, on small fusulinids and conodonts. There was a need to synthesize the work of different geologists in China and especially different Institutes. We are all inclined to be influenced by what we expect to see and in this way we can reach a more satisfactory situation. Detailed comparison of different sections was needed and he suggested the use of Walter Sweet's method. A meeting that involved Chinese workers could be arranged and correspondence and exchange of specimens both within and outside could help to standardise taxonomy. Ultimately, Chinese colleagues would need to indicate which section would be the most satisfactory. General discussion followed on the requirements of the best section and the fossil criteria which should be used. It was generally agreed that a section compatible with accessibility, good exposure and the best fossils should be chosen. The desirability of having a continuous section was canvassed but there was some scepticism on whether there could be any certainty about continuity. Although one could look for an ideal situation, the actualistic regional approach would be more likely to be realistic.

There was considerable discussion on how the biota might be used. Some advocated that the single and "best" group should be chosen and here some favour was expressed for the conodonts but probably most felt that the whole fauna should be taken into account and "the main faunal change" was significant. It was argued by some that the main faunal change cioncided with the main lithological (formational) change at the boundary of the Changsinghian and the Griesbachian. Although no ammonite wirker was present at this meeting, the difficulties of working with this group were indicated. Dr. Baud spoke strongly on the importance of this group.

There was general agreement that the group should seek the best section in China and this was mainly the responsibility of the Chinese colleagues.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Many members of the S.T.S. have not yet given their opinion on the Triassic time scale proposed by I.G.C.P. Project No. 4. Therefore DO NOT FORGET TO SEND YOUR COMMENTS TO THE EDITOR OF ALBERTIANA!

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

ANNOTATED TRIASSIC LITERATURE, 1983, 2

M. BOERSMA

Under this heading new relevant literature on the Triassic research <u>received by the editor or the secretary general</u> of the S.T.S. will be briefly annotated.

Brunner, H. & Wurm, F., 1983. Stratigraphie und Mächtigkeiten der unteren Gipskeuper-Schichten (km. 1, Grabfeld-Folge) in Baden-Württemberg. Jber.Mitt. oberrhein. geol. Ver., N.F., 65: 307-344, 22 figs., 4 tables.

In this lithostratigraphical study a detailed account is given of the unit "untere Gipskeuper-Schichten" (Middle Keuper, Grabfeld sequence) in Baden-Württemberg (GFR). Contrary to the general opinion it has been proven possible to divide the "Gipskeuper-Schichten" into distinct subunits. The 23 investigated profiles show an increase in thickness of the sediments involved in a NE-SW direction, with a local maximum of sedimentation in the "Heilbronner Mulde".

Cafiero, B. & De Capoa Bonardi, P., 1982 (received 1983). Biostratigrafia del Trias pelagico della Sicilia. Bollettino Soc. Paleontol. Italiana, 21(1): 35-71, 13 figs., 10 pls. (with Italian and English summaries).

- Biostratigraphy of the pelagic Triassic of Sicily -. The pelagic sequences of the Triassic Sicano and Imerese basins of Sicily have been studied. The stratigraphic data of the sicilian pelagic Triassic agrees with that of other regions of the Mediterranean area. The Monte Cammarata section, being the most complete and richest in fossils of the sections studied, has been assigned to the Julian-Upper Alaunian stratigraphic interval on the basis of Halobiids, conodonts (rare) and ammonites (very rare). The Monte Cammarata section can be biostratigraphically correlated with other Sicilian sections. The Sicilian Halobiids collected by G.G. Gemmellaro (Palaeontolo= gical Museum, Palermo University) have been studied and re-described. Three new species are described and figured.
The plates hold clear pictures of *Halobia* species and conodonts. The figures include stratigraphical columns.

Chen, Chu-zhen, 1983. Geographic distribution and the realm of Triassic bivalves of Xizang. Acta Palaeontologica Sinica 22(3): 363-365 (in Chinese with English summary).

Up to the present hundreds of species of Triassic bivalves have been described from Xizang. The occurrence is restricted to three regions. In the <u>Tanggula-Chambo region</u> taxa are found of the northern coast of the Tethyan Realm, in association with those of the Boreal-Circum Pacific Realm (species mentioned). In the southern part of the <u>Lhasa-Kangdese region</u> only a few endemic forms occur, which are representative of the southern coast of the Tethyan Realm (species mentioned).

It is concluded that at least during the Early Triassic the eastern part of the Tethyan sea covered a vast area, situated in between the Gondwana and Eurasian continents. At the beginning of the Norian the eastern part of the Tethyan sea was reduced in size. This allowed the Napeng fauna to develop in all the shallow-water clastic facies of Xizang. In the shallow-water carbonate facies (limestones) the Napeng fauna occurs together with Megalodonts. The deep-water facies (Jilong-Shannan region), consisting of shale and radiolarian siliceous beds, yields thin-shelled bivalves of the Tethyan types (species mentioned).

Cros, P. & Doubinger, J., 1982 (received 1984). Études palynologiques de sédiments terrigènes et pélagiques du Trias moyen des Dolomites Italiennes. Relations avec le paléoenvironnement. Sci. Geol., Bull., 35(3): 157-182, 6 figs., 3 pls., 1 table (in French with French and English summaries).

The paper deals with a qualitative and quantitative palynological analysis of Upper Ladinian tuffitic marls and hemipelagic sediments in the Dolomites. The sediments studied form part of the Zoppe Member (Aquatona Fm), overlying the Lower Ladinian Livinallongo Fm.

The terrigenous facies mainly originates from emerged land masses formed of sedimentary and volcanic Triassic rocks and of rocks from the basement of the Dolomites. On the basis of their palynological content the terrigenous sediments can be dated as Upper Ladinian.

Comparison of tuffitic samples from the eastern Carnic Alps with those of the Dolomites enables to date the tuffites underlying the ignimbrites of Rio Freddo in their type locality as Upper Ladinian, too, and not as Upper Anisian or Lower Ladinian as was believed so far.

This new information enables to throw a new light on the palaeogeographical relations between the acid tuffites of the pelagic basin in the Dolomites and the western Carnic Alps on the one hand and the pyroclastic series of the eastern Carnic Alps, deposited in a continental and neritic of hemipelagic environment, on the other.

The quantitative and qualitative variation within the palynological samples is explained by the varying distances from a common southern input of terrigenous material, influenced by aeolian transport dynamics and marine environment. The presence of the Anisian carbonate palaeorelief of Piz del Corco in the Ladinian basin seems to be an important factor too. Palaeoreliefs explain the presence of local subaerial vegetation associations in the investigated samples.

Fraser, N.C. & Walkden, G.M., 1983. The ecology of a Late Triassic reptile assemblage from Gloucestershire, England. Palaeogeography, Palaeoclimatology, Palaeoecology, 42: 341-365, 17 figs., 2 tables.

Triassic sediments recovered from fissure and cavity systems in Carboniferous Limestone at Crommhall Quarry, Gloucestershire, England have been found to contain abundant reptilian remains. Owing to the lack of spores, the precise ages of the fills are difficult to determine but evidence presented suggests they are Late Norian. Over ten genera of archosaur and lepidosaur have been identified from seven different fissure fills and the different faunal assemblages may represent successional ecosystems. The reptiles are mostly small and the largest, a dinosaur, is no more than one metre long. The lepidosaurs include five of six sphenodontids and the dentitions of four of these are examined in detail. The dietary habits of the sphenodontids are assessed, and by comparison with modern lizards it is concluded that at least one species was herbivorous. Different degrees of tooth wear in some species indicate that there was some intraspecific variation in diet. Interspecific competition partly explains the occurrence of the different proportions of each reptile observed at each of the seven sites.

Fig. 1A presents the abundance of seven genera of reptile at six different sites; fig. 1B the abundance of these genera within one selected site. Table II presents a summary of the dietary habits of the most common reptiles from Cromhall Quarry. A good paper with excellent figures.

Gaździcki, A. & Reid, P., 1983. Upper Triassic Involutinidae (Foraminifera) of Lime Peak in Yukon, Canada. Acta Geol. Polonica, 33 (1/4): 99-106, 3 figs., 2 pls., (with English and Polish summaries).

Tethyan benthic foraminifera of the family Involutinidae Bütschli have been discovered in the Upper Triassic sequence at the Lime Peak, Yukon (North Western Canada). Five species belonging to the genera *Aulotortus* Weynschenk and *Triasina* Majzon are recognized. The presence of *Triasina oberhauseri* Koehn-Zaninetti & Brönnimann in the involutinid assemblage indicate a Norian age for the investigated strata.

The illustrations give, apart from involutinids, information on the geography and geomorphology of the Lime Peak area.

Hüssner, H., 1983. Die Faunenwende Perm/Trias. Geol. Rundschau, 72(1): 1-22, 20 figs., 2 tables (with German, English, French and Russian summaries).

At the Permian-Triassic boundary a low diversity can be observed as far as invertebrates are concerned. The extinction rates are not higher than at other times throughout the Phanerozoic; the amount of new taxa, however, is extremely low. The low number of new taxa is explained by the formation of Pangea in the Upper Palaeozoic, that diminished the number of geomorphological and climatic barriers. The absence of barriers implied a reduction of isolated areas which are essential for the origin of new taxa (allopatric speciation). During the Triassic the continents drifted apart, resulting in a higher origination rate and increased diversity.

The paper provides with numerous figures and tables on origination/extinction rates through time in general, and for trilobites, ammonoids, blastoids and fusulinids in particular. In an appendix the author compares his results with an alternative view expressed by RAUP & SEPKOSKI (1982).

Kelber, K.-P., 1983. *Schizoneura paradoxa* SCHIMP. & MOUG. aus dem Unteren Keuper Frankens. Naturw.-Jahrbuch Schweinfurt, 1: 19-33, 4 figs., 2 pls. (with German and English summaries).

Leafy branches as well as single leaves of *Schizoneura paradoxa* SCHIMP. & MOUG. are introduced from Scheerieth near Schweinfurt (Franconia, W.Germany). The new finds fill a gap in the geographical and stratigraphical distribution of the taxon. Other finds of *Schizoneura* in the central European Mesozoic are discussed.

Fig. 4 provides with the distribution pattern of *Schizoneura* in Great Britain, France and W.Germany. Other illustrations show interesting morphological details.

Kristan-Tollmann, E. & Tollmann, A., 1983. Tethys-Faunenelemente in der Trias der USA (mit einem Beitrag von B. Gruber). Mitt.Österr.geol.Ges., 76: 213-272. 15 figs., 17 pls., 1 table (with English summary).

Important Upper Triassic outcrops in the USA are compared with those of the Tethys realm. The number of formations in the american Triassic is much smaller and the specific formations of the Tethys realm are mostly missing. The carbonate facies is much less developed in the USA. In most cases the fossiliferous content of the american Upper Triassic is considerably less rich and varied.

Despite the lesser rich and varied fossiliferous content in general an impressive conformity has been found between the fauna of the Tethys and the western part of the USA. Many species of foraminifera, coprolites of crustacea, halobiids, ammonites and echinoderms occur on both sides of the Pacific Ocean. This confirms a recently published concept by the authors in which they state that the faunal elements must have been mainly distributed across the triassic Pacific , the Panthalassa, since a direct connection between the Tethys and the open sea across the Pangaea in a westward direction (the hypothetical "Poseidon") did not exist at the time.

The paper includes a revision of Halobiids by B. Gruber. A beautifully illustrated document.

Kuss, J., 1983. Faziesentwicklung in proximalen intraplattform-Becken: Sedimentation, Palökologie und Geochemie der Kössener Schichten (Ober-Trias, Nördliche Kalkalpen). (Depositional Environments of Proximal Intraplatform Basins: Sedimentation, Palecology and Geochemistry of the Kössen Beds (Upper Triassic, Northern Alps). Facies, 9: 61-172, 41 figs., 16 pls., 8 tables (with German and English summaries).

Investigation of the carbonates of the Kössen Beds (Salzburg/Tyrol, Austria) has shown that the deposition took place within a protected intraplatform basin. Three facies units can be recognized: a Marl Carbonate sequence, Coral Limestones and a Carbonate Marl sequence.

A diachronous development of 14 microfacies types and also of the facies units (alternating within one profile) becomes evident when the sections are compared. The microfacies types are described. The presence of *Choristoceras marshi* indicates a Rhaetian age for the Carbonate Marl sequence.

The Marl Carbonate sequence has been formed in protected areas of surf zones. The Coral Limestones show two genetic types: a Shallow Coral Limestone formed in agitated water and a Deeper-Marine Coral Limestone formed below the photic zone, but still within the influence of episodic storms. The Carbonate Marl sequence points to a deposition in greater depths and indicates a subsidence of the basin. The faunal remains are delt with (pp. 85-95). Of special interest is the distribution of the benthic foraminifera: facies-controlled associations can be recognized.

The distribution of trace elements (Fe, Mn, Mg, Sr) and insoluble residues has been interpreted with the help of cluster analysis and factor analysis. The R-technique shows that the variability of the parameters is due to the primary mineralogical composition and diagenetic alterations; the Q-technique makes clear that water energy and micrite content are restrictive factors.

Sr and Mn distributions within the different profiles exhibit various patterns: the Sr values reflect different diagenetic stages; the Mn values indicate different intensities of the freshwater/phreatic diagenesis.
The illustrations are of good quality, the fine plates prove the necessity of high quality paper for the printing of photographs. At places the author provides with schematic drawings in the legend to the plates, which facilitate the interpretation of the relevant pictures.

Lippmann, F. & Steiner, K., 1983. Der Mineralbestand des Gipskeuper von Pfäffingen (Tübingen) und Schwenningen, Württemberg. Oberrhein. geol. Abh., 32: 15-43, 16 figs., 5 tables (with German and English summaries).

The Gipskeuper ("gypsum-bearing Keuper") in the upper part of the Germanic Triassic deserves attention, not only as an evaporite Formation, but also since it has caused difficulties in the past in the construction of tunnels and motor ways. Therefore, careful petrographic study of the few outcrops present in Württemberg (GFR) is necessary. Two outcrops have been studied: (1) near Pfäffingen (Tübingen), in the Middle Gypsum Member ("Mittlerer Gipshorizont"), and (2) the brickpit near Schwenningen, characteristic for the (leached) lower part of the Gipskeuper. Samples have been studied for their mineral composition. A new lithologic description is given of the Pfäffingen section. For future reference the studied outcrops enable well-documented sampling.

Orłowska-Zwolińska, T., 1983. Palynostratigraphy of the Upper part of Triassic epicontinental sediments in Poland. Prace instyt. Geol. Warszawa, 104: 89 pp., 4 figs., 36 pls., 15 tables (in Polish and English, with Polish and English summaries).

The author characterizes the microflora of the upper part of Triassic epicontinental sediments in Poland. According to the stratigraphic subdivision used in Poland so far, these are referred to as Keuper and "Rhaetic" sediments. She uses both terms in the sense of lithostratigraphic units. The probable age of the units is discussed on the basis of a comparison with the Alpine stages Upper Ladinian, Carnian, Norian and Rhaetian. In the investigated sediments five assemblages have been distinguished of the rank of assemblage zones, which have been named after the most important miospores:

I. *Heliosaccus dimorphus* (without marine microplankton), characteristic of Lower Keuper microflora
II. *Conbaculatisporites longdonensis*, with two subassemblages:
   a. *Echinitosporites iliacoides*, characteristic of the microflora of the Border Dolomite horizon (Grenzdolomit) and the lower part of the Lower Gypsum Beds, and
   b. *Triadispora verrucata*, typical of the upper part of the Lower Gypsum Beds.
III. *Aulisporites astigmosus*, characteristic of the Reed Sandstone.
IV. *Corollina meyeriana*, typical of the microflora of the top part of the Upper Gypsum Beds (Keuper) and of the Drawno, Jarkowo and Zbąszynek Beds (Rhaetic).
V. *Ricciisporites tuberculatus*, characteristic of the microflora of the Wielichowo Beds.

Microspore assemblages were determined on the basis of the length of the vertical range of the particular species, with special emphasis on the moment when these species appear for the first time, and on the basis of the maximal and minimal amount of these species, expressed in percentage. The area of western Poland is treated as basic for tracing the vertical range of the miospore species distinguished. The synthetic scheme of the occurrence of miospores in this area (table 13) is used as a comparative basis for determining the biostratigraphy of deposits in other regions of Poland and for palynological correlation of sediments classified according to local lithostratigraphic subdivisions in Poland.

An attempt has been made to correlate the assemblages distinguished in western Poland with similar assemblages in other parts of Europe (table 14). The author had identified 186 miospore species, including seven new species and two new combinations. One gets impressed by the terrible amount of work done and the excellent quality of the numerous tables. It is a pity that the quality of the photographs is negatively affected by the paper used.

Yang, Z., Yin, H., Xu, G., Wu, S., He, Y., Liu, G. & Yin, J., 1983. Triassic of the South Qilian Mts. . Geological Publishing House, Peking, 224 pp., 99 figs., 29 pls. (in Chinese with English summary - pp. 190-194 -).

On the basis of detailed investigation the Triassic of the South Qilian Mountains (the former "Junzihe Group") has been divided into 6 Formations and 8 Members.

The Lower Triassic includes the Xiahuancang (Induan), the Jianghe (Olenekian) and the Yangkang Fm. The Middle Triassic is represented by the Junzihe Fm (Anisian). The Upper Triassic Mole Group includes the Atasi (Carnian) and Galedesi Fm (Norian, or Norian to Rhaetian).

23 Sections have been measured and sampled. As a result of the investigation of the fossil remains (about 10.000 specimens) 98 genera and 172 species are described and figured, among which 21 new genera and 69 new species.

The major part of the book deals with the systematic description of the fossil remains: pp. 67-189, including 61 figures. Brachiopods, bivalves, gastropods, ammonoids and plants are figured on pls. 1-11, 12-24, 25, 26-27 and 28-29, respectively.

The remaining three chapters deal with stratigraphy. analyses of the age of the investigated strata, lithofacies, palaeogeography, biogeographical provinciality and palaeoclimate.

Van der Eem, J.G.L.A., 1983. Aspects of Middle and Late Triassic palynology. 6. Palynological investigations in the Ladinian and Lower Karnian of the western Dolomites, Italy. Review Palaeobotany Palynology, 39: 189-300, 13 figs., 30 pls., 13 tables (with English and Italian summaries).

For contents see Albertiana, 1: 18.

Zhao, J.K., Chen, C.Z., Wang, Y.G., He, G.X., and Chen, J.H., 1982. (received 1984). Problems on subdivision and correlation of the Marine Triassic strata in China. In: X, 1982, Stratigraphic correlation chart in China with explanator text. Sci. Press Beijing: 191-205, 2 charts (in Chinese).

Although this publication is written in Chinese, the Latin names in the correlation charts make it accessible to scientists not familiar with Chinese characters. In the first chart Lamellibranch, Gastropod and Brachiopod assem= blages as well as Conodont and Ammonoid zones are correlated with the Triassic chronostratigraphical units.

In the second chart (covering six pages) the biostratigraphical information from six regions within China is correlated with the ammonoid zone and the chronostratigraphical units.

Within the Himalayan region two areas are distinguished, viz. a southern and a northern Tethyan Himalayan area.

From the Gandise-Hengduan region six areas have been investigated, viz., Southwest Xinjiang, Lhasa, Tanggula, Qambdo, Yidun and West-Yunnan.

The Qilian-Bayanhar region holds five investigated areas, viz., Qilian, Kunlun, Bayanhar, Qinling and Garze-Yajiang.

The six areas treated within the Yangtze region are: Central Yunnan, S.W. Guizhou/S.E. Yunnan, S. Guizhou/N. Guangxi, Central Guizhou, S.W.-N.W. Sichuan and S.E. Sichuan/W. Hubei.

In the S.E. region three areas have been investigated, viz., Lower Yangtze, Hunan-Jiangxi and Nanling.

Finally, from the Nadanhada region information is provided from the Baoqing-Hulin area.

This up-to-date information from China is important for anyone working on Triassic stratigraphy, see also p. 18.

The following abstracts have been received:

Adloff, M.C. & Doubinger, J., 1982. Etude palynologique dans les séries rhéto-liasiques de la bordure N.E. du Bassin de Paris (Luxembourg). Bull. Inf. Géol. Bass. Paris, 19(2): 9-20.

Three palynological assemblages have been recognized. Assemblage C is of interest since it seems to be restricted to a facies within the Norian, that has been found, until now, in a geographical zone between Greenland and Eastern Asia, including part of the alpine region. In: Terra cognita, 3: 210.

Jaeger, J.J., Adloff, M.C., Doubinger, J., Pons, D., Vozenin-Serra, C. & Wang Naiwen, 1982? The contribution of fossils to paleogeography of the Lhassa Block (Tibet). No further information.

Relationships with Laurasia and Gondwana are discussed.
In: Terra cognita, 3: 268.

ADRESSES OF CONTRIBUTORS

ALBERTIANA 2

M. BOERSMA	Laboratory of Palaeobotany and Palynology, Heidelberglaan 2, 3584 CS Utrecht, The Netherlands.
J.M. DICKINS	Bureau of Mineral Resources, Geology and Geophysics, P.O. Box 378, Canberra City, A.C.T. 2601, Australia.
M. GAETANI	Instituto di Paleontologia, Piazzale Gorini 5, 20133 Milano, Italy.
V.J. GUPTA	Centre of Advanced Study in Geology, Panjab University, Chandigarh - 160014, India.
S. KOVÁCS	Hungarian Geological Institute, Népstadion U.14, H-1143 Budapest, Hungary.
H. KOZUR	Hungarian Geological Institute, Népstadion U.14, H-1143 Budapest, Hungary.
A. ORAVECZ SCHEFFER	Hungarian Geological Institute, Népstadion U.14, H-1143 Budapest, Hungary.
H. VISSCHER	Laboratory of Palaeobotany and Palynology, Heidelberglaan 2, 3584 CS Utrecht, The Netherlands.
G. WARRINGTON	British Geological Survey, Keyworth, Nottingham NG 12 5 GG, Great Britain.
YANG ZUNYI	Beijing Graduate School, Wuhan College of Geology, Beijing, People's Republic of China.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

The production and distribution of ALBERTIANA is sponsored by the "Special Services" of the Laboratory of Palaeobotany and Palynology of the State University of Utrecht.

"In the light of the Laboratory's role as one of the few training centres for stratigraphical palynology in Europe, and as a result of the expending need for accurate palynostratigraphical data, the Laboratory of Palaeobotany and Palynology has become engaged in a wide range of services which assist universities, government agencies and companies in their geological research.

It is not the objective of the programme of Special Services to supplant the work of professional consultants. However, palynological information is frequently required from stratigraphical intervals and/or geographical areas where palynological consultants are not yet operating on a routine basis. Material from such areas may be accepted for detailed analysis by the Laboratory of Palaeobotany and Palynology. The funds raised from the special services will be exclusively used to support the various educational activities of the Laboratory."

The assistance by members of the scientific, technical and administrative staff of the Laboratory, and by research-students is gratefully acknowledged.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

SUBCOMMISSION ON TRIASSIC STRATIGRAPHY

INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)