

Foraminiferal Holotypes, Lectotypes, and Syntypes Stored in the Paleontological Collection of the Geological Survey of Austria

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7 Plates

Micropaleontology
Foraminifera
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Contents

Zusammenfassung	245
Abstract	245
Introduction	245
Publications from 1846 to 1998	246
Discussion	247
Acknowledgements	247
Plates 1–7	248
References	262

Foraminiferenholo-, Foraminiferenlecto-, und Foraminiferensyntypen in der paläontologischen Sammlung der Geologischen Bundesanstalt

Zusammenfassung

Die an der Geologischen Bundesanstalt in Wien aufbewahrten Foraminiferenholo-, -lecto- und -syntypen werden aufgelistet und abgebildet. Die dazugehörigen Veröffentlichungen werden kurz beschrieben. Der historische Zuwachs der Holo-, Lecto- und Syntypen in dieser Sammlung wird diskutiert. Im Zusammenhang mit dem Vorschlag eines GSSP für die Basis des Jura (Kuhjoch, Tirol) und einer Neuinterpretation der frühen Evolution planktischer Foraminiferen hat das Interesse an Stücken aus dieser Sammlung in letzter Zeit deutlich zugenommen.

Abstract

Foraminiferal holotypes, lectotypes, and syntypes stored in the paleontological collection of the Geological Survey of Austria have been listed and figured and the corresponding publications briefly described. The historical growth of holotypes, lectotypes, and syntypes in the collection has been discussed. Due to both the proposal that the GSSP marking the base of the Jurassic System be sited in the Kuhjoch section in Tyrol and a revision of the early evolution of planktic foraminifera, interest in the collection has increased markedly in recent years.

Introduction

The paleontological collection of the Geological Survey of Austria hosts a number of foraminiferal type specimens described in several important historical and more recent publications. In this contribution, 193 holotypes, 108 lectotypes, and 8 syntypes (in total 309) have been listed and figured. Some general information on the corresponding publications in which they were first described has also been provided.

Only the material originally described by D'ORBIGNY (1846) has been completely revised (PAPP & SCHMID, 1985). Phylogenetic revisions are in progress for some of the genera and species first described by FUCHS (1968, 1973) and

OBERHAUSER (1960) and proposed to be potential ancestors of planktic foraminifera. In order to avoid confusion, revised names have only been used for the D'ORBIGNY (1846) material.

Due to the large number of type specimens, detailed information on specific type levels, type localities and type figures has not been presented here, as it has been in the other contributions to this volume. For most of the species listed, such additional information has already been published in the Catalogue of Foraminifera (ELLIS & MESSINA, 1940 et seq.) and can be obtained from there or from the associated website (www.micropress.org). All species descriptions or further modern revisions were published in readily accessible journals.

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For this publication, the order of type specimens has been based first on the order of the publication dates and secondly on their alphabetical order (Plates 1–7). Only one view per species is figured in this contribution. Type localities, type levels and collection numbers have been given beneath the species names in the plate explanations.

Publications from 1846 to 1998

D'ORBIGNY 1846 (Plates 1–3)

After the rediscovery of the material collected by HAUER and initially described in the well known monograph of D'ORBIGNY (1846), PAPP & SCHMID (1985) revised this very important collection. HAUER collected foraminifera from Middle Miocene (Badenian) rocks, mainly in the vicinity of Vienna (Baden, Nußdorf, Kahlenberg) and a few other places in the former Austrian Empire. From these samples, D'ORBIGNY described 228 species. However, for a long time, the collection was ascribed to REUSS, until PAPP et al. (1977) recognised it as being the type material described in D'ORBIGNY's (1846) monograph and discussed the evidence for the allocation of the material to HAUER and D'ORBIGNY.

Apart from the large number of lectotypes (107) and a few holotypes (7) selected by PAPP & SCHMID (1985), some specimens in the collection have been used to define new species and subspecies by other authors. A new genus (*Hauerina*) was erected by PAPP & SCHMID (1985). In 1954, PAPP & KÜPPER used specimens from Vöslau to define the subspecies *Heterostegina costata levitesta*, but later PAPP & SCHMID (1985) denied the rank of subspecies for specimens with a smooth surface and consequently also for *H. costata levitesta*. PAPP & SCHMID (1978) chose a specimen from D'ORBIGNY's material for the generotype of the new genus *Stellarticulina*. However, the lectotype of *S. mutabilis* was figured only as a crude line drawing. The revised names of PAPP & SCHMID (1985) for the figured type specimens have been used here since these names are well established in modern foraminiferal literature.

SCHUBERT 1904 (Plate 3)

SCHUBERT (1904) described foraminiferal assemblages from a drill-core from Wels in Upper Austria. He erected one new species (*Bulimina rotula*) and four other new subspecies from the same site. The age assignment of the strata is not clear but is most likely late Oligocene ("Meletta-Schuppe") to early Miocene ("Schlier").

SCHUBERT 1914 (Plate 3)

Only one new genus and species (*Pavonitina styriaca*) from Middle Miocene rocks in Styria was described in the short paper by SCHUBERT (1914). The author discusses phylogenetic relationships to related genera.

NOTH 1951 (Plate 3)

NOTH (1951) described eight new species of various genera (6 holotypes, 2 syntypes) from Cretaceous rocks of various tectonic units. Sample locations for the holo- and

syntypes were Nußbach, Leonstein (both Upper Austria) and Korneuburg (Lower Austria).

NOTH 1952 (Plate 3)

This very short paper described only one holotype of a new genus (*Plectorecurvoides alternans*) from the (possibly Cretaceous) flysch rocks of Rinerbach in Upper Austria (NOTH, 1952).

OBERHAUSER 1957 (Plate 3)

OBERHAUSER (1957) described foraminifera from Carnian rocks (Upper Triassic) of the Eastern Alps west of Wiener Neustadt (Lower Austria). Six new species and subspecies of the genera *Trocholina* and *Paratrocholina* were described (4 holotypes, 2 lectotypes).

WEINHANDL 1958 (Plate 3)

The short paper of WEINHANDL (1958) described one new genus and species (*Schackoinella sarmatica*) from a Sarmatian (Middle Miocene) locality in Vienna.

OBERHAUSER 1960 (Plates 3, 4)

In this paper, OBERHAUSER (1960) dealt with foraminifera and other microfossils of Ladinian and Carnian (Triassic) age from the Eastern Alps and Iran. The Austrian material came from Hohe Wand, Alt-Aussee, and Helenental. Further samples were taken in Süd-Tirol (Dolomites, Italy) and Aghdarband (Chorassan, Iran). In total, 1 new genus (*Austrocolomia*) and 26 new foraminifera species and subspecies were described, including two species allocated to the planktic genus *Globigerina*. The early planktic foraminifera are currently being reviewed by a working group led by Prof. M. HART (Plymouth University). Preliminary results, based on wall structure and chamber arrangement, however, show that these species were benthic foraminifera. One species considered to be new by HUDSON et al. (2009) was not named by OBERHAUSER (1960) and thus has not been listed here.

OBERHAUSER 1963 (Plate 4)

In this short paper, OBERHAUSER (1964) described a new genus with one species (*Pragoconulus robustus*) from the Seelandalpe in northern Italy (Ladinian, Triassic).

OBERHAUSER 1964 (Plate 4)

OBERHAUSER (1964) discussed the systematic position of the genera *Permodiscus*, *Trocholina* and *Triasina*. Five new species of the genera *Permodiscus* and *Trocholina* were described in Triassic rocks from northern Italy and Austria.

SCHMID 1967 (Plate 4)

This paper dealt with two planktic foraminifera (*Globigerinoides grilli*, *Globigerinoides kuehni*; SCHMID, 1967), of which one (*G. kuehni*) was subsequently considered to be a synonym of the other (*G. grilli*, RÖGL, 1985). The specimens were found in Badenian (Middle Miocene) marls from the type locality of the Badenian stage, the former brickyard at Sooss near Baden (Lower Austria).

FUCHS 1967 (Plates 4, 5)

FUCHS (1967) described 30 new species and one new subspecies amongst many already known mid-Albian species from a deep well near Delft, Netherlands. FUCHS (1967) also erected six new genera (*Clarella*, *Discospirella*, *Edithaella*, *Echinoporina*, *Grillita*, and *Oberhauserina*) and one new subfamily (Edithaellinae). The fossiliferous assemblage particularly rich in species (154 species and subspecies in total) of one core sample has been investigated to better constrain the stratigraphic age of the strata.

FUCHS 1968 (Plate 5)

FUCHS (1968) introduced 21 new species (from five new genera: *Kollmanita*, *Oberhauserella*, *Praegubkinella*, *Schlagerina*, *Schmidita*) of so-called “Triassic Globigerinas”. For some of them, FUCHS (1968) suggested a planktic habitat. As with the material collected by OBERHAUSER (1960), these potential ancestors of modern planktic foraminifera are currently being reviewed (see above). Evolutionary lineages have already been discussed in FUCHS (1967). The Ladinian to Rhaetic (Triassic) material came from northern Italy (Prager Dolomiten, St. Cassian) and Austria (Upper and Lower Austria, Carinthia, Salzburg).

OBERHAUSER 1968 (Plate 5)

OBERHAUSER (1968) described two new species of the genus *Austrocolomia* from Triassic rocks of the Eastern Alps. The stratigraphic distribution of the entire genus was also documented.

FUCHS 1970 (Plates 5, 6)

The rich and well-preserved lower Liassic (Lower Jurassic) foraminiferal assemblages of three samples collected at a temporary outcrop near Hernstein in Lower Austria were described by FUCHS (1970). The total number of species described was 106 of which 23 were new. A new genus, *Sieberina*, was also erected by FUCHS (1970). The assemblages showed a distinct similarity with boreal regions and gave valuable information for the refinement of alpine stratigraphy.

SCHMID 1971 (Plate 6)

The short paper of SCHMID (1971) defined the new species *Uvigerina grilli*, which is an important index species in Neogene Paratethys biostratigraphy.

FUCHS 1971 (Plates 6, 7)

In this monograph, FUCHS (1971) described 193 species, including 42 new species and a new genus, *Iuliusina*. The material was from an especially rich and well-preserved sample from a mid-Barrémian outcrop in Vorarlberg (Austria). FUCHS (1971) not only described the diverse benthic assemblage, but also emphasized the phylogenetic relationships and evolution of early planktic foraminifera.

FUCHS 1973 (Plate 7)

FUCHS (1973) discussed the phylogenetic relationships of Middle to Late Jurassic Globigerina-like foraminifera from southern Poland. The new genera (*Eoheterohelix*, *Eoceratobulimina*, *Jurassorotalia*, *Mariannenina*, *Poliskanella*, *Tectoglobigerina*, *Wo-*

letzina) were considered to be ancestors of Early Cretaceous planktic foraminifera. In total, 18 new “planktic” and benthic species were described.

GEBHARDT 1998 (Plate 7)

GEBHARDT (1998) described three new arenaceous species from the Maastrichtian Mamu Formation of the Anambra Basin in Nigeria. The holo- and paratypes were originally stored at the collection of the Technische Universität Berlin (TUB) but were relocated to the Geological Survey of Austria because proper storage for the type specimens could no longer be guaranteed in Berlin (GEBHARDT, 2008).

Discussion

An early phase of type description and deposition began with D'ORBIGNY (1846) and lasted until the early 20th century (SCHUBERT, 1904, 1914). In these, only line drawings were published and the holotype concept was not yet established. Consequently, figured types are either syntypes, or lectotypes if the material was revised later (e.g., PAPP & SCHMID, 1985). The material of D'ORBIGNY (1846) with its 108 lectotypes and 7 holotypes is certainly the most important portion of the foraminiferal type specimens stored in this collection.

In the 1950s to 1970s abundant new species and genera were described and added to the collection with both OBERHAUSER (1957, 1960, 1963, 1964, 1968) and FUCHS (1967, 1968, 1970, 1971, 1973) as the main contributors. Since the material of FUCHS (1973) was deposited, no new holotypes have been added to the collection of the Geological Survey. The material of GEBHARDT (1998) was transferred to the collection because proper storage could no longer be guaranteed in its old repository.

The material of OBERHAUSER and FUCHS in particular has attracted more attention in the past few years. The Triassic/Jurassic boundary has become a topic of special interest with the proposal that the Global Stratigraphic Section and Point, GSSP, marking the base of the Hettangian stage, and the Jurassic System should be places in the Kuhjoch Section in Tyrol. The foraminiferal content is one of the most important constraints for this boundary (HILLEBRANDT et al., 2007, HILLEBRANDT, 2008, HILLEBRANDT & URLICHS, 2008).

Rising interest in the early evolution of planktic foraminifera in recent times has initiated the revision and phylogenetic re-interpretation of the so-called “Triassic Globigerinas” by a British working group led by Prof. M. HART (Plymouth-University). The revisions may lead to changes at generic and species levels for the species described by OBERHAUSER and FUCHS. The first results have shown that many of the potential ancestors of planktic forms were actually benthic (HUDSON et al., 2009).

Acknowledgements

Thanks to Hugh RICE for improving the English and to Irene ZORN (both Vienna) for assistance with the database at the Geological Survey of Austria.

Plate 1

- Fig. 1: *Adelosina longirostra* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0501.
- Fig. 2: *Adelosina schreibersi* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0519.
- Fig. 3: *Ammobaculites agglutinans* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0196.
- Fig. 4: *Amphistegina hauerina* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0340.
- Fig. 5: *Anomalina badensis* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0280.
- Fig. 6: *Articulina gibbosula* D'ORBIGNY 1846.
Lectotype, Badenian, Tarnopol. Coll. no.: GBA 1981/003/0464.
- Fig. 7: *Asterigerinata planorbis* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0336.
- Fig. 8: *Bigenerina agglutinans* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0392.
- Fig. 9: *Bolivina antiqua* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0395.
- Fig. 10: *Bolivina compressa* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0380.
- Fig. 11: *Bolivina digitalis* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0389.
- Fig. 12: *Bulimina elongata* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0319.
- Fig. 13: *Bulimina pyrula* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0314.
- Fig. 14: *Ceratocancris haueri* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0211.
- Fig. 15: *Cibicides boueanus* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0275.
- Fig. 16: *Cibicides ungerianus* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0236.
- Fig. 17: *Cycloforina badensis* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0535.
- Fig. 18: *Cycloforina contorta* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0531.
- Fig. 19: *Cycloforina hauerina* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0472.
- Fig. 20: *Cycloforina nussdorfensis* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0511.
- Fig. 21: *Dentalina acuta* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0069.
- Fig. 22: *Dentalina antennula* D'ORBIGNY 1846.
Holotype, Badenian, Baden. Coll. no.: GBA 1981/003/0061.
- Fig. 23: *Dentalina badensis* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0033.
- Fig. 24: *Dentalina boueana* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0043.
- Fig. 25: *Dentalina brevis* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0049.
- Fig. 26: *Dentalina elegans* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0038.
- Fig. 27: *Dentalina inornata* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0034.
- Fig. 28: *Dentalina scripta* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0060.
- Fig. 29: *Dendritina haueri* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0189.
- Fig. 30: *Elphidium aculeatum* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0187.
- Fig. 31: *Elphidium fichtelianum* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0164.
- Fig. 32: *Elphidium flexuosum* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0169.
- Fig. 33: *Elphidium hauerinum* (D'ORBIGNY 1846).
Lectotype, Badenian, Vienna. Coll. no.: GBA 1981/003/0155.
- Fig. 34: *Elphidium obtusum* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0162.
- Fig. 35: *Elphidium reginum* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0182.
- Fig. 36: *Elphidium rugosum* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0161.
- Fig. 37: *Eponides boueanus* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0215.
- Fig. 38: *Fursenkoina acuta* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0385.
- Fig. 39: *Gaudryina mayeriana* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0406.
- Fig. 40: *Globigerina regularis* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0254.
- Fig. 41: *Globigerinoides quadrilobatus* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0263.
- Fig. 42: *Glandulina ovula* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0008.
- Fig. 43: *Globulina punctata* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0373.
- Fig. 44: *Globulina spinosa* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0378.
- Fig. 45: *Guttulina austriaca* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0356.
- Fig. 46: *Guttulina ovata* (D'ORBIGNY 1846).
Holotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0381.
- Fig. 47: *Hanzawaia boueana* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0138.
- Fig. 48: *Hauerina compressa* D'ORBIGNY 1846.
Lectotype, Badenian, Vienna. Coll. no.: GBA 1981/003/0153.

D'ORBIGNY 1846, all Figs. from PAPP & SCHMID (1985).
Scale bars 0.1 mm.

Plate 2

- Fig. 1: *Heterolepa dutemplei* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0240.
- Fig. 2: *Heterostegina costata* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0346.
- Fig. 3: *Heterostegina costata levitesta* PAPP & KÜPPER 1954.
Holotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0348.
- Fig. 4: *Lagena clavata* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0005.
- Fig. 5: *Lenticulina arcuata* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0093.
- Fig. 6: *Lenticulina ariminensis* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0106.
- Fig. 7: *Lenticulina clypeiformis* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0118.
- Fig. 8: *Lenticulina cymboides* (D'ORBIGNY 1846).
Holotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0091.
- Fig. 9: *Lenticulata inornata* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0120.
- Fig. 10: *Lenticulina ornata* (D'ORBIGNY 1846).
Holotype, Badenian, Baden. Coll. no.: GBA 1981/003/0112.
- Fig. 11: *Lingulina costata* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0074.
- Fig. 12: *Marginulina nodosaria* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0352.
- Fig. 13: *Marginulina obliqua* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0351.
- Fig. 14: *Marginulina similis* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0081.
- Fig. 15: *Neoeponides schreibersi* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0226.
- Fig. 16: *Nodosaria badensis* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0027.
- Fig. 17: *Nodosaria elegantissima* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0064.
- Fig. 18: *Nodosaria guttifera* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0050.
- Fig. 19: *Nodosaria irregularis* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0013.
- Fig. 20: *Nodosaria longiscata* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0010.
- Fig. 21: *Nodosaria rudis* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/00017.
- Fig. 22: *Nodosaria urnula* (D'ORBIGNY 1846).
Holotype, Badenian, Baden. Coll. no.: GBA 1981/003/0062.
- Fig. 23: *Nummuloculina contraria* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0431.
- Fig. 24: "*Orbiculina*" *rotella* D'ORBIGNY 1846.
Lectotype, Miocene, Buitur. Coll. no.: GBA 1981/003/0198.
- Fig. 25: *Orbulina bilobata* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0268.
- Fig. 26: *Planularia lanceolata* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0100.
- Fig. 27: *Planulina austriaca* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0283.
- Fig. 28: *Polymorphina complanata* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0387.
- Fig. 29: *Pyrgo clypeata* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0423.
- Fig. 30: *Pyrgo inornata* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0433.
- Fig. 31: *Pyrgo lunula* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0425.
- Fig. 32: *Pyrgo simplex* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0427.
- Fig. 33: *Quinqueloculina akneriana* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0496.
- Fig. 34: *Quinqueloculina boueana* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0508.
- Fig. 35: *Quinqueloculina buchiana* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0486.
- Fig. 36: *Quinqueloculina haidingeri* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0492.
- Fig. 37: *Quinqueloculina peregrina* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0503.
- Fig. 38: *Quinqueloculina triangularis* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0481.
- Fig. 39: *Quinqueloculina ungeriana* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0498.
- Fig. 40: *Rosalina obtusa* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0309.
- Fig. 41: *Rotalia aculeata* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0250.
- Fig. 42: *Schackoinella imperatoria* (D'ORBIGNY 1846).
Lectotype, Badenian, Tarnopol. Coll. no.: GBA 1981/003/0299.
- Fig. 43: *Sigmoilopsis bronniana* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0479.
- Fig. 44: *Sinuloculina consobrina* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0460.
- Fig. 45: *Sinuloculina mayeriana* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0476.
- Fig. 46: *Siphonodosaria verneuli* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0046.
- Fig. 47: *Spirolina austriaca* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0194.
- Fig. 48: *Spiroloculina badensis* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0437.

D'ORBIGNY 1846, all Figs. from PAPP & SCHMID (1985).
Scale bars 0.1 mm.

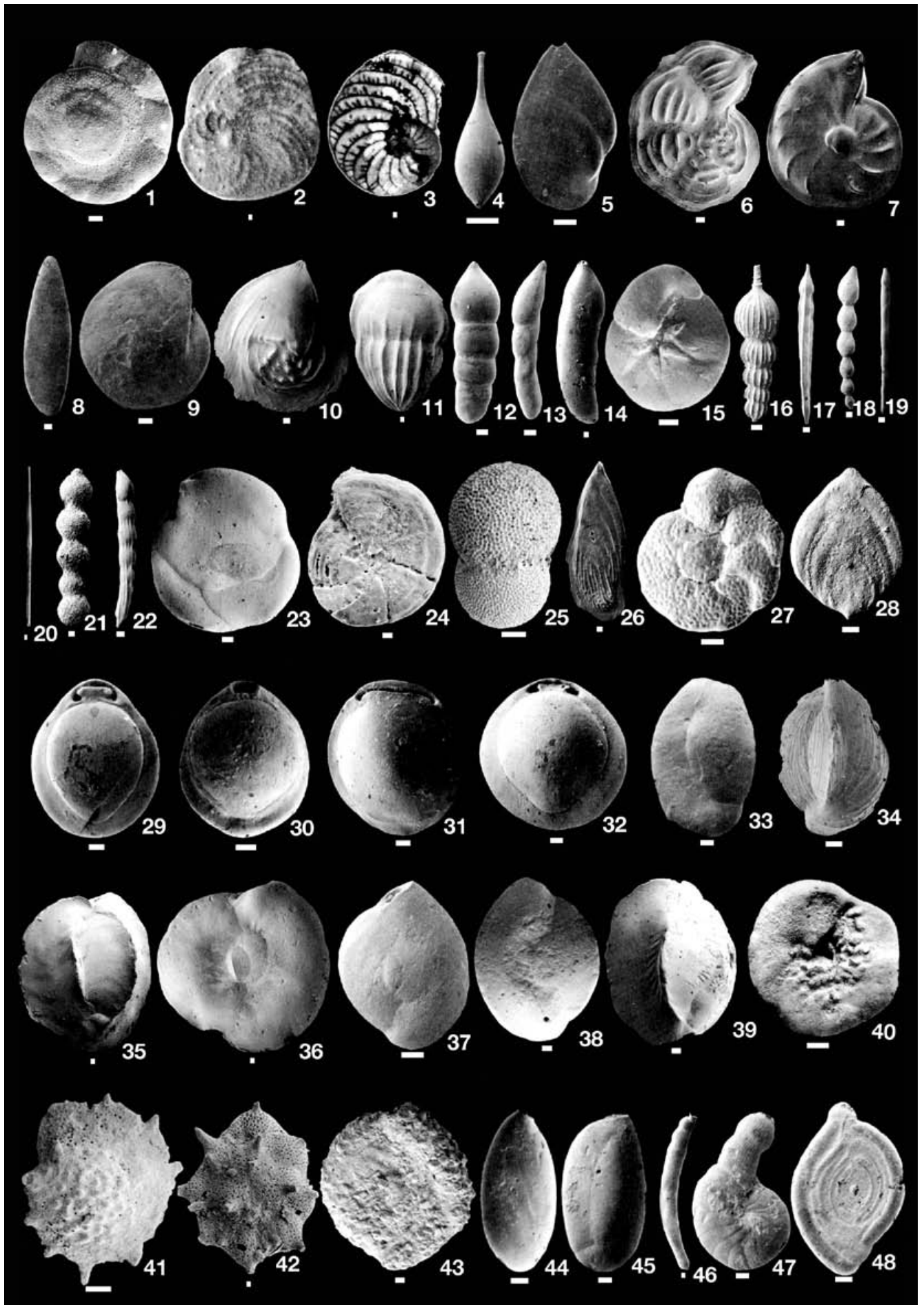


Plate 3

- Fig. 1: *Spiroloculina canaliculata* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0435.
- Fig. 2: *Spiroloculina excavata* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0441.
- Fig. 3: *Spiroplectinella carinata* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0413.
- Fig. 4: *Stellarticulina mutabilis* (D'ORBIGNY 1846).
Lectotype, Badenian, Bad Vöslau.
Coll. no.: 1 GBA 978/004/0001.
(Fig. from PAPP & SCHMID 1978).
- Fig. 5: *Stilostomella adolphina* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0058.
- Fig. 6: *Stilostomella consobrina* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0042.
- Fig. 7: *Textularia deperdita* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0405.
- Fig. 8: *Textularia gramen* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0417.
- Fig. 9: *Textularia mariae* D'ORBIGNY 1846.
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0409.
- Fig. 10: *Textularia nussdorfensis* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0400.
- Fig. 11: *Triloculina inflata* D'ORBIGNY 1846.
Holotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0461.
- Fig. 12: *Triloculina scapha* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0451.
- Fig. 13: *Uvigerina semiornata* D'ORBIGNY 1846.
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0324.
- Fig. 14: *Vaginulinopsis hauerina* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0085.
- Fig. 15: *Vaginulinopsis pedum* (D'ORBIGNY 1846).
Lectotype, Badenian, Baden. Coll. no.: GBA 1981/003/0079.
- Fig. 16: ?*Valvulineria akneriana* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0233.
- Fig. 17: *Valvulineria complanata* (D'ORBIGNY 1846).
Lectotype, Badenian, Nußdorf. Coll. no.: GBA 1981/003/0294.
- Fig. 18: *Bulimina rotula* SCHUBERT 1904.
Syntype, Miocene, Wels. Coll. no.: GBA 1904/002/0005.
- Fig. 19: *Bulimina affinis* var. *tenuissimestriata* SCHUBERT 1904.
Syntype, Miocene, Wels. Coll. no.: GBA 1904/002/0003.
- Fig. 20: *Bulimina elegans* var. *gibba* SCHUBERT 1904.
Syntype, Miocene, Wels. Coll. no.: GBA 1904/002/0004.
- Fig. 21: *Cristellaria josephina* var. *umbonata* SCHUBERT 1904.
Syntype, Miocene, Wels. Coll. no.: GBA 1904/002/0002.
- Fig. 22: *Sagrina dimorpha* var. *ornata* SCHUBERT 1904.
Syntype, Miocene, Wels. Coll. no.: GBA 1904/002/0006.
- Fig. 23: *Pavonitina styriaca* SCHUBERT 1914.
Syntype, Miocene, Laubegg. Coll. no.: GBA 1914/001/0001.
- Fig. 24: *Cyclammina polygonata* NOTH 1951.
Syntype, Senonian, Nußbach. Coll. no.: GBA 1951/001/0175.
- Fig. 25: *Lenticulina (Margulinopsis) hemicylindrica* NOTH 1951.
Holotype, Senonian, Nußbach. Coll. no.: GBA 1951/001/0243.
- Fig. 26: *Lenticulina (Saracenaria) praemudonensis* NOTH 1951.
Holotype, Hauterivian, Korneuburg.
Coll. no.: GBA 1951/001/0026.
- Fig. 27: *Lenticulina (Vagulinopsis) angulata* NOTH 1951.
Holotype, Albian, Leonstein. Coll. no.: GBA 1951/001/0149.
- Fig. 28: *Lenticulina (Vagulinopsis) korneuburgensis* NOTH 1951.
Holotype, Hauterivian, Korneuburg.
Coll. no.: GBA 1951/001/0022.
- Fig. 29: *Lituotuba nußbachensis* NOTH 1951.
Holotype, Senonian, Nußbach. Coll. no.: GBA 1951/001/0195.
- Fig. 30: *Rhizammina grilli* NOTH 1951.
Syntype, Senonian, Nußbach. Coll. no.: GBA 1951/001/0165.
- Fig. 31: *Trocholina infragranulata* NOTH 1951.
Holotype, Hauterivian, Korneuburg.
Coll. no.: GBA 1951/001/0029.
- Fig. 32: *Plectrorecurvoides alternans* NOTH 1952.
Holotype, Albian–Cenomanian, Rinerbach.
Coll. no.: GBA 1952/001/0001.
- Fig. 33: *Trocholina (Paratrocholina) eomesozoica* OBERHAUSER 1957.
Holotype, Carnian, Hohe Wand. Coll. no.: GBA 1957/002/0019.
- Fig. 34: *Trocholina (Trocholina) biconvexa biconvexa* OBERHAUSER 1957.
Holotype, Carnian, Hohe Wand. Coll. no.: GBA 1957/002/0011.
- Fig. 35: *Trocholina (Trocholina) biconvexa major* OBERHAUSER 1957.
Holotype, Carnian, Hohe Wand. Coll. no.: GBA 1957/002/0017.
- Fig. 36: *Trocholina (Trocholina) biconvexa minor* OBERHAUSER 1957.
Lectotype, Carnian, Hohe Wand. Coll. no.: GBA 1957/002/0013.
- Fig. 37: *Trocholina (Trocholina) multispira* OBERHAUSER 1957.
Holotype, Carnian, Hohe Wand. Coll. no.: GBA 1957/002/0001.
- Fig. 38: *Trocholina (Trocholina) ventroplana* OBERHAUSER 1957.
Lectotype, Carnian, Hohe Wand. Coll. no.: GBA 1957/002/0007.
- Fig. 39: *Schackoinella sarmatica* WEINHANDL 1958.
Holotype, Sarmatian, Kaasgraben.
Coll. no.: GBA 1958/001/0001.
- Fig. 40: *Ammovertella persica* OBERHAUSER 1960.
Holotype, Ladinian, Aghdarband.
Coll. no.: GBA 1960/004/0002.
- Fig. 41: *Austrocolomia marschalli* OBERHAUSER 1960.
Holotype, Carnian, Hohe Wand. Coll. no.: GBA 1960/004/0096.
- Fig. 42: *Darbyella kollmanni* OBERHAUSER 1960.
Holotype, Carnian, Hohe Wand. Coll. no.: GBA 1960/004/0028.
- Fig. 43: *Darbyella nothi* OBERHAUSER 1960.
Holotype, Carnian, Helenental. Coll. no.: GBA 1960/004/0029.
- Fig. 44: *Dentalina vadaszi* OBERHAUSER 1960.
Holotype, Carnian, Hohe Wand. Coll. no.: GBA 1960/004/0031.
- Fig. 45: *Endothyra austrotriadica* OBERHAUSER 1960.
Holotype, Carnian, Hohe Wand. Coll. no.: GBA 1960/004/0005.
- Fig. 46: *Endothyra grünbachensis* OBERHAUSER 1960.
Holotype, Carnian, Grünbach. Coll. no.: GBA 1960/004/0008.
- Fig. 47: *Endothyra küpperi* OBERHAUSER 1960.
Holotype, Carnian, Hohe Wand. Coll. no.: GBA 1960/004/0009.
- Fig. 48: *Eponides helenentalensis* OBERHAUSER 1960.
Holotype, Triassic, Helenental. Coll. no.: GBA 1960/004/0101.
- Figs. 1–17: D'ORBIGNY 1846, all Figs. from PAPP & SCHMID (1985) except Fig. 4.
Figs. 18–22: SCHUBERT (1904), no scale given.
Fig. 23: SCHUBERT (1914).
Figs. 24–31: NOTH 1951, Fig. 30, no scale given.
Fig. 32: NOTH (1952).
Figs. 33–38: OBERHAUSER (1957).
Fig. 39: WEINHANDL (1958).
Figs. 40–48: OBERHAUSER (1960).

Scale bars 0.1 mm.

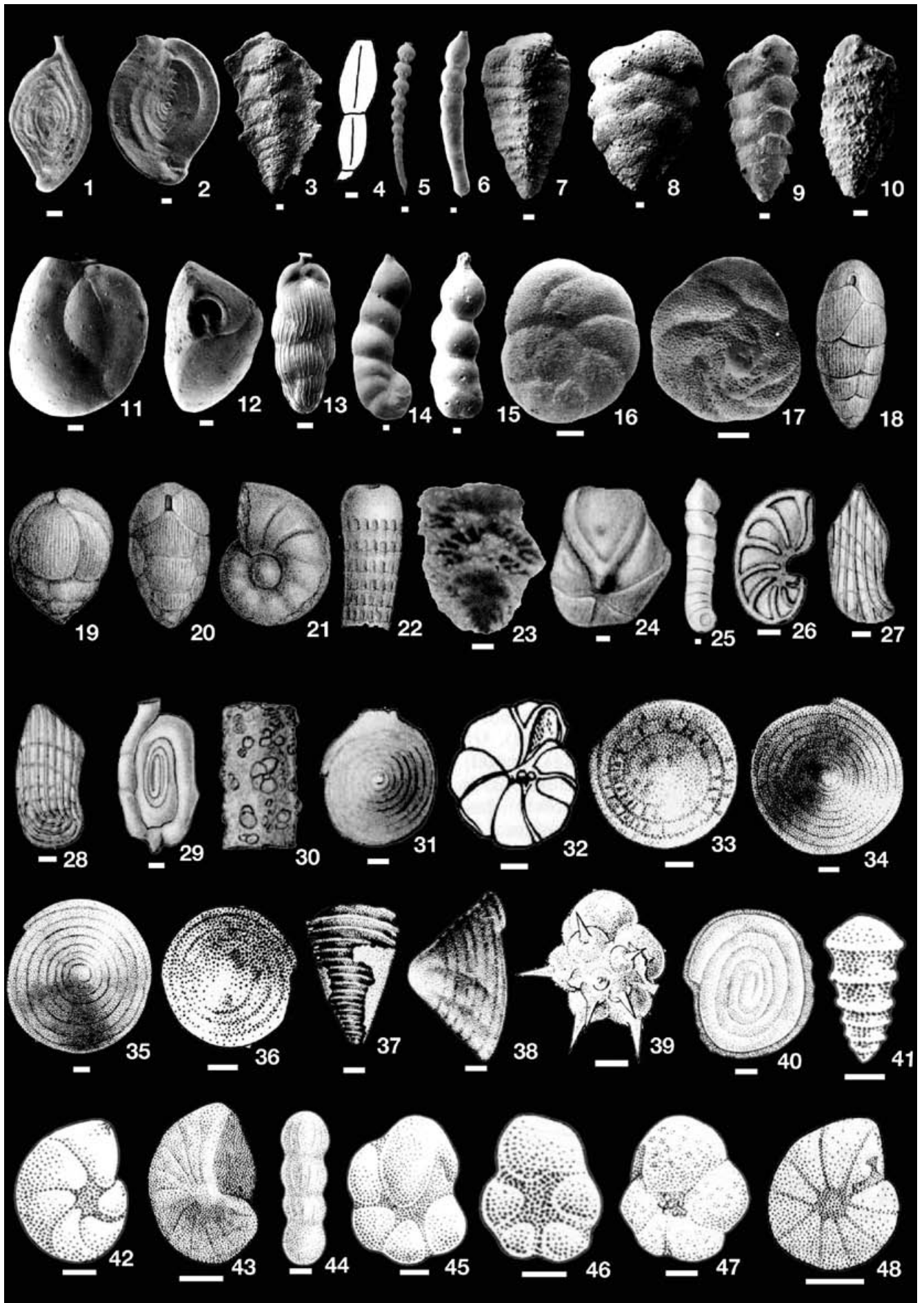


Plate 4

- Fig. 1: *Falsopalmula dolomitica* OBERHAUSER 1960.
Holotype, Ladinian, Seelandalpe.
Coll. no.: GBA 1960/004/0054.
- Fig. 2: *Fronicularia ruttneri* OBERHAUSER 1960.
Holotype, Ladinian–Carnian, Aghdarband.
Coll. no.: GBA 1960/004/0090.
- Fig. 3: *Globigerina ladinica* OBERHAUSER 1960.
Holotype, Ladinian, Settsass-Scharte.
Coll. no.: GBA 1960/004/0108.
- Fig. 4: *Globigerina mesotriassica* OBERHAUSER 1960.
Holotype, Ladinian, Settsass-Scharte.
Coll. no.: GBA 1960/004/0106.
- Fig. 5: *Lingulina aghdarbandi* OBERHAUSER 1960.
Holotype, Ladinian–Carnian, Aghdarband.
Coll. no.: GBA 1960/004/0060.
- Fig. 6: *Lingulina dracosimilis* OBERHAUSER 1960.
Holotype, Carnian, Hohe Wand. Coll. no.: GBA 1960/004/0064.
- Fig. 7: *Lingulina infirmis* OBERHAUSER 1960.
Holotype, Carnian, Hohe Wand. Coll. no.: GBA 1960/004/0066.
- Fig. 8: *Lingulina iranica* OBERHAUSER 1960.
Holotype, Ladinian–Carnian, Aghdarband.
Coll. no.: GBA 1960/004/0067.
- Fig. 9: *Lingulina iranica sieberi* OBERHAUSER 1960.
Holotype, Ladinian–Carnian, Aghdarband.
Coll. no.: GBA 1960/004/0070.
- Fig. 10: *Lingulina klebelsbergi* OBERHAUSER 1960.
Holotype, Ladinian, Seelandalpe.
Coll. no.: GBA 1960/004/0072.
- Fig. 11: *Marginulina karnica* OBERHAUSER 1960.
Holotype, Carnian, Hohe Wand. Coll. no.: GBA 1960/004/0030.
- Fig. 12: *Polytaxis seelandensis* OBERHAUSER 1960.
Holotype, Ladinian, Seelandalpe.
Coll. no.: GBA 1960/004/0027.
- Fig. 13: *Pseudoglandulina plöschingeri* OBERHAUSER 1960.
Holotype, Carnian, Hohe Wand. Coll. no.: GBA 1960/004/0050.
- Fig. 14: *Pseudoglandulina rosenbergi* OBERHAUSER 1960.
Holotype, Ladinian, Seelandalpe.
Coll. no.: GBA 1960/004/0052.
- Fig. 15: *Quadratina irregularis* OBERHAUSER 1960.
Holotype, Carnian, Hohe Wand. Coll. no.: GBA 1960/004/0042.
- Fig. 16: *Spiroloculina praecursor* OBERHAUSER 1960.
Holotype, Ladinian, Settsass-Scharte.
Coll. no.: GBA 1960/004/0024.
- Fig. 17: *Pragsoconulus robustus* OBERHAUSER 1963.
Holotype, Ladinian, Seelandalpe.
Coll. no.: GBA 1963/003/0001.
- Fig. 18: *Permodiscus planidiscoides* OBERHAUSER 1964.
Holotype, Ladinian, Seelandalpe.
Coll. no.: GBA 1964/002/0011.
- Fig. 19: *Permodiscus pragsooides* OBERHAUSER 1964.
Holotype, Ladinian, Seelandalpe.
Coll. no.: GBA 1964/002/0010.
- Fig. 20: *Trocholina acuta* OBERHAUSER 1964.
Holotype, Rhaetian, Hohe Wand. Coll. no.: GBA 1964/002/0009.
- Fig. 21: *Trocholina cordevolica* OBERHAUSER 1964.
Holotype, Ladinian, Seelandalpe.
Coll. no.: GBA 1964/002/0008.
- Fig. 22: *Trocholina permodiscoides* OBERHAUSER 1964.
Holotype, Norian, Panüler Schrofen.
Type material not available.
- Fig. 23: *Globigerinoides grilli* SCHMID 1967.
Holotype, Badenian, Sooss. Coll. no.: GBA 1967/001/0002.
- Fig. 24: *Globigerinoides kuehni* SCHMID 1967.
Holotype, Badenian, Sooss. Coll. no.: GBA 1967/001/0001.
- Fig. 25: *Ammobaculites amabilis* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0014.
- Fig. 26: *Ammobaculites germanicus* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0015.
- Fig. 27: *Cornusphaera grandis* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0143.
- Fig. 28: *Discospirella obscura* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0006.
- Fig. 29: *Dentalina hollandica* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0064.
- Fig. 30: *Echinopora erinaceus* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0149.
- Fig. 31: *Edithaella sessilis* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0141.
- Fig. 32: *Ellipsoidella cuneiformis* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0172.
- Fig. 33: *Eoguttulina fusus* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0134.
- Fig. 34: *Gavelinella umbilicitecta* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0177.
- Fig. 35: *Globotextularia parva* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0028.
- Fig. 36: *Grillita planispira* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0145.
- Fig. 37: *Hemisphaerammina obstinata* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0003.
- Fig. 38: *Lenticulina (Margulinopsis) sequana* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0098.
- Fig. 39: *Lenticulina (Saracenaria) bononiensis forticarinata* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0103.
- Fig. 40: *Lenticulina (Vaginulinopsis) carinata* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0109.
- Fig. 41: *Milliammina procera* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0011.
- Fig. 42: *Nouria tenera* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0010.
- Fig. 43: *Nubecularia concava* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0033.
- Fig. 44: *Oberhauserina morator* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0159.
- Fig. 45: *Orthomorphina cretacea* FUCHS 1967.
Holotype, middle Albian, Delft. Coll. no.: GBA 1967/006/0115.
- Figs. 1–16: OBERHAUSER (1960).
Fig. 17: OBERHAUSER (1963).
Figs. 18–22: OBERHAUSER (1964).
Figs. 23, 24: SCHMID (1967).
Figs. 25–45: FUCHS (1967).

Scale bars 0.1 mm.

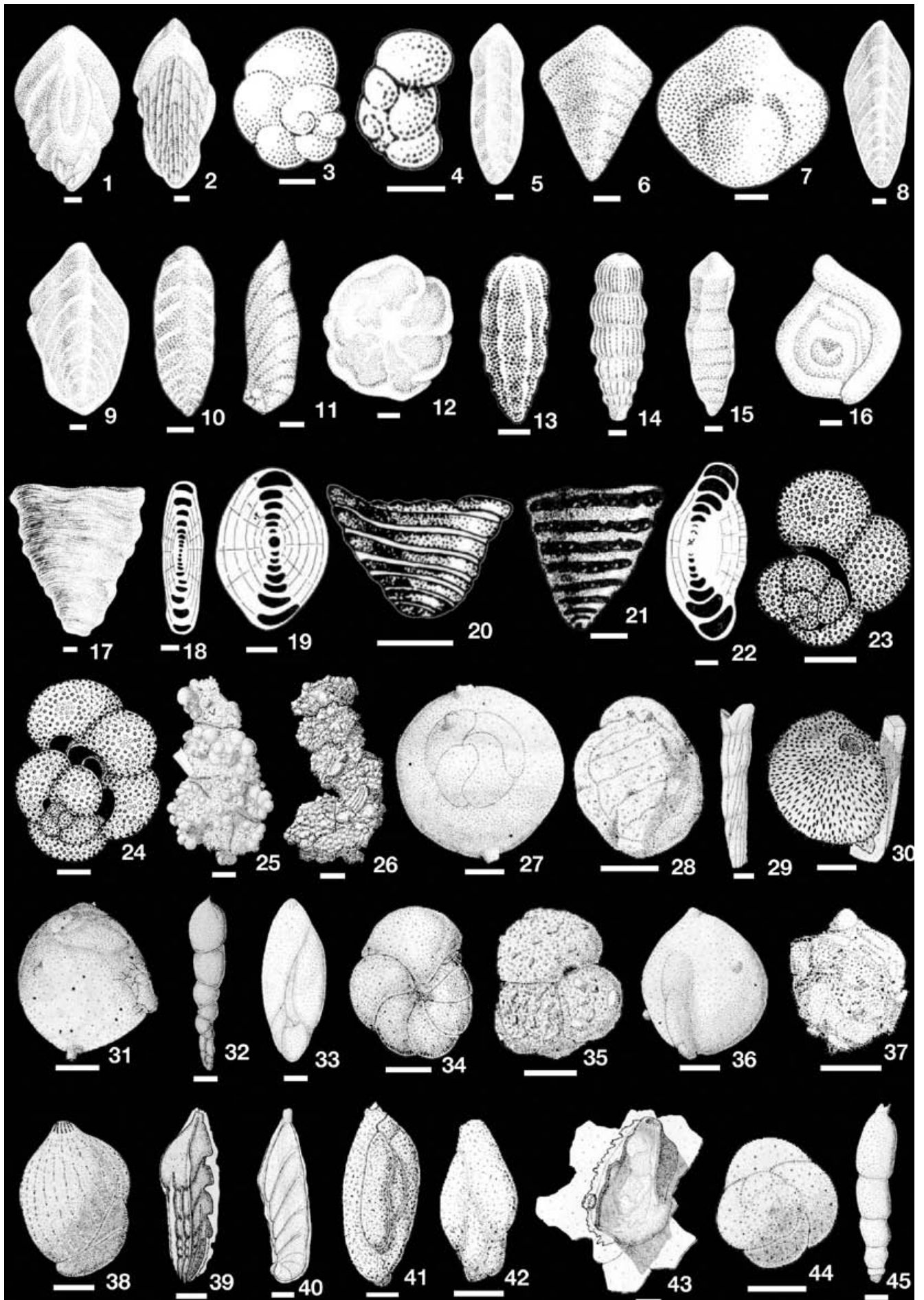


Plate 5

- Fig. 1: *Pseudopolymorphina subtilis* FUCHS 1967.
Holotype, middle Albian, Delft.
Coll. no.: GBA 1967/006/0137.
- Fig. 2: *Pseudopyrulinoides magnus* FUCHS 1967.
Holotype, middle Albian, Delft.
Coll. no.: GBA 1967/006/0138.
- Fig. 3: *Pseudopyrulinoides solidus* FUCHS 1967.
Holotype, middle Albian, Delft.
Coll. no.: GBA 1967/006/0139.
- Fig. 4: *Pyrulinoides hollandica* FUCHS 1967.
Holotype, middle Albian, Delft.
Coll. no.: GBA 1967/006/0140.
- Fig. 5: *Spiroloculina exigua* FUCHS 1967.
Holotype, middle Albian, Delft.
Coll. no.: GBA 1967/006/0037.
- Fig. 6: *Uvigerinammina triangula* FUCHS 1967.
Holotype, middle Albian, Delft.
Coll. no.: GBA 1967/006/0026.
- Fig. 7: *Vaginulina albiensis* FUCHS 1967.
Holotype, middle Albian, Delft.
Coll. no.: GBA 1967/006/0120.
- Fig. 8: *Vaginulina borealis* FUCHS 1967.
Holotype, middle Albian, Delft.
Coll. no.: GBA 1967/006/0122.
- Fig. 9: *Vaginulina delftensis* FUCHS 1967.
Holotype, middle Albian, Delft.
Coll. no.: GBA 1967/006/0125.
- Fig. 10: *Vaginulina pseudodebilis* FUCHS 1967.
Holotype, middle Albian, Delft.
Coll. no.: GBA 1967/006/0126.
- Fig. 11: *Diplostromina multifimbriata* FUCHS 1968.
Holotype, Ladinian, Seelandalpe.
Coll. no.: GBA 1967/005/0001.
- Fig. 12: *Kollmannita cordevolica* FUCHS 1968.
Holotype, Ladinian, Seelandalpe.
Coll. no.: GBA 1967/005/0012.
- Fig. 13: *Kollmannita diplostrominaeformis* FUCHS 1968.
Holotype, Ladinian, Seelandalpe.
Coll. no.: GBA 1967/005/0002.
- Fig. 14: *Kollmannita gemmaeformis* FUCHS 1968.
Holotype, Ladinian, Seelandalpe.
Coll. no.: GBA 1967/005/0010.
- Fig. 15: *Kollmannita multiloculata* FUCHS 1968.
Holotype, Ladinian, Seelandalpe.
Coll. no.: GBA 1967/005/0003.
- Fig. 16: *Kollmannita praeladinica* FUCHS 1968.
Holotype, Ladinian, Seelandalpe.
Coll. no.: GBA 1967/005/0005.
- Fig. 17: *Oberhauserella alta* FUCHS 1968.
Holotype, Rhaetian, Hinterer Gosausee.
Coll. no.: GBA 1967/005/0023.
- Fig. 18: *Oberhauserella karinthiaca* FUCHS 1968.
Holotype, Carnian, Eisenkappel.
Coll. no.: GBA 1967/005/0017.
- Fig. 19: *Oberhauserella norica* FUCHS 1968.
Holotype, Norian, Roßmoos.
Coll. no.: GBA 1967/005/0027.
- Fig. 20: *Oberhauserella ovata* FUCHS 1968.
Holotype, Rhaetian, Hohe Wand.
Coll. no.: GBA 1967/005/0035.
- Fig. 21: *Oberhauserella parviforamen* FUCHS 1968.
Holotype, Rhaetian, Hohe Wand.
Coll. no.: GBA 1967/005/0034.
- Fig. 22: *Oberhauserella praerhaetica* FUCHS 1968.
Holotype, Rhaetian, Hinterer Gosausee.
Coll. no.: GBA 1967/005/0030.
- Fig. 23: *Oberhauserella quadrilobata* FUCHS 1968.
Holotype, Rhaetian, Hohe Wand.
Coll. no.: GBA 1967/005/0018.
- Fig. 24: *Praegubkinella kryptumbilicata* FUCHS 1968.
Holotype, Rhaetian, Xanten.
Coll. no.: GBA 1967/005/0048.
- Fig. 25: *Praegubkinella turgescens* FUCHS 1968.
Holotype, Rhaetian, Xanten.
Coll. no.: GBA 1967/005/0036.
- Fig. 26: *Schlagerina altispira* FUCHS 1968.
Holotype, Rhaetian, Hohe Wand.
Coll. no.: GBA 1967/005/0039.
- Fig. 27: *Schlagerina angustumbilicata* FUCHS 1968.
Holotype, Rhaetian, Hohe Wand.
Coll. no.: GBA 1967/005/0036.
- Fig. 28: *Schlagerina scissumbilicata* FUCHS 1968.
Holotype, Rhaetian, Hohe Wand.
Coll. no.: GBA 1967/005/0042.
- Fig. 29: *Schlagerina subcircularis* FUCHS 1968.
Holotype, Rhaetian, Hohe Wand.
Coll. no.: GBA 1967/005/0040.
- Fig. 30: *Schmidita hebergelloides* FUCHS 1968.
Holotype, Rhaetian, Hohe Wand.
Coll. no.: GBA 1967/005/0014.
- Fig. 31: *Schmidita inflata* FUCHS 1968.
Holotype, Carnian, Eisenkappel.
Coll. no.: GBA 1967/005/0013.
- Fig. 32: *Austrocolomia cordevolica* OBERHAUSER 1968.
Holotype, Ladinian, Seelandalpe.
Coll. no.: GBA 1967/007/0004.
- Fig. 33: *Austrocolomia rhaetica* OBERHAUSER 1968.
Holotype, Rhaetian, Hohe Wand.
Coll. no.: GBA 1967/007/0002.
- Fig. 34: *Conicospirulina planispiralis* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0134.
- Fig. 35: *Dentalina liassica* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0039.
- Fig. 36: *Hippocrepina rudis* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0003.
- Fig. 37: *Lenticulina (Astaculus) austroalpina* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0078.
- Fig. 38: *Lenticulina (Astaculus) securis* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0085.
- Fig. 39: *Lenticulina (Lenticulina) cicatricosus* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0086.
- Fig. 40: *Lenticulina (Lenticulina) semireticulata* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0087.
- Fig. 41: *Lenticulina (Marginulopsis) noervangi* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0089.
- Figs. 1–10: FUCHS (1967).
Figs. 11–31: FUCHS (1968).
Figs. 32, 33: OBERHAUSER (1968).
Figs. 34–41: FUCHS (1970).

Scale bars 0.1 mm.

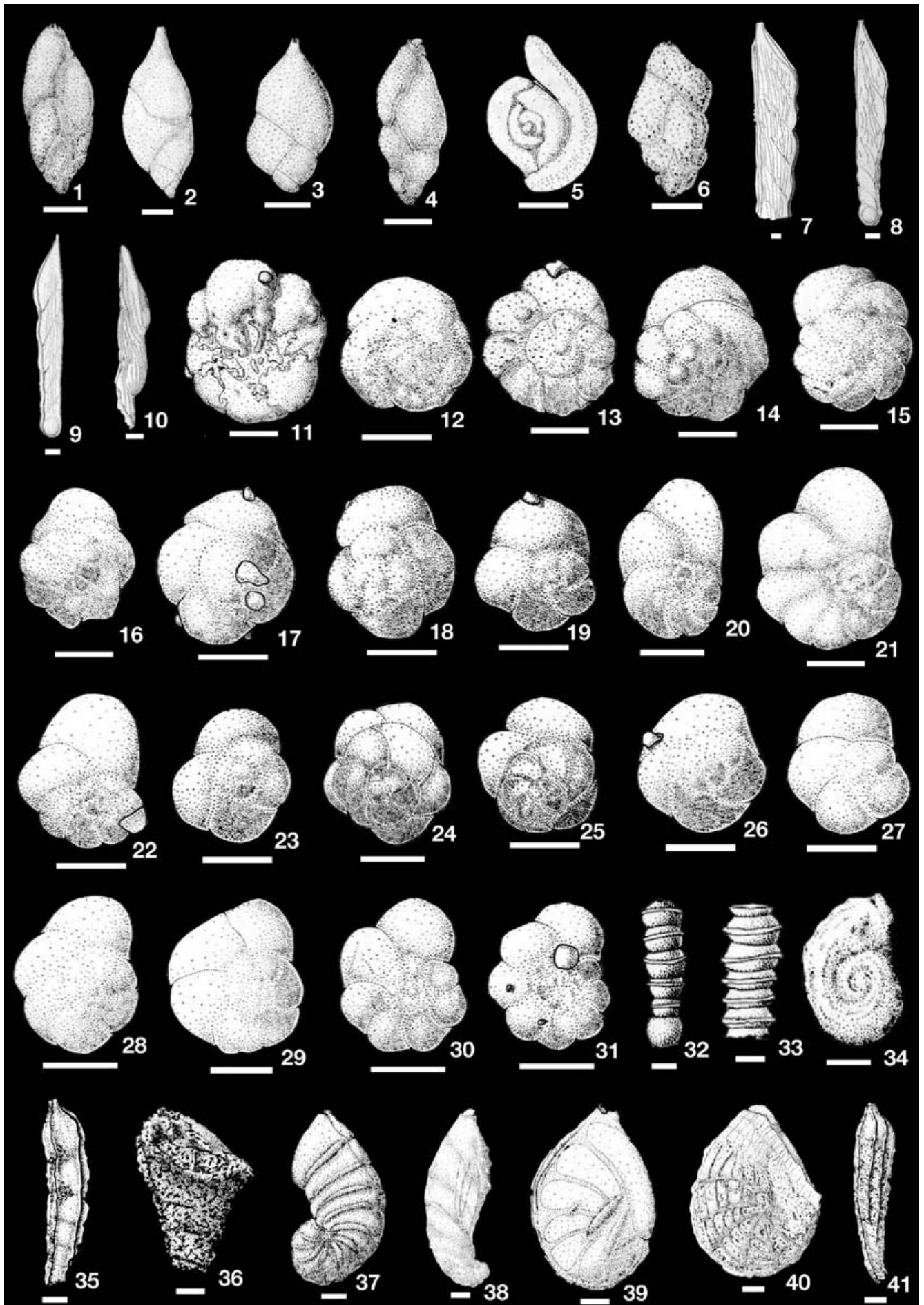


Plate 6

- Fig. 1: *Lenticulina (Planularia) hernsteinensis* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0094.
- Fig. 2: *Lenticulina (Vaginulinopsis) barnardi* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0099.
- Fig. 3: *Marginulina pseudolamellosa* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0104.
- Fig. 4: *Oberhauserella crassa* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0130.
- Fig. 5: *Oberhauserella planiconvexa* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0131.
- Fig. 6: *Ophthalmidium minutum* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0013.
- Fig. 7: *Orthovertella semiinvoluta* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0011.
- Fig. 8: *Palmula demissa* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0106.
- Fig. 9: *Planiiinvoluta rotunda* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0012.
- Fig. 10: *Pseudonodosaria pumila* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0010.
- Fig. 11: *Schlagenerina orbis* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0132.
- Fig. 12: *Sieberina sagitta* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0116.
- Fig. 13: *Sieberina virgata* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0117.
- Fig. 14: *Sigmomorphina guttula* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0128.
- Fig. 15: *Usbekistania globosa* FUCHS 1970.
Holotype, lower Liassic, Hernstein.
Coll. no.: GBA 1970/003/0006.
- Fig. 16: *Uvigerina grilli* SCHMID 1971.
Holotype, Badenian, Sooss.
Coll. no.: GBA 1971/001/0001.
- Fig. 17: *Adercotryma fossilis* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0017.
- Fig. 18: *Amphicoryna infracretacea* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0059.
- Fig. 19: *Arenobulimina lepida* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0038.
- Fig. 20: *Buccicrenata tuberosa* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0022.
- Fig. 21: *Cassidella alpina* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0210.
- Fig. 22: *Ceratolamarckina austroalpina* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0225.
- Fig. 23: *Ceratolamarckina obesa* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0226.
- Fig. 24: *Conorboides conula* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0227.
- Fig. 25: *Conorboides glabra* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0229.
- Fig. 26: *Conorboides ornata* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0232.
- Fig. 27: *Dentalina fibula* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0071.
- Fig. 28: *Eoguttulina levis* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0154.
- Fig. 29: *Eoguttulina pusilla* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0155.
- Fig. 30: *Eouvigerina austriaca* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0175.
- Fig. 31: *Gaudryina intercedens* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0030.
- Fig. 32: *Glandulopleurostomella imperfecta* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0156.
- Fig. 33: *Globigerinelloides primitivus* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0200.
- Fig. 34: *Goesella procera* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0042.
- Fig. 35: *Guembelitra coniungens* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0182.
- Fig. 36: *Hedbergella pseudoplanispiralis* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0191.
- Fig. 37: *Hedbergella ranzenbergensis* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0192.
- Fig. 38: *Hedbergella velata* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0193.
- Fig. 39: *Hedbergella ventricosa* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0194.
- Fig. 40: *Heterohelix hohenemsensis* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0204.
- Fig. 41: *Heterohelix trochospiralis* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0206.
- Fig. 42: *Iuliusina grata* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0186.
- Figs. 1–15: FUCHS (1970).
Fig. 16: SCHMID (1971).
Figs. 17–42: FUCHS (1971).
Scale bars 0.1 mm.

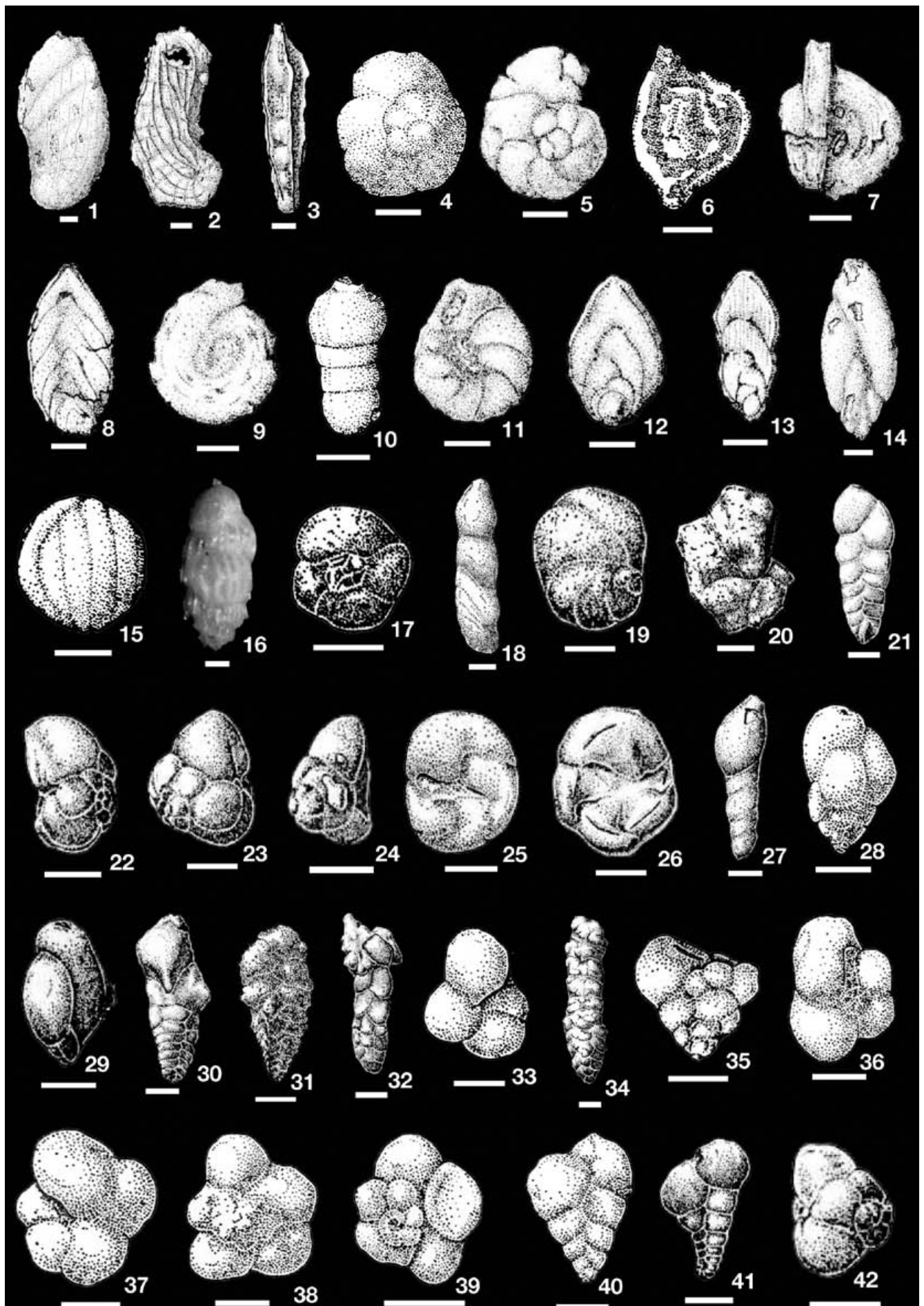
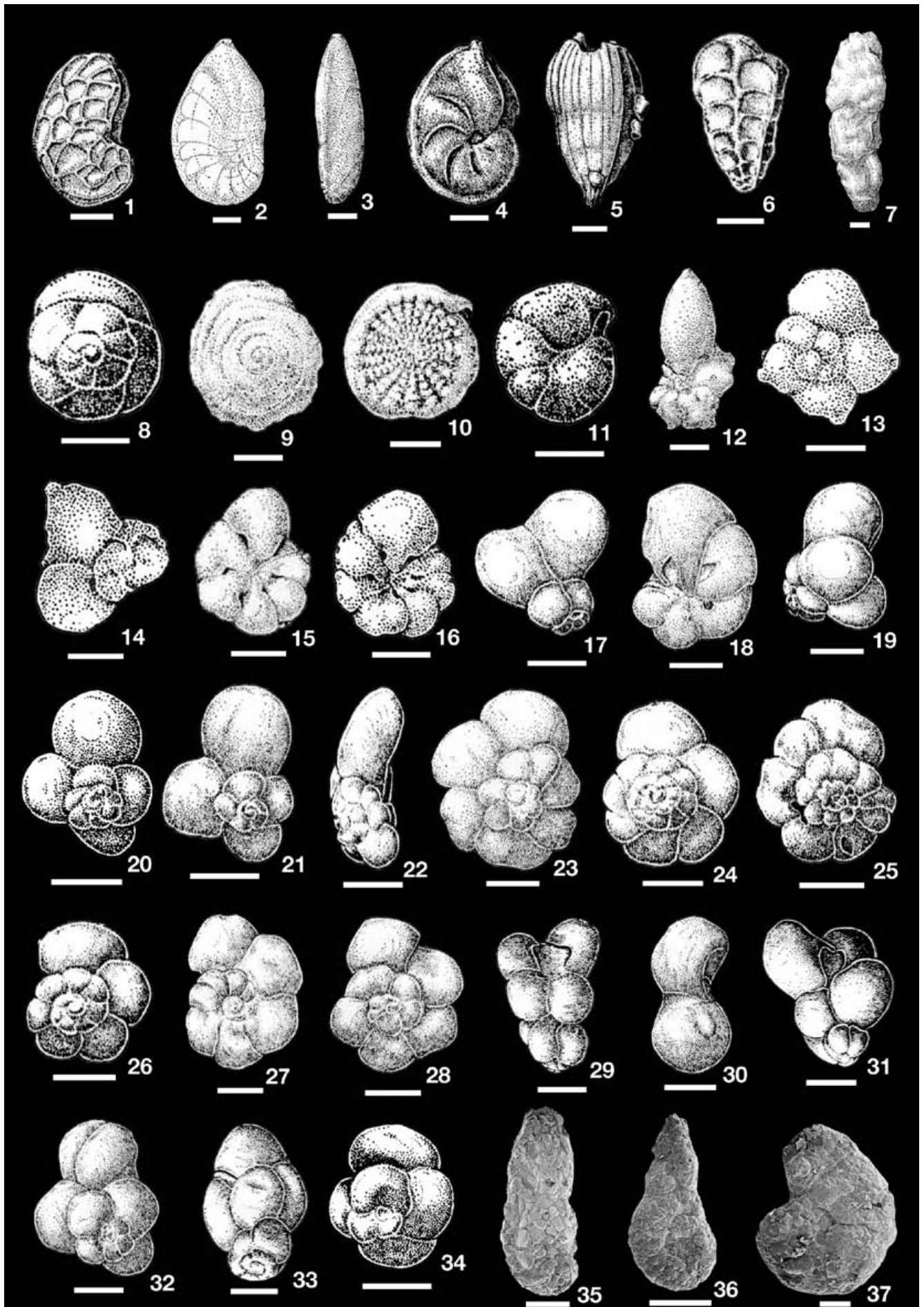


Plate 7

- Fig. 1: *Lenticulina (Astaculus) alemannia* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0087.
- Fig. 2: *Lenticulina (Astaculus) soluta* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0096.
- Fig. 3: *Lenticulina (Astaculus) telum* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0097.
- Fig. 4: *Lenticulina (Lenticulina) pseudoatheria* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0101.
- Fig. 5: *Lingulina aculeata* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0142.
- Fig. 6: *Loxostomum incredibile* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0212.
- Fig. 7: *Nodophthalmidium vastum* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0048.
- Fig. 8: *Oberhauserina barremiana* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0233.
- Fig. 9: *Paalzowella infractetacea* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0213.
- Fig. 10: *Planispirillina ranzenbergensis* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0178.
- Fig. 11: *Recurvoides exiguus* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0018.
- Fig. 12: *Schackoina armata* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0201.
- Fig. 13: *Schackoina francogallicorum* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0202.
- Fig. 14: *Schackoina trifolia* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0203.
- Fig. 15: *Ticinella austriaca* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0207.
- Fig. 16: *Ticinella vorarlbergensis* FUCHS 1971.
Holotype, middle Barremian, Ranzenberg.
Coll. no.: GBA 1971/003/0209.
- Fig. 17: *Eoheterohelix prima* FUCHS 1973.
Holotype, Oxfordian, Wiek.
Coll. no.: GBA 1973/003/0016.
- Fig. 18: *Eoceratobulimina iucunda* FUCHS 1973.
Holotype, Callovian, Wiek.
Coll. no.: GBA 1973/003/0022.
- Fig. 19: *Globuligerina frequens* FUCHS 1973.
Holotype, Oxfordian, Wiek.
Coll. no.: GBA 1973/003/0018.
- Fig. 20: *Globuligerina parva* FUCHS 1973.
Holotype, Oxfordian, Wiek.
Coll. no.: GBA 1973/003/0020.
- Fig. 21: *Globuligerina umbilicata* FUCHS 1973.
Holotype, Callovian, Wiek.
Coll. no.: GBA 1973/003/0021.
- Fig. 22: *Jurassorotalia curva* FUCHS 1973.
Holotype, Oxfordian, Wiek.
Coll. no.: GBA 1973/003/0031.
- Fig. 23: *Jurassorotalia grandis* FUCHS 1973.
Holotype, Callovian, Wiek.
Coll. no.: GBA 1973/003/0032.
- Fig. 24: *Jurassorotalia multispiralis* FUCHS 1973.
Holotype, Oxfordian, Wiek.
Coll. no.: GBA 1973/003/0033.
- Fig. 25: *Mariannenina multiloculata* FUCHS 1973.
Holotype, Callovian, Wiek.
Coll. no.: GBA 1973/003/0026.
- Fig. 26: *Mariannenina nitida* FUCHS 1973.
Holotype, Oxfordian, Wiek.
Coll. no.: GBA 1973/003/0027.
- Fig. 27: *Mariannenina pseudoplanispiralis* FUCHS 1973.
Holotype, Callovian, Wiek.
Coll. no.: GBA 1973/003/0029.
- Fig. 28: *Mariannenina pulchra* FUCHS 1973.
Holotype, Callovian, Wiek.
Coll. no.: GBA 1973/003/0030.
- Fig. 29: *Poliskanella altispira* FUCHS 1973.
Holotype, Callovian, Wiek.
Coll. no.: GBA 1973/003/0004.
- Fig. 30: *Poliskanella bisphaerica* FUCHS 1973.
Holotype, Oxfordian, Wiek.
Coll. no.: GBA 1973/003/0005.
- Fig. 31: *Poliskanella megastoma* FUCHS 1973.
Holotype, Oxfordian, Wiek.
Coll. no.: GBA 1973/003/0006.
- Fig. 32: *Tectoglobuligerina calloviana* FUCHS 1973.
Holotype, Callovian, Wiek.
Coll. no.: GBA 1973/003/0009.
- Fig. 33: *Woletzina cylindrica* FUCHS 1973.
Holotype, Callovian, Wiek.
Coll. no.: GBA 1973/003/0010.
- Fig. 34: *Woletzina irregularis* FUCHS 1973.
Holotype, Callovian, Wiek.
Coll. no.: GBA 1973/003/0013.
- Fig. 35: *Ammotium liruensis* GEBHARDT 1998.
Holotype, lower Maastrichtian, Leru-Okigwe.
Coll. no.: GBA 2007/146/0001/09.
- Fig. 36: *Ammobaculoides parvus* GEBHARDT 1998.
Holotype, lower Maastrichtian, Leru-Okigwe.
Coll. no.: GBA 2007/146/0001/01.
- Fig. 37: *Haplophragmoides pettersi* GEBHARDT 1998.
Holotype, lower Maastrichtian, Leru-Okigwe.
Coll. no.: GBA 2007/146/0001/06.

Figs. 1–16: FUCHS (1971).
Figs. 17–34: FUCHS (1973).
Figs. 35–37: GEBHARDT (1998).

Scale bars 0.1 mm.



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