

On the Discovery of Microfauna in the Opalinus Beds (Klippen Belt, West Carpathians)

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Summary

In the work is described a microfauna from a new locality of the Opalinus Beds in the Orava valley (Orava area) in the Klippen Belt, West Carpathians, which represents a first discovery of such a microfauna on the Slovak territory. In the work are presented 15 species of foraminifers and 4 species of ostracods.

Zusammenfassung

In dieser Arbeit wird eine Foraminiferen- und Ostrakodenfauna aus den Opalinus-Schichten von einem neuen Fundort im Orava-Tal (Orava-Gebiet) in der Klippenzone, Westkarpaten bekannt gemacht. Es stellt die erste Erwähnung einer Mikrofauna aus den Opalinus-Schichten in der Slowakei dar. 15 Foraminiferenarten und 4 Ostrakodenarten werden beschrieben.

Acknowledgements

I should like to express my gratitude to the Alexander von Humboldt-Stiftung for an invitation to Germany to continue in my research work and to Professor Dr. R. DEHM, the head of the Institut für Paläontologie und historische Geologie of the Maximilian's University in Munich for a kind allowance to work at his institute. My very sincere thanks are due to Professor Dr. H. HAGN for a many-sided help and to Dr. D. HERM for his help during edition of this manuscript.

Introduction

In 1967 during the study excursion with S. W. ALEXANDROWICZ, K. BIRKENMAJER, E. SCHEIBNER and the author of this paper a new locality of the Opalinus Beds has been found (north-west of Zemianska Dedina, north of Lučivná, text-fig. 1). The Opalinus Beds yielded a rich assemblage of microfauna of foraminifers and ostracods description of which is a matter of this paper.

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The term Opalinus Beds (Opalinus Member) was introduced in the Klippen Belt by L. HOHENEGGER (1855, p. 308) and attributed to the Lower Dogger. The type locality was between Szaflary and Rogoznik (in Poland), i. e. the outcrop studied already by L. ZEUSCHNER (1833, p. 22). More accurately, these beds were defined by E. MOJSISOVICS (1867, p. 212). A rich ammonite fauna characteristic of these beds on the Polish territory has been studied by several authors: G. G. PUSCH (1837), L. ZEUSCHNER (1846, 1856), L. HOHENEGGER (1855), E. MOJSISOVICS (1867), K. ZITTEL (1868, 1869), M. NEUMAYR (1871) and V. UHLIG (1878, 1890) and K. BIRKENMAJER (1962, 1963); on the Slovak territory by D. ANDRUSOV (1953) and E. SCHEIBNER (1964).

As Opalinus Beds we define a sequence of gray, gray-blue, yellow usually spotted marls, shaly limestones and marly shales. The thickness is about 10 m, also more. Stratigraphical range of the Opalinus Beds on the basis of the rich ammonite fauna is Upper Toarcian and Lower Aalenian (E. SCHEIBNER 1964 — on the Slovak territory). The most typical occurrences of the Opalinus Beds are in Poland (Pieniny Mts.), however, they occur also on the Slovak territory of the Klippen Belt.

Detailly, with the Opalinus Beds deals K. BIRKENMAJER (1963) in his monograph of the Czorsztyn Unit in the Polish part of the Klippen Belt. Among others he quotes a list of fauna showing the following ages: Lower-Middle Aalenian (*Tmetoceras scissum*, *Leioceras opalinum*), Upper Toarcian (*Dumortieria costula*), Middle-Upper Toarcian (*Calliphyloceras nilssoni*, *Harpoceras elegans*). According to K. BIRKENMAJER (1963) the Opalinus Beds represent at least the following zones: aalensis, opalinus and scissum.

Description of the new locality of the Opalinus Beds

North-west of Zemianska dedina village in the Orava valley (Orava area), north of Lučivná, on the left bank of the Hlodočín stream, approximately 300 m north-east of the elevation point 877 (Fig. 1) was discovered a new occurrence of the Opalinus Beds. At the northern margin of the Klippen Belt occur small klip-pes of the Czorsztyn Unit surrounded by red Globotruncana marls on the north in tectonic contact with the Magura Palaeogene. Besides the Upper Cretaceous red marls there occur fragments of variegated Globotruncana marls, green, variegated marlstones and limestones of the Albian, Tithonian — Lower Cretaceous (Berriasian) Calpionella limestones, red nodular limestones of the Dogger — Malm and in erosion grooves and in the cut of the field road were found yellow, gray and brown spotted marls, marlstones, shaly limestones with numerous fragments of ammonites. The outcrop of the Opalinus Beds is up to 10 m long and 3—5 m broad. The sequence is strongly tectonically affected and it is rather difficult to reconstruct the detailed stratigraphical conditions. Some fragments of ammonites were determined as *Leioceras* aff. *opalinum* (REIN.). Microscopical study showed that the rocks are represented by micrites with Sponges and other minute organic fragments and some micrites contain a silt material (minute quartz grains).

The Opalinus Beds represent a member of stratigraphy of the Czorsztyn Unit. They deposited at the beginning of development of the Jurassic sedimentation, i. e. in a shallow environment with a rich contribution of organic material. Most probably, due to a greater amount of organic remains the hydrosulphuric acid concentrations occurred in the deposited sediment. In the same time a greater amount of pelitic material covering the organic remains caused a retarded decay of the latter which resulted in a reduced environment in the sediment. In consequence of the mentioned both micro- and macrofauna is frequently pyritized. According to K. BIRKENMAJER (1963) sedimentary conditions could be also very similar to those in lagoons and as evidence of this he quotes a considerable amount of ostracods in these beds.

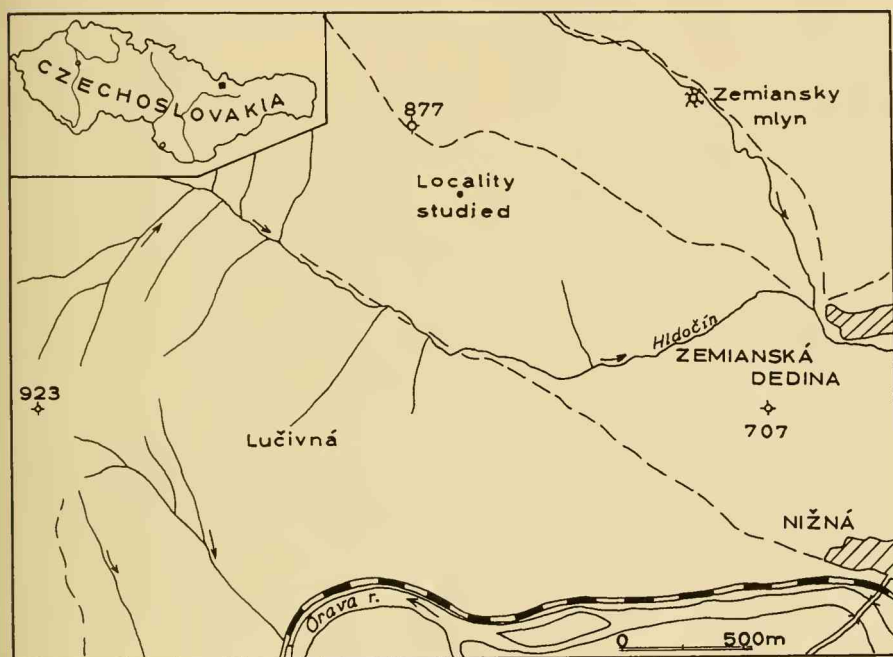


Fig. 1: Locality map of the Opalinus Beds (Klippen Belt, West Carpathians)

In the beds described were found the following species of foraminifers and ostracods:

- Ammodiscus incertus* (D'ORB.)
- Ammobaculites agglutinans* (D'ORB.)
- Trochammina inflata* (MONTAGU)
- Involutina liassica* (JONES)
- Nodosaria crispata* TERQ.

Nodosaria fontinensis TERQ.
Nodosaria denticulata-costata FRANKE
Dentalina turgida SCHWAGER
Dentalina vetustissima D'ORB.
Lenticulina splendens TERQ.
Lenticulina stilla TERQ.
Marginulina prima D'ORB.
Fronicularia sulcata BORNEMANN
Fronicularia regularis PAALZOW
Flabellina cf. *deslongschampsii* TERQ.
 ? Gen. indet. (*Paracypris* sp.)
Bairdia cassiana (REUSS)
Schuleridea sp.
Exophthalmocythere sp.

The microfauna shows the age Upper Lias — Lower Dogger. In general, the material studied is very rich, unfortunately rather badly preserved. Foraminifers form about 70 % of the association, ostracods 30 %. From among foraminifers about 40 % is formed of Agglutinantia. Remaining part is formed of *Nodosaria* and *Dentalina* (mostly fragments) and smooth forms are prevailing. Genus *Lenticulina* is rather rare and represented by forms with tendency to uncoiled later chambers. *Lenticulina* with a rich sculpture has not been found.

Ostracods in the Opalinus Beds and in general in the Mesozoic sequences of the West Carpathians up to the present have not been more detailly studied. It is well known that in Jurassic beds together with foraminifers there occur more or less numerous ostracods, mainly smooth. In this paper are determined some characteristic forms from the Upper Lias — Lower Dogger. They are represented by species of genera ?*Paracypris*, *Bairdia*, ?*Schuleridea* and *Exophthalmocythere*. The most common are species of the genus *Bairdia* and ?*Schuleridea*. *Exophthalmocythere* is represented by 1 specimen.

Systematical description

Family Ammodiscidae

Genus *Ammodiscus* REUSS, 1862

Ammodiscus incertus (D'ORBIGNY, 1839)

Figs. 2—6

- 1839 *Operculina incerta* — D'ORBIGNY, p. 49, tab. 6, figs. 16, 17
 1862 *Involutina silicea* TERQ. — TERQUEM, p. 450, tab. 6, fig. 11 a, b
 1890 *Trochammina incerta* (D'ORB.) — HAEUSSLER, p. 55, figs. 1—21
 1936 *Ammodiscus infimus* (STRICKL.) — FRANKE, p. 15, tab. 1, fig. 14 a, b
 1937 *Ammodiscus incertus* (D'ORBIGNY, 1839) — BARTENSTEIN et BRAND, p. 130, tab. 2 B, fig. 4; tab. 3, fig. 5 a—c; tab. 4, fig. 4; tab. 5, fig. 5 a, b; tab. 8, fig. 5; tab. 10, fig. 4; tab. 11 A

Remarks: in the Opalinus Beds studied occur very numerous specimens with a coarse agglutination, both regular and irregular. They form the essential part of the association.

Family Lituolidae

Genus *Ammobaculites* CUSHMAN, 1910

Ammobaculites agglutinans (D'ORBIGNY, 1846)

Fig. 7

1846 *Spirolina agglutinans* — D'ORBIGNY, p. 137, tab. 7, figs. 10—12 (fide BARTENSTEIN et BRAND 1937, p. 186)

1936 *Ammobaculites agglutinans* (D'ORB.) — FRANKE, p. 127, tab. 12, fig. 25

1937 *Ammobaculites agglutinans* (D'ORBIGNY) — BARTENSTEIN et BRAND, p. 186, tab. 4, fig. 14; tab. 5, fig. 78; tab. 6, fig. 4 a, b; tab. 8, fig. 38 a—c; tab. 10, fig. 45 a, b; tab. 11 A, fig. 19 a—b; tab. 11 B, fig. 28 a, b; tab. 12 A, fig. 22; tab. 13, fig. 23; tab. 14 B, fig. 19

Remarks: the species in the studied beds rather rare — only one entire specimen, but very characteristic.

Family Trochamminidae

Genus *Trochammina* PARKER et JONES, 1859

Trochammina inflata (MONTAGU, 1808)

Figs. 8 a—c, 9—11, 12 a—c

1808 *Nautilus inflatus* MONTAGU — MONTAGU, p. 81, tab. 18, fig. 3 (fide BARTENSTEIN et BRAND 1937, p. 189)

1890 *Trochammina inflata* (MONTAGU) — HAEUSSLER, p. 65, tab. 10, figs. 25—26

1937 *Trochammina inflata* (MONTAGU, 1808) — BARTENSTEIN et BRAND, p. 189, tab. 8, fig. 40 a, b; tab. 12 A, fig. 26 a, b; tab. 14 C, fig. 17

1959 *Trochammina inflata* (MONTAGU) — ZIEGLER, tab. 2, figs. 1, 2

1959 *Trochammina* sp. 1. — ZIEGLER, tab. 2, fig. 3

? 1959 *Trochammina pulchra* nov. sp. — ZIEGLER, pp. 94—95, tab. 2, figs. 6, 7 (non 8)

Remarks: the species is represented by very numerous specimens of varying size of grains and measurements. Besides *Ammodiscus incertus* the most numerous species.

Family Ophthalmidtidae

Genus *Involutina* TERQUEM, 1862

Involutina liassica (JONES, 1853)

Figs. 13, 14

1853 *Nummulites liassicus* n. sp. — JONES, p. 275 (fide E. KRISTAN, 1957, p. 272)

1862 *Involutina jonesi*, TERQ. — TERQUEM, p. 461, tab. 6, fig. 22 a—d

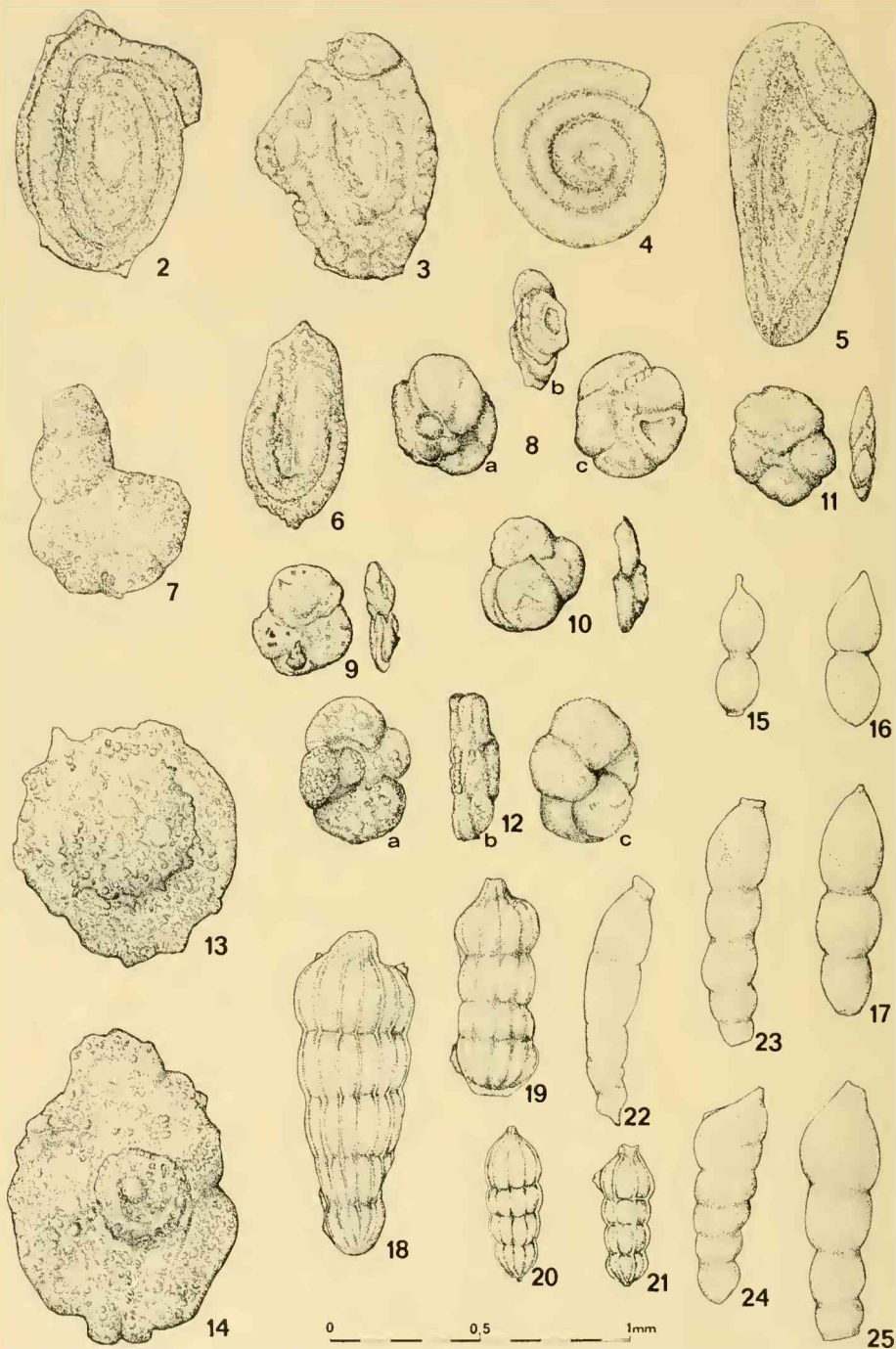
1936 *Involutina liassina* (JONES) — FRANKE, p. 17, tab. 1, fig. 13

1952 *Involutina liassina* (JONES) — WICHER, tab. 15, figs. 1, 3; tab. 16, fig. 3; tab. 17, fig. 1

1961 *Involutina liassica* (JONES) — MIŠÍK, p. 179, tab. 29, 30

1962 *Involutina liassica* (JONES) — KRISTAN — TOLLMANN, p. 4, tab. 2, figs. 1—3

Remarks: The occurrence of this species in the Opalinus Beds (ranging from the Upper Lias to the Lower Dogger) is rather interesting. Only 2 specimens



found, but rather characteristic. In the West Carpathians, this species was up to the present known only from the Lias (mainly lower part) and Upper Triassic. Very detailly, this species was dealt with by M. Mišík (1961) who described not only its stratigraphical value, but also structure, diagenetic changes, ecology and nomenclatorial questions. In the marly, shaly facies of the Klippen Belt it was mentioned by the author of this paper (V. SCHEIBNEROVÁ 1965) from the Lower-Middle Lias. The recent discovery of the species in the Opalinus Beds may show that it occurs also higher — at least in the Upper Lias. However, there arises a question about redeposition, but no other species of the assemblage seems to be redeposited and also a state of preservation can speak against such a possibility.

Family Nodosariidae

Genus *Nodosaria* LAMARCK, 1812

Nodosaria crispata TERQUEM, 1866

Figs. 15—17

1866 *Nodosaria crispata* TERQ. — TERQUEM, p. 476, tab. 19, figs. 9, 10 a—c, 11 a, b

1936 *Nodosaria crispata* TERQ. — FRANKE, p. 41, tab. 3, fig. 20 a, b

1937 *Nodosaria crispata* TERQUEM, 1866 — BARTENSTEIN et BRAND, p. 145, tab. 3, fig. 13; tab. 4, fig. 33; tab. 5, fig. 22

Remarks: very faint, rather small smooth nodosariid, most specimens broken.

Nodosaria fontinensis TERQUEM, 1870

Figs. 18—21

1870 *Nodosaria fontinensis* TERQ. — TERQUEM, p. 251, tab. 27, figs. 1—5

1936 *Nodosaria fontinensis* TERQ. — FRANKE, p. 50, tab. 5, fig. 1

1937 *Nodosaria fontinensis* TERQUEM, 1870 — BARTENSTEIN et BRAND, p. 148, tab. 6, fig. 24; tab. 8, fig. 16 a—c; tab. 10, fig. 19 a, b; tab. 11 B, fig. 6 a, b; tab. 12 A, fig. 4; tab. 12 B, fig. 5; tab. 13, fig. 9 a—c; tab. 14 B, fig. 3; tab. 14 C, fig. 5; tab. 15 A, fig. 12 a—c; tab. 15 C, fig. 4

1957 *Nodosaria fontinensis* TERQUEM — NØRVANG, p. 356, fig. 79

1957 *Nodosaria fontinensis* TERQUEM — KAPTARENKO-ČERNOUSOVA, pp. 171—172, tab. 2, figs. 2—5

1957 *Nodosaria fontinensis* TERQUEM — MAMONTOVA, pp. 171—172, tab. 2, fig. 2

1960 *Nodosaria fontinensis* TERQUEM — BIELECKA, p. 67, tab. 5, fig. 38

Remarks: about 15 specimens of varying size.

Fig. 2—6: *Ammodiscus incertus* (D'ORB.). KPUK 2035, 2038, 2066, 2096, 2097

Fig. 7: *Ammobaculites agglutinans* (D'ORB.). KPUK 2036

Fig. 8 a—c, 9, 10, 11, 12 a—c: *Trochammina inflata* (MONTAGU). KPUK 2051, 2052, 2053, 2055, 2054

Fig. 13, 14: *Involutina liassica* (JONES). KPUK 2037, 2039

Fig. 15—17: *Nodosaria crispata* TERQ. KPUK 2050, 2056, 2057

Fig. 18—21: *Nodosaria fontinensis* TERQ. KPUK 2058, 2059, 2060, 2061

Fig. 22—23: *Dentalina vetustissima* D'ORB. KPUK 2062, 2063

Fig. 24—25: *Dentalina turgida* SCHWAGER. KPUK 2064, 2065

Nodosaria denticulatacostata FRANKE, 1936

Figs. 26—27

1936 *Nodosaria denticulata-costata* n. sp. — FRANKE, p. 52, tab. 5, fig. 8 a—c

R e m a r k s : the species occurs in two very characteristic specimens corresponding to FRANKE's (1936) description and figure.

Genus *Dentalina* D'ORBIGNY, 1826

Dentalina vetustissima D'ORBIGNY, 1849

Figs. 22—23

1849 *Dentalina vetustissima* — D'ORBIGNY, p. 242, No. 261 (fide BARTENSTEIN et BRAND 1937, p. 137)

1958 *Dentalina vetustissima* D'ORB. — TERQUEM, p. 600, tab. 2, fig. 8

1908 *Dentalina vetustissima* D'ORB. — ISSLER, p. 62, tab. 3, fig. 143

1937 *Dentalina vetustissima* D'ORBIGNY, 1849 — BARTENSTEIN et BRAND, p. 137, tab. 4, fig. 25; tab. 5, fig. 12

1950 *Dentalina vetustissima* D'ORB. — BARNARD, p. 20, text-fig. 12

1961 *Dentalina vetustissima* D'ORBIGNY, 1849 — PIETRZENUK, p. 62, tab. 3, fig. 2

R e m a r k s : very characteristic smooth *Dentalina*, usually broken.

Dentalina turgida SCHWAGER, 1865

Figs. 24—25

1865 *Dentalina turgida* m. — SCHWAGER, p. 100, tab. 2, fig. 19; tab. 3, figs. 6, 11, 20

R e m a r k s : in the assemblage studied occur two specimens, several others broken.

Genus *Marginulina* D'ORBIGNY, 1826

Marginulina prima D'ORBIGNY, 1849

Figs. 28—30

1849 *Marginulina prima* D'ORB. — D'ORBIGNY, p. 242, No. 262 (fide E. PIETRZENUK 1961, p. 71)

1858 *Marginulina prima* D'ORB. — TERQUEM, p. 612, tab. 3, figs. 5—7 (and varieties *acuta* TERQ., *gibbosa* TERQ. and *recta* TERQ.)

1936 *Marginulina prima* D'ORB. — FRANKE, p. 76—78, tab. 8, figs. 1—7 (and varieties *rugosa* BORN., *gibbosa* TERQ., *praelonga* TERQ. et BERTH., *recta* TERQ., *acuta* TERQ., *gibberula* TERQ. et BERTH. and *ornata* TERQ.)

1936 *Marginulina burgundiae* TERQ. — FRANKE, p. 78, tab. 8, fig. 8

1936 *Dentalina insignis* n. sp. — FRANKE, p. 36, tab. 3, fig. 11 a, b

1937 *Marginulina prima* D'ORBIGNY, 1849 — BARTENSTEIN et BRAND, p. 161, tab. 2 B, fig. 26; tab. 3, figs. 39, 40; tab. 4, fig. 60 a, b; tab. 5, fig. 46 a, b

1937 *Marginulina burgundiae* TERQ. — BARTENSTEIN et BRAND, p. 161, tab. 4, fig. 58

1937 *Dentalina insignis* FRANKE, 1936 — BARTENSTEIN et BRAND, p. 142

1950 *Marginulina prima* D'ORB. — BARNARD, p. 372, fig. 5 a, b, g

1957 *Marginulina prima* D'ORB., form *burgundiae* TERQ. — NORVANG, p. 88, figs. 100 bis 102

1957 *Marginulina prima* D'ORB., subsp. *prima* D'ORB. — NORVANG, p. 89, figs. 98, 99, 103, 104

- 1957 *Marginulina prima* D'ORB., subsp. *rugosa* BORN. — NØRVANG, p. 90, fig. 97
 1957 *Marginulina prima* D'ORB. subsp. *praerugosa* nov. subsp. — NØRVANG, p. 91, fig. 96
 1960 *Marginulina prima* D'ORB., 1849 — ESPITALIÉ et SIGAL, p. 56, tab. 2, fig. 2
 1961 *Marginulina prima* D'ORBIGNY, 1849 — PIETRZENUK, pp. 71—73, tab. 7, figs. 1—9

Remarks: in the sample studied only a few specimens found. In other places of the Klippen Belt (Lias of the Zázrivá Klippe etc.) it forms an essential part of assemblages. Very variable species with several subspecies or varieties described. Quite detaillly is this questions dealt with in a work by E. PIETRZENUK (1961) who stated all described varieties or subspecies as synonymous, however, it is possible to state several groups (variants a—d) occurring in dependence upon stratigraphy and so showing a form evolution of this variable group. In the Carpathians it is very characteristic Lower-Middle Lias species and as shows the discovery of this species in the Opalinus Beds also Upper Lias at least.

Genus *Lenticulina* LAMARCK 1804
Lenticulina stilla (TERQUEM 1866)
 Figs. 31—32

- 1866 *Cristellaria stilla*, TERQ. — TERQUEM, p. 517, tab. 22, fig. 7
 1936 *Cristellaria* (*Planularia*) *stilla* TERQ. — FRANKE, p. 96, tab. 9, fig. 26
 1937 *Cristellaria* (*Planularia*) *stilla* TERQUEM, 1866 — BARTENSTEIN et BRAND, p. 169, tab. 4, fig. 78; tab. 9, fig. 46; tab. 10, fig. 32
 1957 *Planularia stilla* (TERQ.) — NØRVANG, p. 101, figs. 136—147
 1961 *Lenticulina* (*Planularia*) *stilla* (TERQUEM 1866) — PIETRZENUK, p. 69

Remarks: in general very rare species, frequently confused with *L. crepidula* (FICHTEL et MOLL). According to figures and descriptions of different authors it is possible to take into consideration that *L. stilla* differs from *L. crepidula* in having a more expressed and a broader keel.

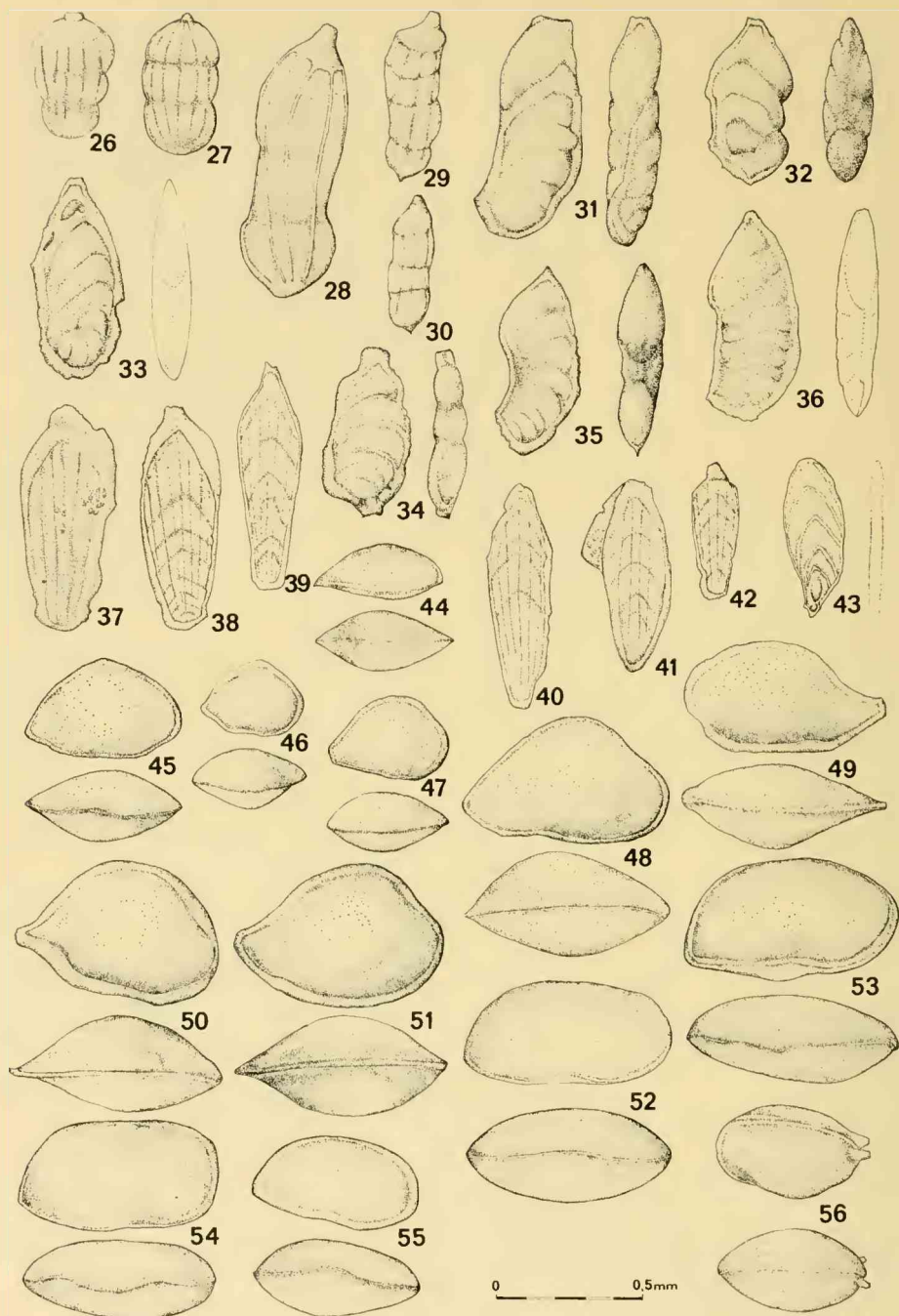
Lenticulina splendens (TERQUEM 1863)
 Figs. 33—36

- 1863 *Cristellaria splendens*, TERQ. — TERQUEM, pp. 211—213, tab. 10, fig. 7
 1866 *Cristellaria splendens*, TERQ. — TERQUEM, p. 438, tab. 18, fig. 6

Remarks: another only rarely quoted species characterized by a broad faint keel bordering the entire test. In the sample studied quite numerous and characteristic.

Genus *Frondicularia* DEFANCE, 1854
Frondicularia sulcata BORNEMANN 1854
 Figs. 37—42

- 1854 *Frondicularia sulcata* m. — BORNEMANN, p. 37, tab. 3, fig. 22 a—c (fide BARTENSTEIN et BRAND 1937, p. 158)
 1858 *Frondicularia pulchra*, TERQ. — TERQUEM, p. 592, tab. 1, fig. 10 a—c
 1862 *Frondicularia sulcata*, TERQ. — TERQUEM, p. 438, tab. 5, fig. 13
 1936 *Frondicularia sulcata* BORN. — FRANKE, pp. 71—72, tab. 7, fig. 8
 1936 *Frondicularia pulchra* TERQ. — FRANKE, p. 71, tab. 7, fig. 7



- 1936 *Fronicularia interrupta-costata* n. sp. — FRANKE, p. 72, fig. 1
 1937 *Fronicularia sulcata* BORNEMANN, 1854 — BARTENSTEIN et BRAND, p. 158, tab. 1 A, fig. 12; tab. 2 A, fig. 19; tab. 2 B, fig. 20; tab. 4, fig. 50
 1950 *Fronicularia sulcata* BORN. — BARNARD, p. 369, figs. 7 a, c, f
 1957 *Spandelina bicostata* D'ORB. subsp. *sulcata* (BORN.) — NØRVANG, p. 63, figs. 56—59
 1961 *Fronicularia sulcata* BORNEMANN, 1854 — PIETRZENUK, p. 81, tab. 6, figs. 5, 6

R e m a r k s : very characteristic and numerous species, very often broken. The occurrence in the Opalinus Beds rather interesting from the stratigraphical point of view.

Fronicularia regularis PAALZOW 1922

Fig. 43

- 1922 *Fronicularia regularis* nov. sp. — PAALZOW, p. 19, tab. 2, fig. 11

R e m a r k s : in the sample studied only one specimen found.

Ostracods

Sub-order Podocopa SARS 1866

Family Cypridae BAIRD 1846

Genus *Paracypris* SARS 1866

Paracypris ? sp.

Fig. 44

R e m a r k s : shell is drop-like, rather small, surface smooth. Dorsal margin straight, ventral one slightly curved. Posterior pointed, anterior nearly rounded. Left valve larger than right. Both valves convex, greatest height is a little nearer to the anterior margin; it forms more than one third of length. In a dorsal view the greatest thickness is nearly central and does not reach height. Greatest midlength is a little over the ventral line and is parallel to the latter. Internal features not observed. Only one specimen found.

Family Bairdiidae SARS 1888

Genus *Bairdia* MCCOY 1844

Bairdia cf. *cassiana* (REUSS 1868)

Figs. 45—51

- 1868 *Cythere cassiana* m. — REUSS, p. 108, fig. 57

- 1908 *Bairdia cassiana* Rss. — ISSLER, p. 94, fig. 339

Fig. 26—27: *Nodosaria denticulatacostata* FRANKE, KPUK 2091, 2092

Fig. 28—30: *Marginulina prima* D'ORB. KPUK 2080, 2081

Fig. 31—32: *Lenticulina stilla* (TERQ.). KPUK 2086, 2085

Fig. 33—36: *Lenticulina splendens* (TERQ.). KPUK 2087, 2088

Fig. 37—42: *Fronicularia sulcata* BORN. KPUK 2090, 2084, 2083, 2089, 2070, 2071

Fig. 43: *Fronicularia regularis* PAALZOW. KPUK 2072

Fig. 44: ? *Paracypris* sp. KPUK 2073

Fig. 45—51: *Bairdia* cf. *cassiana* (REUSS). KPUK 2067, 2068, 2069, 2074, 2075, 2076, 2077

Fig. 52—55: ? *Schuleridea* sp. KPUK 2078, 2079, 2093, 2094

Fig. 56: *Exophthalmocythere* sp. KPUK 2095

Remarks: shell oval-elongated. Greatest height is approximately at the mid and reaches almost 2/3 of length. Dorsal line more-or-less strongly convex, ventral line before the mid slightly compressed. Anterior margin broadly rounded, posterior beak-like prolonged. Right valve smaller. Both valves strongly convex. Greatest thickness in the mid or slightly to the posterior and reaches about 2/3 of height. Internal features not observed. The species is very numerous in the sample studied.

Genus *Schuleridea* SWARTZ et SWAIN 1946

Schuleridea ? sp.

Figs. 52—55

Remarks: shell subovoid in side views; greatest height nearly median or median; hinge margin moderately convex, ventral only very slightly convex. Anterior margin broadly rounded, posterior narrowly rounded, extended below. Left valve mostly overlaps and extends beyond right around entire periphery. Valves moderately convex, greatest thickness median or slightly posteromedian. Interior features not observed. Very numerous specimens in the Opalinus Beds.

Genus *Exophthalmocythere* TRIEBEL 1938

Exophthalmocythere sp.

Fig. 56

Remarks: in the sample studied only one specimen, but characteristic of the genus found.

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