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Lower Palaeozoic Conodonts from Albania

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With 1 figure and 2 plates

Albania
Korabi Zone
Stratigraphy
Lower Palaeozoic
Conodonts

Zusammenfassung

Die Korabi Zone der inneren Albaniden besteht aus schwach metamorphen altpaläozoischen Schiefern mit Einschaltungen von verschieden mächtigen Karbonatkörpern und Vulkaniten. Die intensive Tektonik und Metamorphose sowie die allgemeine Fossilarmut erlaubten es bisher nicht, eine detaillierte stratigraphische Synthese über dieses Altpaläozoikum vorzulegen. Erst in letzter Zeit wurden darin vereinzelt silurische Graptolithen, einige Trilobiten, Crinoiden und Tentakuliten gefunden. Neuerdings kamen Conodonten hinzu, die weitere Möglichkeiten einer stratigraphischen Untergliederung der verschuppten und metamorphen Schichtenfolge eröffneten.

Die hier erwähnten und abgebildeten Conodonten gehören in den Zeitraum vom jüngeren Ordoviz bis an die Frasne/Famenne-Grenze. Silur ist bisher nicht durch Indexconodonten vertreten. Aus dem Devon liegen Leitformen des Oberlochkovs, der Prag-Stufe, aus dem jüngsten Givet sowie aus dem Frasne vor. Ihre Häufigkeit ist allerdings sehr gering, da fast alle Formen Bruchstücke sind, mehr oder weniger stark deformiert wurden und rekristallisiert sind. Dieser Erhaltungszustand erlaubt daher nur in Ausnahmefällen eine sichere Bestimmung, die bei Vorliegen morphologisch hervortretender Merkmalskombinationen erleichtert wird.

Summary

In Albania rocks of Palaeozoic age are found in the Korabi Zone which is known as the innermost tectonic unit of the Albanides. This zone corresponds to the Pelagonian Zone of Greece and the Golia Zone of Eastern Yugoslavia respectively. The strongly faulted and metamorphosed rock sequence consists of various clastic and carbonate rock with intercalations of mostly acid volcanics (ignimbrites). Fossils if any are extremely rare except graptolites of Silurian age and a few dacryoconarids. Hence, conodont discovery in recent years became very important as they promised to answer many unsolved questions about age, structural relationship and thickness of the Palaeozoic rock sequence in that region.

The oldest conodonts belong to the late (?)Ordovician followed by a fauna of probably Silurian age although index conodonts have not been found yet. The Devonian is dominated by limestones. Their conodont fauna indicates in stratigraphic order Pragian as well as Middle and Upper Devonian equivalents.

In this short contribution we report about and illustrate for the first time Palaeozoic conodonts from Albania which were derived from the Korabi Zone in the northeastern corner of the country. This tectonic zone represents the easternmost and innermost tectonic unit of the Albanides, a mountain chain in the territory of Albania situated between the Dinarides of Yugoslavia and the Hellenides of Greece.

In the past knowledge about lithology and age of Palaeozoic deposits of Albania was mainly based on lithostratigraphic considerations (V. MELO, 1969, 1970). In recent years, however, some fossils were found indicating a Palaeozoic age for various parts of the Korabi Zone, e. g., graptolites (V. NASSI, 1973), trilobites (V. MELO, 1969), dacryoconarids (P. PASHKO, unpubl.) and crinoids (S. PINARI, 1971). They suggest a Silurian and in part Devonian age which recently was confirmed by the first recognition of conodonts (S. MEÇO, 1984). Yet, there is no fossil proof for the Carboniferous Period. On the other hand Permian fusulinids have been long known from Albania (F. v. NOPSCA, 1929, det. F. & G. KAHLER, 1969). They are associated with other foraminifera, brachiopods and algae (G. BIGNOT et al., 1982).

Distribution of the samples

The Korabi Zone can be divided into two different lithologic subzones. The western part is dominated by Silurian and Lower Devonian graptolitic shales whereas in the eastern region a stronger clastic influence can be observed. In this part quartzites and different shales are more common than in the western Korabi Zone. During the Middle and Upper Devonian both environments intergraded and a uniform limestone development was established.

Our samples were collected from the following isolated localities and from sections:

P2-21, 8, 750a_2 were collected in the surroundings of the town Peshkopia near the village Miravec. They belong to the western Korabi Zone. The conodont bearing beds are small impure limestones lenses intercalated in a predominatly shaly facies.

Samples 517a, 518a, 519a and 520a were collected in the central part of the Korabi Zone from section Buzëmadhe north of the town Peshkopia and southeast of the small town Kukës. In these limestones also crinoids occur.

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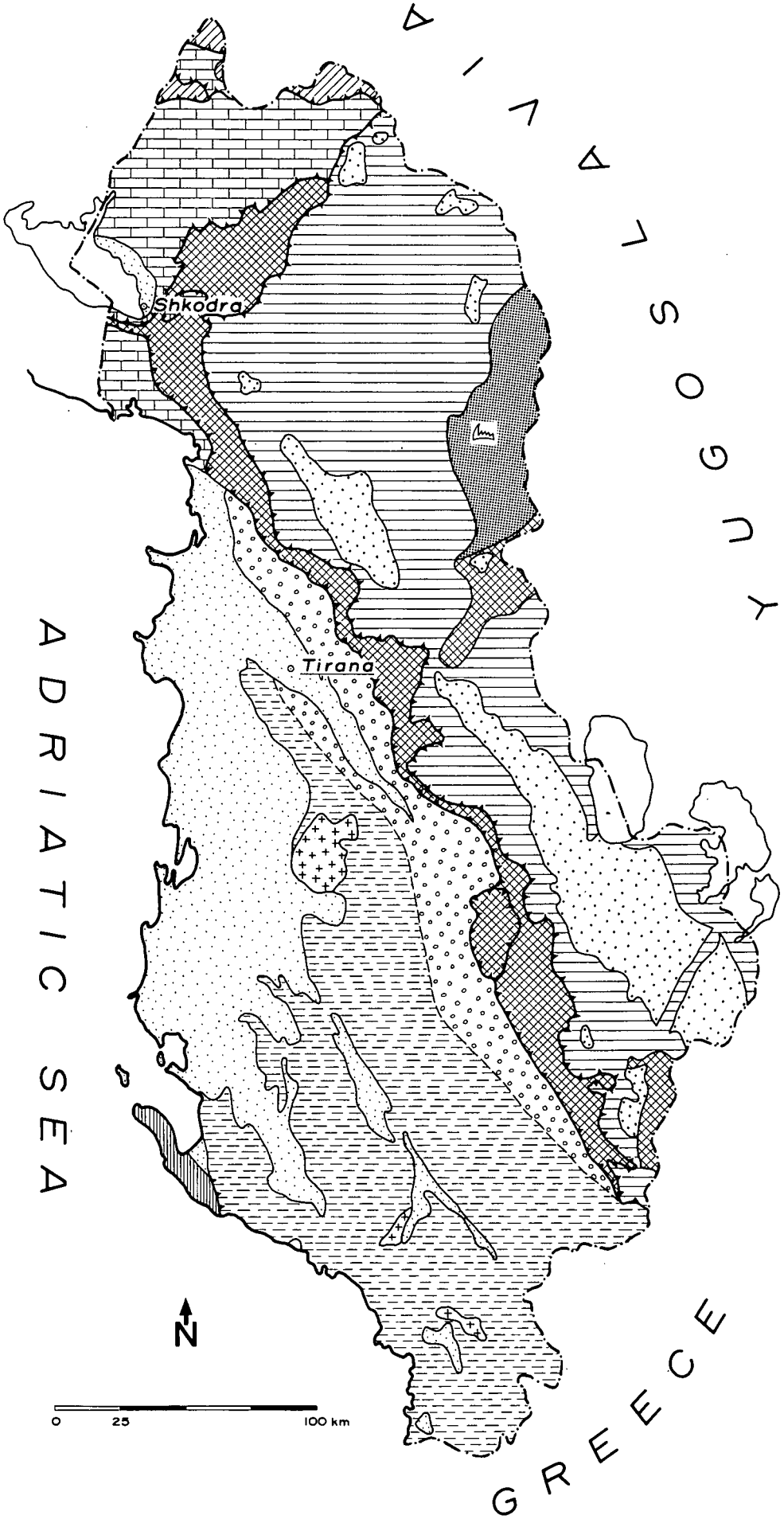


Korabi Zone: Geosynclinal development during the Lower Palaeozoic. Variscan Orogeny.

Mirdita Zone: Geosynclinal development between Triassic and Lower Jurassic. First folding at the Jurassic/Cretaceous boundary. Between Cretaceous and Paleogene platform sedimentation. Folding at the end of the Upper Cretaceous and at the end of the Eocene.

Gashi Zone: Oldest strata of Upper Palaeozoic age. Geosynclinal development between Triassic and Jurassic. First folding at the Jurassic/Cretaceous boundary.

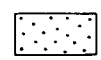
Zone of the Albanian Alps: Upper Palaeozoic with fusulinids, algae and other foraminifera. Triassic to Cretaceous sedimentation. Folding at the end of Eocene but also older folding possible (end of Upper Cretaceous).

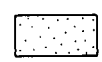
Krasta-Cukali Zone: Geosynclinal development between Triassic and Cretaceous. First folding at the end of the Eocene. This zone can be divided into three subzones, one of which exhibits the older „Labinat-Dibra-Korridor". Flysch sedimentation in all three subzones between Upper Cretaceous and Eocene.

Kruja Zone: Geosynclinal development with platform sediment types in the Mesozoic up to the Eocene. Terrigenous flysch during the Oligocene and subsequent folding.

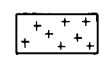
Jonic Zone: Neritic development between Upper Triassic and middle Liassic. Between upper Liassic and Eocene deep geosynclinal development. Gypsum in the Upper Permian and lower Triassic. Flysch development between upper Eocene and Aquitan. Main orogeny in the lower Miocene.

Sasani Zone: Geosynclinal development of platform type until the end of the Oligocene. Folding in the lower Miocene.

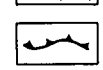




a) Local depressions filled with Molasse sediments in the Oligocene. Folded during Neogene.
b) Periadriatic depression: Molasse type sediments of Tortonian age. Molasse unconformably overlies older structures of the external zones between upper Miocene and Pliocene. Folding between Pliocene and Quarternary.



Evaporites and formation of halokineses.



Tectonic boundaries.

Figure 1: Geology of Albania

Sample 526a was collected close to the above mentioned section but its relation to the section proper is unclear yet.

From the eastern Korabi Zone the samples 316a, 51a$_2$, 2132, 108a, 1sh, 1871, 104a, 369a, 221a and 403a$_1$ were collected. Their localities are close to the village Nimça near the Yugoslavian border. The conodont bearing beds are limestones as well as limestone lenses belonging to different shale formations. In addition some samples are from isolated localities and not from longer ranging or undisturbed sections.

State of preservation

In our studied material conodont yields are rather low. Less than one third of our 150 samples produced conodonts. Their numbers and state of preservation varies considerably. Generally, it must be stated that all conodonts were affected by an intense metamorphism which can be held responsible for mostly black or even grayish colours of conodonts from Albania. In addition, most conodonts are strongly deformed, many are broken or with fissures, recrystallized, corroded or reflect an early stage of dissolution due to the Variscan regional metamorphism. This preservation sharply contrasts with Triassic conodonts from Albania which are distinctly less altered than the older material.

Hence, in many cases identification of single elements and their grouping into mult-elements was hampered. This fact had some bearing on the age assignement as well, for example, as regards our supposed "Ordovician" conodonts from sample 104a$_1$ of the eastern part of the Korabi Zone. Other samples only yielded long ranging taxa such as *Ozarkodina e. excavata*, which did not permit an exact age date to proof any conodont zone in the Silurian. We have documented this different kind of preservation in many selected examples on our plates.

Obviously, our samples do not reflect a uniform metamorphic overprint because closely adjacent samples often vary significantly depending on the lithology of the conodont bearing host rock and its surrounding rocks. Moreover, the Lower Palaeozoic sequences of the Korabi Zone are strongly faulted and often are on a small scale sheared, banded or recrystallized. These processes may also result in different degrees of preservation.

Conodont biostratigraphy

Ordovician
(Sample 104a)

Tentatively and provisionally we have identified three specimens of sample 104a from the eastern Korabi Zone about 2 km off the Yugoslavian border as *Tetraprioniodus* sp., *Prioniodina* sp. and *Drepanodus* sp. We conclude an upper Ordovician age for this association. The sample is derived from chamosite bearing limestones which are interbedded with sandstones. This lithology is unknown from younger strata in Albania.

Silurian
(Samples 108a, 182a, 1sh?, 316a?)

In the Silurian graptolite bearing sequences limestones are very rare except in its upper part. From these horizons we have obtained the long ranging taxon *Ozarkodina e. excavata*. *Ozarkodina confluens* and *Ozarkodina r. eosteinhornensis* also suggest a late Pridolian age but their true identification seems uncertain.

Devonian

A) Lower Devonian
(Samples 526a, 589a, 595a, 517a, 519a, 520a, 221a, 1813?, 2132, 313a, P2-21, 750, 8, 1813, 858a, 316a?, 173a, 403a, 369a, 209a)

The Lochkovian Stage of the Lower Devonian seems to be well documented by representatives of *O. r. remscheidensis* and *Icriodus* cf. *woschmidti* (517a, 520a). The latter specimen does not permit identification on a subspecies level. Certainly of late Lochkovian age is a fauna composed of *Ozarkodina* cf. *stygia* (589), *Ancyrodelloides* cf. *delta* (595a), *Ancyrodelloides omus* (221a) und *Ozarkodina masara* (517a). Representatives of *Pandorinellina st. miae* agree well with this age assignement.

The succeeding Pragian Stage can be demonstrated by the presence of *Icriodus steinachensis* AL-RAWI beta and eta morphotypes in the samples 750a and 8, *Pelekysgnathus serratus* in the samples 750a and P2-21 and finally on the basis of *Polygnathus* cf. *dehiscens* in sample 858a.

Diagnostic conodonts for the following Emsian Stage of the late Lower Devonian are questionable representatives of *Ozarkodina carinthiaca* in sample 1813, *Polygnathus gronbergi* (173a), *Polygnathus serotinus* (403a) and *Polygnathus l. linguiformis* (369a, 209a). The latter, however, may also indicate an early Middle Devonian age.

B) Middle Devonian
(Samples 911a?, 922a)

Yet, index conodonts for the lower portion of the Middle Devonian are missing in our collection. The illustrated icriodid conodont of sample 911a may be correlative with the Eifelian or Givetian Stage.

The zonal conodont for the uppermost Givetian disparilis-zone, *Palmatolepis disparilis* ZIEGLER & KLAPPER, was recognized in sample 922a. This isolated outcrop produced a fairly good preserved and rather abundant conodont fauna dominated by the zonal name-bearer (for comparison see ZIEGLER & KLAPPER, 1976, 1982).

C) Upper Devonian
(Samples 1871, 1598, 51a$_2$, 5358/2)

Four samples yielded conodonts of the early Upper Devonian. They were identified as *Ancyrodella* sp?, *Palmatolepis* cf. *triangularis*, *Palmatolepis* cf. *regularis*, *Palmatolepis m. minuta* and *Icriodus arkonensis*. Pending on the single representative of the genus *Ancyrodella* only for sample 1871 a definite Frasnian age can be concluded. The three remaining samples, however, may also range into the basal Famennian.

Acknowledgements

The stratigraphy of the Korabi Zone has been studied and worked out by a team from the Geology Department of the University of Tirana (Prof. V. MELO, Doz. S. MEÇO) and members of the Instituti i Studimeve dhe Projektimeve Gjeolojika at

Tirana (Drs. A. XHOMO, P. PASHKO, V. QIRICI and B. KODRA). The authors gratefully acknowledge their help and guidance. A great deal of our studied material was supplied by the above mentioned colleagues. Other samples were collected by the authors. Detailed information about the site of the localities can be obtained by the Albanian authorities. This study was carried out during a four months UNESCO grant of Doz. S. MEÇO at the Geological Survey of Austria at Vienna. The same institution also financed a visit of H. P. SCHÖNLAUB to Albania during which occasion several samples were collected. Our study is based on more than 150 conodont samples.

We pay attention to the fact that this report is a preliminary first account on conodont occurrences in Lower Palaeozoic strata of Albania. Future studies are needed and are planned in cooperation with Albanian representatives to solve stratigraphic questions and problems as well as to refine the stratigraphic data and conclusions drawn in this short paper.

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Plate 1
(Magnification approx. ×60)

Figs. 1–2, 5–8, 13: *Palmatolepis minuta minuta* BRANSON & MEHL. Localities 1871 (figs. 1–2, 5–7), 51 (fig. 8), 5358 (fig. 13).
Figs. 3, 11: *Palmatolepis* cf. *triangularis* SANNEMANN. Loc. 1871 (fig. 3) and 1598 (fig. 11).
Fig. 4: *Ancyrodella* sp. Juvenile specimen of loc. 1871.
Fig. 9: *Icriodus* sp. aff. *I. arkonensis* STAUFFER. Loc. 1871.
Fig. 10: *Icriodus* sp. aff. *I. nodosus* (HUDDLE). Juvenile specimen of loc. 51.
Fig. 12: *Palmatolepis* cf. *regularis* COOPER. Loc. 1598.
Figs. 14–15, 17–19: *Palmatolepis disparilis* ZIEGLER & KLAPPER. All specimens from loc. 51. Oblique view except fig. 18 with lower view of the basal cavity.
Figs. 16, 20: *Polygnathus* sp. Both specimens are undeterminable due to crystal overgrowth or deformation. Loc. 1598 (fig. 16) and loc. 922 (fig. 20: disparilis Zone).
Figs. 21–24: *Polygnathus linguiformis linguiformis* HINDE, representing probably the alpha morphotype. Fragmentary specimens from localities 209 (figs. 21, 23, 24) and loc. 369 (fig. 22).
Figs. 25–26: *Icriodus* sp. Two fragmentary specimens resembling Middle Devonian representatives of the genus *Icriodus*. Both from loc. 911.
Fig. 27: *Acodina* sp. Simple cone conodont associated with *Pelekysgnathus serratus* JENTZSCH in the middle Pragian. Loc. P2-21.
Figs. 28–29: *Polygnathus serotinus* TELFORD. Oblique view of two specimens with typical platform outline and characteristic shape of basal cavity. Both specimens show platform overgrowth. Loc. 403.
Fig. 30: *Ozarkodina* sp. aff. *O. carinthiaca* (SCHULZE). Strongly recrystallized surface makes identification uncertain. Loc. 1813.
Fig. 31: *Polygnathus* sp. aff. *P. dehiscens* PHILIP & JACKSON. A fragmentary specimen showing middle part of the platform in upper view. Loc. 858.
Figs. 32–33, 36–37: *Pelekysgnathus serratus* JENTZSCH. Lateral view of 4 characteristic specimens from localities P2-21 (figs. 32, 36) and 750 (figs. 33, 37).
Fig. 34: *Polygnathus gronbergi* KLAPPER & JOHNSON. Oblique view of a fragmentary specimen from loc. 173.
Figs. 35, 39: *Icriodus steinachensis* AL-RAWI, beta and eta morphotypes. Fig. 35 is a fragmentary specimen, fig. 39 shows typical lanceolate platform outline. Both from loc. 750 associated with *Pelekysgnathus serratus* (cf. figs. 33, 37).
Fig. 38: Ozarkodinan element, probably belonging to *Pandorinellina steinhornensis miae* (BULTYNCK). Loc. 750; middle Pragian.

Plate 2
(Magnification approx. ×60)

Fig. 1: *Ozarkodina* cf. *stygia* (FLAJS). Upper view of the central part of the platform with central node. Fragmentary and strongly recrystallized specimen. Locality 589; upper Lochkovian.

Figs. 2, 5: *Ancyrodelloides* cf. *delta* (KLAPPER & MURPHY). Lateral view of two fragmentary specimens from loc. 595; upper Lochkovian.

Figs. 3, 6: *Ancyrodelloides omus* MURPHY & MATTI. Two fragmentary specimens in upper view from loc. 221; upper Lochkovian.

Fig. 4: Strongly recrystallized blade-element, probably belonging to *Ozarkodina e. excavata*. Loc. 221, associated with *A. omus*; upper Lochkovian.

Figs. 7, 8: Ozarkodinan (or spathognathodontiform) element and a hindeodelliform element, probably belonging to *O. e. excavata* from loc. 221, associated with *A. omus*; upper Lochkovian.

Figs. 9–14: *Ozarkodina remscheidensis remscheidensis* (ZIEGLER). Lateral and upper view of a sp- and one oz-element. Fig. 10 resembles *Pandorinellina steinhornensis miae* BULTYNCK. Localities 526 (figs. 9, 10, 11), 520 (figs. 12, 14), 519 (fig. 13), associated with *Icriodus* cf. *woschmidti*; Lochkovian.

Figs. 15–16, 19–20: *Ozarkodina remscheidensis remscheidensis* (ZIEGLER). Lateral and upper view of 4 specimens from loc. 517 resembling partly *O. r. eosteinhornensis* (WALLISER), in particular fig. 20. Associated with *Icriodus* cf. *woschmidti* ZIEGLER and *Ozarkodina masara* SCHÖNLAUB; lower Lochkovian.

Fig. 17: *Ozarkodina* cf. *pandora* MURPHY, MATTI & WALLISER. Upper view, identification uncertain due to fragmentary preservation. Loc. 520; Lochkovian.

Fig. 21: *Ozarkodina masara* SCHÖNLAUB. Although overgrowth occurs this specimen exhibits the characteristic features of the species. Loc. 517; Lochkovian.

Fig. 22: *Icriodus* cf. *woschmidti* ZIEGLER. Upper view, characteristic arrangement of denticle rows on the platform. Loc. 517; lower Lochkovian.

Figs. 23–24, 26–27: Three elements of the multielement *Ozarkodina e. excavata* from sample 108. Note recrystallized surface of blade. Upper Silurian–Lower Devonian (fig. 24 also suggests representation of *O. r. eosteinhornensis* of late Pridolian or early Lochkovian age).

Figs. 25, 28, 29–30: *Ozarkodina excavata excavata* (BRANSON & MEHL). Figs. 29 and 30 represent the oz-element, fig. 28 the sp-element. Note the tabular crystal overgrowth on fig. 30. Loc 316; Upper Silurian or Lower Devonian.

Figs. 31, 32: *Ozarkodina e. excavata* (BRANSON & MEHL)? The species is represented by the neoprioniodiniform and the plectospathodontiform elements. They may, however, also belong to another species. Loc. 313; Upper Silurian–Lower Devonian.

Fig. 33: Gen. et sp. indet., probably belonging to the genus *Ozarkodina*. Loc. 1sh; Lower Devonian (associated with specimen on fig. 34).

Fig. 34: *Ozarkodina remscheidensis remscheidensis* (ZIEGLER). Strongly recrystallized specimen resembling also *O. r. eosteinhornensis* (WALLISER). Loc. 1sh; Lower Devonian (?).

Fig. 35: *Tetraprioniodus* sp. Anterior view. Loc. 104; Upper Ordovician (?).

Fig. 36: *Prioniodina* sp.? Lateral view. Loc. 104; Upper Ordovician (?).

Fig. 37: *Drepanodus* sp.? Lateral view. Loc. 104; Upper Ordovician (?).