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On the evolution of *excelsa*-stock in the Upper Ladinian — Carnian (Conodonta, genus *Gondolella*, Triassic)

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6 plates, 1 fig.

Abstract

The evolution of *excelsa*-stock went on in two directions in the Upper Ladinian — Carnian. At the beginning of the Longobardian substage *Gondolella foliata inclinata* n. subsp. evolved from *G. excelsa*. In the Upper Longobardian it branched in two directions: one is the *G. foliata foliata* — *G. tadpole* line, the other is the *G. polygnathiformis* line, which continued in the Norian *G. navicula* group. *Gondolella noah* (Hayashi, 1968) is regarded as a junior synonym of *Gondolella polygnathiformis* Budurov & Stefanov, 1965. Furthermore three new species, *Gondolella szabói* n. sp., *Gondolella tornaënsis* n. sp. and *Metapolygnathus longobardicus* n. sp. are described.

During the common revision of Middle and Upper Triassic conodonts (Budapest, Nov. 19—24, 1979) the majority of the Triassic Conodont Working Group regarded *Gondolella polygnathiformis* BUDUROV & STEFANOV, 1965 and *Gondolella noah* (HAYASHI, 1968) as distinct species (Triassic Conodont Working Group, in press). However, the author has a different opinion, which he would like to express here in details.

This alternate opinion is based on the study of the evolution of *excelsa*-stock in different North Hungarian Upper Ladinian — Carnian sections (KOVÁCS, 1977b; BALOGH & KOVÁCS, 1981). This study has revealed that *Gondolella foliata* (BUDUROV, 1975) is not only an intermediate species between *G. excelsa* MOSHER, 1968 and *G. polygnathiformis* BUDUROV & STEFANOV, 1965 (KOVÁCS, 1977a), but divides itself in two subspecies, and *G. foliata* sensu stricto did not directly evolve from *G. excelsa*. At the beginning of the Longobardian substage more or less arched forms of *G. foliata* evolved from *G. excelsa*; these are named here as *G. foliata inclinata* n. subsp. They differ from the holotype of *G. foliata*, which has a quite straight basal edge before the place of the pit in lateral view. In the upper part of the Longobardian (just after the disappearance of *G. excelsa*; see BALOGH & KOVÁCS, 1981, Table) *G. foliata foliata* evolved from *G. foliata inclinata*, and in its topmost part *G. polygnathiformis***). So, *G. foliata inclinata* branches in two directions: one branch goes to *G. tadpole* Hayashi, 1968 (through *G. foliata foliata*), and the other, through *G. polygnathiformis*, to the Norian *G. navicula*-group. These Longobardian — Carnian evolutionary lines are shown on Fig. 1.

The figured forms are deposited at the museum of the Hungarian Geological Institute, Budapest.

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**) According to Dr. KRYSŤYN's results, the appearance of *G. polygnathiformis* indicates the beginning of the Carnian stage (pers. comm. and in the present volume).

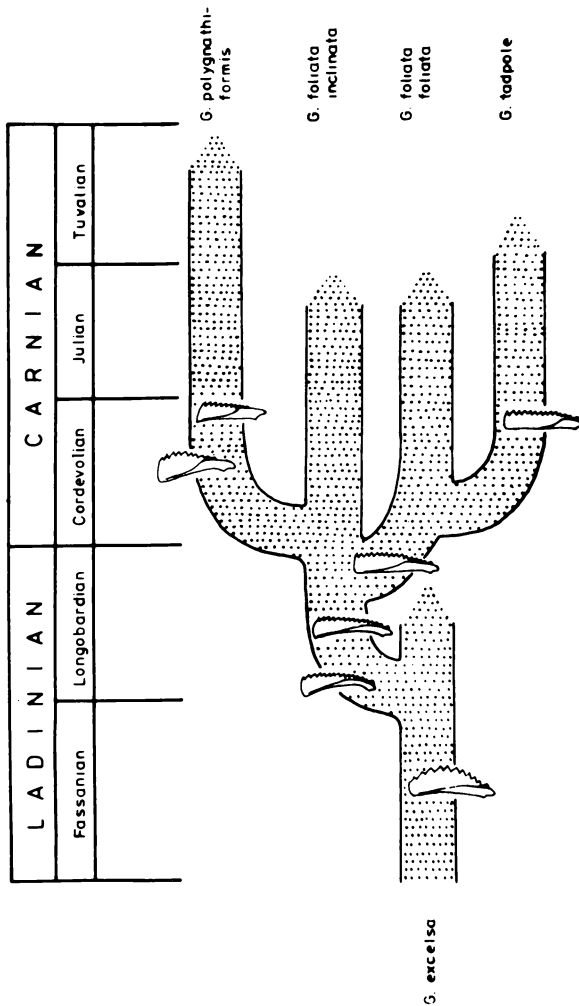


Fig. 1: Evolutionary lines of the *Gondolella excelsa*-stock in the Ladinian — Carnian. Note: According to Dr. KRYSZTYN, the appearance of *G. polygnathiformis* coincides with the Ladinian/Carnian boundary (see this volume).

Description of species

Gondolella foliata foliata (BUDUROV, 1975)

Pl. 2, figs. 1—2; pl. 3, fig. 1

- 1958 *Gondolella navicula* sp. n. — HUCKRIEDE, pl. 12, figs. 2, ?18a—b, ?20a—b, 24a—b, 27a—b
- 1975 *Paragondolella foliata* sp. n. — BUDUROV, p. 79—81, pl. 1, figs. 2, ?9—10, ?11—12, 14, ?15, 16, 19—22

1976a *Paragondolella foliata* BUDUROV — BUDUROV, pl. 4, figs. 1—4

1976b *Paragondolella foliata* BUDUROV — BUDUROV, pl. 2, figs. 18, 35

Diagnosis: Basal edge straight before pit. Denticles of carina stand perpendicularly or almost perpendicularly to basal edge.

Description: The unit is practically straight and elongated in lateral view. The basal edge before the place of the pit is quite straight, only the short posterior part at the pit (e. g. the loop) is inclined slightly downwards together with the posterior part of the platform.

The platform is developed in full width with thickened margins and honeycomb structure only in the posterior third — half of the unit. At the anterior end of the thickened margins it abruptly becomes thin and narrowing into a lanceolated anterior platform end, which is always before the half of the carina. Platform margins at that point drop downwards, but without an abrupt step. The posterior platform end is blunted or squared off.

The carina is fairly high and long, consists mostly of 15—20 fused denticles. In the anterior two-thirds it decreases only slightly in height, then drops towards the posterior 1—2, discrete, conical, denticles, which are always situated before the platform end. Often an asymmetrically located denticle is present at the posterior end of the carina, or even the cusp itself is asymmetrically located. The tips of denticles tend to form a straight line in the anterior two-thirds of the carina. The denticles stand perpendicularly or almost perpendicularly to the basal edge.

The keel is slightly elevated, with deeply excavated groove and widens posteriorly in a rounded or squared off loop, depending on the shape of the platform end. The pit is located at the end, rounded or ovaloid. Its margin is not or only slightly protruding.

Juvenile forms are also straight in lateral view. The platform usually begins to develop as a “tadpole-like” process around the posterior third of the unit and only later expands anteriorly.

Relations: *G. foliata foliata* developed from *G. foliata inclinata* n. subsp. in the upper Longobardian. It differs from its forerunner by being practically straight in lateral view, having a quite straight basal edge before the place of the pit and the denticles of the carina, which stand perpendicularly or nearly perpendicularly to the basal edge*). Furthermore, the upper edge of the carina is very often straight in the anterior two-thirds, the platform usually more abruptly tapers off anteriorly by ceasing of the thickened margins with honeycomb structure and the platform end (together with the loop) is also very often squared off.

G. foliata foliata is bound together with *G. tadpole* HAYASHI, 1968 by a series of transitional forms. In these forms the thin and narrowing (“rudimentary”) continuation of the platform before its thickened margins tends to withdraw. The boundary between them is established so that all forms with a free blade, shorter than half of the carina, belong still to *G. foliata foliata*.

This subspecies differs from the Norian *G. navicula* (HUCKRIEDE) by its platform, which is developed in full width with thickened margins and honeycomb-

*) In transitional forms between *G. foliata inclinata* and *G. foliata foliata* the anteriormost part of the basal edge can be gently downwards inclined; however, if the denticles stand at the right angle to the most part of the basal edge, they should already be placed in *G. foliata foliata*.

like structure only in the posterior third — half of the unit and its carina, which is usually higher in the middle.

Remarks: Differences between *G. foliata inclinata* and *G. foliata foliata* on the one hand and between *G. foliata foliata* and *G. tadpole* on the other are not more than on the level of subspecies. However, *G. tadpole* HAYASHI, 1968 has the priority against *G. foliata* (BUDUROV, 1975) and the difference between *G. foliata inclinata* and *G. tadpole* are so much, that it is impossible to regard the former as a subspecies of the latter. For this reason *G. tadpole* is treated here as a distinct species from *G. foliata*.

Stratigraphical range and occurrence: Upper Longobardian — uppermost Julian; disappears somewhat before *Gladigondolella tethydis* (HUCKRIEDE). Until now reported only from Tethyan provinces (except West Mediterranean, sensu KOZUR, 1973).

Gondolella foliata inclinata n. subsp.

Pl. 1, figs. 1—4; pl. 3, figs. 2—4

- 1958 *Gondolella navicula* sp. n. — HUCKRIEDE, pl. 12, figs. 3, 4, 8, 17, 19; 16 and 21 (transitional forms to *G. polygnathiformis*)
- 1960 *Gondolella navicula* HUCKRIEDE — BUDUROV, pl. 1, figs. 21, 22a—c, 24a—d
- 1965 *Gondolella navicula* HUCKRIEDE — BUDUROV & STEFANOV, pl. 2, figs. 8a—b, 9a—b
- 1965 *Gondolella polygnathiformis* sp. nov. — BUDUROV & STEFANOV, pl. 3, figs. 5a—b, 6a—b
- ?1973 *Gondolella polygnathiformis* BUDUROV & STEFANOV — KRYSSTIN, pl. 2, fig. 1
- ?1975 *Gondolella navicula* (HUCKR.) — KRISTAN-TOLLMANN & KRYSSTYN, pl. 1, figs. 1a—b, 4a—b
- 1975 *Gondolella excelsa* (MOSHER) — KRISTAN-TOLLMANN & KRYSSTYN, pl. 3, figs. 7a—b
- 1975 *Paragondolella foliata* sp. n. — BUDUROV, p. 79—81, pl. 1, figs. ?1, 3, 4, 5, 6, 7—8, 13, 17—18
- 1976b *Paragondolella polygnathiformis* (BUDUROV & STEFANOV) — BUDUROV, pl. 2, figs. 12, ?17
- 1977 *Gondolella foliata* (BUDUROV) — KOVÁCS, p. 80, pl. 6, figs. 2a—b, 3a—c
- 1980 *Gondolella foliata* (BUDUROV) — KOVÁCS & KOZUR, pl. 6, figs. 3, 5

Derivatio nominis: because of the more or less arched nature of unit in lateral view
Holotype: Pl. 1, Fig. 3a—d; Gfi 2, Hung. Geol. Inst. T-5538.

Locus typicus: borehole Szólórsárdó-1, southern margin of Silica nappe, North Hungary.

Stratum typicum: Upper Longobardian Nádaska Limestone, sample Sza-1/41, together with *Gondolella foliata foliata* (BUDUROV), *Gladigondolella tethydis* (HUCKRIEDE) and *Metapolygnathus diebeli* (KOZUR).

Diagnosis: Basal edge more or less arched before pit. Denticles of carina in respect to basal edge posteriorly inclined.

Description: The unit is more or less arched in lateral view. The basal edge before the place of the pit is never straight, but always more or less arched, while the short posterior part at the pit (e. g. the loop) is bent downwards.

The platform extends in the whole length of the unit, or only the first one or two denticles may be free. On the contrary, its margins are thickened with

honeycomb structure only in the posterior third or half of the unit, surrounding the end of the carina. In this short part they tend to be parallel. Before it they abruptly become thin, without downward bending, and the platform tapers considerably forward. The thickened margins are upturned, leaving a furrow along both sides of the carina. Platform end is rounded or blunted.

The carina is fairly high in its anterior two-thirds, sometimes its upper edge tends to be straight here. In the posterior third it gradually lowers to a posterior, distinct, stout-conical denticle, which represents the cusp. Often an asymmetrically located denticle is present at the posterior end of the carina, or even the main cusp itself is asymmetrically located. The denticles of the carina are always inclined posteriorly in respect to the basal edge; that is, the angle between the denticles and the basal edge is always less than 90° . The number of denticles is between 15—20 in adult stage.

The "keel" is slightly elevated, widens posteriorly, with deeply excavated groove. The pit is terminally located, rounded or ovaloid. The loop is also rounded or, depending on the shape of the platform end, blunted posteriorly.

The platform develops in full length and with thickened margins in its posterior third-half already in a fairly early ontogenetic stage (Pl. 3, figs. 2a—b). During further ontogeny the width/length ratio of the platform does not change considerably, only the carina grows in length by the increasing number of the denticles. The arching in lateral view is more prominent in earlier ontogenetic stages, though in mature stage, both gently and strongly arched forms occur too.

Relations: *G. excelsa* (MOSHER, 1968), the forerunner of *G. foliata inclinata*, differs above all by its platform which has a flat appearance, does not become abruptly thin before the thickened margins (which are never upturned so that the furrows along the carina are not present); furthermore, *G. foliata inclinata* is more slender and elongated.

G. polygnathiformis BUDUROV & STEFANOV, 1965 evolved from *G. foliata inclinata* in a transitional series and is distinguished by the abrupt falling downwards of the platform in lateral view at the end of its thickened margin with honeycomb structure (thus producing a characteristic step) and the shorter carina, which is generally higher in its anterior part.

G. foliata foliata (BUDUROV, 1975) differs by its basal edge, which is quite straight before the pit, and the denticles of its carina, which stand perpendicularly (or almost perpendicularly) to the basal edge. Furthermore, the downward bending of the posterior part of the basal edge at the pit (e. g. at the loop) is not as strong as in *G. foliata inclinata*.

There are also differences between the two subspecies in the appearance of platform in early ontogenetic stage. Juvenile forms of *G. foliata inclinata* are also arched in lateral view and the platform usually begins to develop as a swelling along both sides of the carina. It becomes widest at two-thirds of the unit, but extending almost in the whole length of that. Juvenile forms of *G. foliata foliata* are also straight in lateral view (only the posterior part is a little downward bent) and the platform usually begins to develop as a "tadpole"-like process around the posterior third of the unit and expands anteriorly only later. However, these differences are not always clearly recognizable.

The holotype of *G. murtitchiensis* (GEDIK, 1977, pl. 3, fig. 2) has a platform with parallel margins to its anterior third.

Stratigraphical range and occurrence: Basis of Langobardian — Upper Julian

(in our material it disappears a little before *Gladigondolella tethydis*); Tethyan provinces (except West Mediterranean, sensu KOZUR, 1973) and North America.

Gondolella polygnathiformis BUDUROV & STEFANOV, 1965

Pl. 2, figs. 5—6

- 1958 *Gondolella navicula* n. sp. — HUCKRIEDE, pl. 12, fig. 15
1965 *Gondolella polygnathiformis* sp. nov. — BUDUROV & STEFANOV, p. 118—119, pl. 3, only figs. 7a—b
1968 *Metapolygnathus noah* gen. et sp. nov. — HAYASHI, p. 72, pl. 3, figs. 10a—c
1968 *Paragondolella polygnathiformis* (BUDUROV & STEFANOV) — MOSHER, pl. 118, only fig. 14
1970 *Neogondolella palata* n. sp. — BENDER, p. 519—520, pl. 4, only figs. 6, 7
1972 *Gondolella polygnathiformis* BUDUROV & STEFANOV — KOZUR, pl. 3, figs. 3—5
1973 *Gondolella polygnathiformis* BUDUROV & STEFANOV — KRYSZYN, only pl. 3, figs. 1a—c
1973 *Metapolygnathus polygnathiformis* (BUDUROV & STEFANOV) — MOSHER, pl. 20, figs. 7, 12
1975 *Gondolella polygnathiformis* BUDUROV & STEFANOV — KRISTAN-TOLLMANN & KRYSZYN, pl. 1, figs. 5a—b
1976a *Paragondolella polygnathiformis* (BUDUROV & STEFANOV) — BUDUROV, pl. 5, figs. 3—4
1976b *Paragondolella polygnathiformis* (BUDUROV & STEFANOV) — BUDUROV, pl. 2, figs. 14, 15—16; pl. 5, figs. 1—4
1977 *Gondolella polygnathiformis* BUDUROV & STEFANOV — KOVÁCS, pl. 6, figs. 4a—b
1980 *Gondolella noah* (HAYASHI) — KOVÁCS & KOZUR, pl. 10, figs. 1—3

Remarks: *G. polygnathiformis* emend., the forerunner of the Uppermost Carnian — Norian *Metapolygnathus* species (KOZUR, 1972), is distinguished from all other Middle and Upper Triassic *Gondolella* (except *G. tadpole*) by the presence of an abrupt step of the platform in lateral view, where it begins to drop downward. From the type series figured by BUDUROV & STEFANOV, 1965 on their pl. 3 the identity of all forms with the holotype is at least questionable (but we must be aware of the fact, that in that time it was the third Middle and Upper Triassic *Gondolella* species established). So, the specimens figured by figs. 5 and 6 belong quite sure to *G. foliata inclinata* and those on figs. 3 and 4 may also be *G. foliata*. The holotype has only a gently arched basal edge and the most part of the upper edge of its carina is straight, but the downward stepping of the platform in lateral view is clear. The denticles of its carina are inclined posteriorly with respect to its basal edge. The holotype of “*Metapolygnathus*” *noah* (HAYASHI, 1968, pl. 3, fig. 10) is more strongly arched in lateral view and has a higher anterior carina (because its anterior part is more downward inclined), otherwise not significantly different. But also in the forerunner, *G. foliata inclinata*, both strongly and gently arched forms are present, that is, the scale of arching or bending in lateral view is only a matter of intraspecific variation. Consequently, these two morphotypes cannot be separated from each other and “*Metapolygnathus*” *noah* HAYASHI, 1968 must be considered as junior synonym of *Gondolella polygnathiformis* BUDUROV & STEFANOV,

1965. The holotype*) itself is a primitive form, still near to *G. foliata inclinata*. Higher up in the Carnian less arched or bent forms (which are rare already at the beginning) become rarer and rarer, being the phylogenetical trend toward the characteristic *Metapolygnathus*-bending of the unit and -outline of the carina.

Stratigraphical range and occurrence: Uppermost Ladinian — Carnian; world-wide. (Note: According to Dr. KRYSZYN, the appearance of this species marks the basis of Carnian; see this volume.)

Gondolella tadpole HAYASHI, 1968

Pl. 2, figs. 3—4

- 1958 *Gondolella navicula* sp. n. — HUCKRIEDE, pl. 12, figs. 22a—c
1968 *Gondolella tadpole* sp. nov. — HAYASHI, p. 71, pl. 1, figs. 6a—b
1972 *Gondolella tadpole* HAYASHI — KOZUR, pl. 3, figs. 7, 8a—c
1980 *Gondolella tadpole* HAYASHI — KOVÁCS & KOZUR, pl. 9, figs. 4a—c, 5

Remarks: *G. tadpole* is the end-form of the *G. foliata foliata* — *G. tadpole* line. For differences between them see "Relations" at *G. foliata foliata*. Except the short platform (at least half of the carina is free), *G. tadpole* has the same characteristics as *G. foliata foliata*: the unit is straight, the basal edge is quite straight before the place of the pit and its short posterior part at the pit (e. g. the loop) is only gently downward inclined. Denticles of carina stand perpendicularly to the basal edge. Typical forms have a peculiar "tadpole"-shaped platform (see pl. 2, fig. 4 and KOVÁCS & KOZUR, 1980, pl. 9, figs. 4a—c and 5). Forms with transitional character from *G. foliata foliata* have still a somewhat longer platform (but without a rudimentary continuation before the half of the carina), with parallel margins and squared off platform end (pl. 2, figs. 3a—b).

Stratigraphical range and occurrence: Cordevolian — Lower Tuvalian; reported until now only from Tethyan provinces (except West Mediterranean, sensu KOZUR, 1973).

Gondolella tornaënsis n. sp.

Pl. 5, figs. 1—4, pl. 6, figs. 3a—c

- 1958 *Gondolella navicula* n. sp. — HUCKRIEDE, pl. 11, fig. 19

Derivatio nominis: After Gömör-Torna Karst (former name of Slovak and Aggtelek Karst).

Holotype: Pl. 5, figs. 1a—d; Gto 1, Hung. Geol. Inst. T-5555.

Locus typicus: Eastern end of Alsóhegy-Karstplateau, to the ENE of village Tornanádaska, Aggtelek Karst, North Hungary.

Stratum typicum: Red nodular limestone in the basal part of the Nádaska Limestone Formation, immediately overlying the Steinalm Limestone Formation, section Nr. 8, sample T-355/A; together with the last specimens of *Neospathodus kockeli* and *G. bulgarica*, as well as with *G. bifurcata*, *G. hanbulogi*, *G. excelsa* and *Gladigondolella malayensis budurovi*.

Diagnosis: Platform extends in whole length of unit. Platform end rounded, tends to be flattened. Platform margins thin, slightly upturned, usually with

*) The author is greatly indebted to Dr. K. BUDUROV for having had the possibility to study it twice in 1979: once in Sofia and once in Budapest.

crenulation. Carina high. "Keel" flat, narrow, terminates in medium-sized, ovaloid pit.

Description: Unit is slightly arched in lateral view. Platform extends in the whole length of the unit. Platform margins are thin, slightly upturned, usually with crenulation (but not only in the anterior, tapering third!). Crenulation is generally better developed on one side of the platform. Honeycomb structure is restricted only to the upturned marginal part. Platform end is rounded, tends to be flattened.

Carina is high and of the same height at the posterior third as at the anterior one. Denticles are fused and nearly of the same height, only the first and last 2—3 ones are lower. The last, short denticle is more discrete and surrounded by the platform end.

The "keel" is flat, narrow, with narrow groove, which terminates in a medium-sized, ovaloid pit. Loop is ovaloid, rarely squared, often not developed.

Relations: *G. tornaënsis* developed from forms, which were anywhere between *G. bulgarica*, *G. excelsa* and *G. hanbulogi*. It has characteristic features, apart from the crenulation on the platform margin, of both *G. excelsa* and *G. hanbulogi*. Its high carina and rounded platform end, which tends to be flattened, are clearly of *G. excelsa* type, while the thin, slightly upturned platform margin resembles *G. hanbulogi*.

Remarks: In pelagic, open-sea and deep water environments ("Asiatic" and "Dinaric" faunal provinces, sensu KOZUR, 1973), there was an "explosion" (radiation) in *Gondolella*-development in the upper or uppermost part of the Pelsonian substage, with numerous deadlocks and transitional forms in many directions. All branches of development came from a common ancestor, *G. bulgarica*. *G. tornaënsis* represents one of these branches, a very peculiar one, which differs from all others by its generally crenulated platform margins.

Stratigraphical range and occurrence: Uppermost Pelsonian — lowermost Illyrian; "Dinaric" and "Asiatic" (?) provinces.

Gondolella szabói n. sp.

Pl. 4, figs. 1—4

Derivatio nominis: In honour of Dr. Imre SZABÓ, who provided samples from the Balaton Highland to the author.

Holotype: Pl. 4, figs. 1 a—d; Gsz-1, Hung. Geol. Inst. T-5551.

Locus typicus: Pécsely, Balaton Highland, Hungary.

Stratum typicum: Lower Fassanian (sensu SZABÓ et al., 1980) purplish red calcarenite, alternating with green tuffs (Buchenstein Group). Sample SzI-3, rock material encompassing a "*Protrachyceras*" *reitzei* (BOECKH) specimen found in pit No. 17. Other important conodonts from the sample: *Gondolella excelsa* (MOSHER), *G. pseudolonga* MIETTO, KOVÁCS & KOZUR, *G. trammeri* n. subsp. and *Gladigondolella tethydis* (HUCKRIEDE).

Diagnosis: Unit arched in lateral view. Platform narrow, with strongly upturned margins, which are parallel in the posterior half of the unit. Carina high in the anterior two-thirds, with strongly fused denticles. Its anterior third may be free. Pit terminal, ovaloid, with protruding margins.

Description: Unit arched in lateral view. Platform narrow, with strongly upturned margins, producing deep furrows along the carina. Platform end narrowly rounded, always surrounds the posterior denticle. Platform margins parallel in the posterior half and tapering anteriorly. Anterior third of carina may be free.

Carina is high in its anterior two-thirds (here the denticles are of nearly equal height), then rapidly lowers. It consists mostly of 12—16 fused denticles. The posterior two ones are usually discrete, but no prominent cusp is present.

“Keel” is narrow in submatured stage, but widened out in matured stage. Basal groove is also narrow, but deeply excavated and terminates in a narrow, elongated, ovaloid pit with protruding margins. Loop is small, ovaloid, according to the shape of the pit.

Relations: *G. szabói* is distinguished from the other Middle Triassic *Gondolella* species having a high carina (*G. bulgarica*, *G. hanbulogi*, *G. excelsa*, *G. tornaënsis*), by its narrow platform and strongly upturned platform margins, as well as its narrow, elongated pit.

In North Hungary in the Illyrian and lower Fassinian part of the Nádaska Limestone Formation such forms are known, which are very similar in outline. But they have still an *excelsa*-type pit (they are named in BALOGH & KOVÁCS, 1981, Table 1, as “*Gondolella* n. sp. C”). At present it is not clear, whether they represent an extreme morphotype of *G. excelsa* or primitive forms of *G. szabói*, but they are most probably the forerunners of this new species. It seems also very likely, that *G. trammeri* KOZUR evolved from *G. szabói* through *G. trammeri* n. subsp.; this opinion is supported by the shape of the “keel” and pit.

Stratigraphical range and occurrence: Lower half of the reitzi-Zone (*Kellnerites*-fauna); at present known only from the locus typicus*).

Metapolygnathus longobardicus n. sp.

Pl. 6, figs. 1 a—d

Derivatio nominis: With regard to the stratigraphical position.

Holotype: Pl. 6, figs. 1 a—d; Mko 1, Hung. Geol. Inst. T-5559.

Locus typicus: Borehole Szólsárdó-1, southern margin of Silica nappe, North Hungary.

Stratum typicum: Upper Longobardian Nádaska limestone, sample Sza-1/44, together with *Gondolella foliata inclinata*, *Gladigondolella tethydis* and *Metapolygnathus mungoensis*; in the next sample just below it also *M. mostleri* is present (see BALOGH & KOVÁCS, 1981).

Diagnosis: Unit subsymmetrical. Platform present in the posterior two-thirds, abruptly ceases anteriorly. Platform margins tend to be parallel. Posterior platform end broadly, bluntly pointed. Marginal denticles continue in ridges towards the carina. Pit small, located in the centre of the platform. “Keel” moderately wide, only slightly elevated, continues far behind the pit.

Description: Unit is subsymmetrical in upper and lower view. Platform extends in the posterior two-thirds of the unit and abruptly ceases anteriorly. Platform margins tend to be parallel. Posterior platform end is broadly, bluntly pointed. Marginal denticles are upward directed and continue in lowering ridges towards the carina. Posterior part of the platform is without marginal nodes, but covered with honeycomb structure.

Carina consists of 6—8 fused denticles, highest in the anterior part, gradually decreases in height toward a posterior, discrete, small denticle, located far before

* Dr. KRYSZYN has kindly shown me a sample from the upper trinodosus-Zone of Gross Reifling (Salzakapelle, trinodosus-locality of Assereto, 1971), in which this form is also present.

the platform end. The carina continues behind it to the posterior end of the platform as a very low ridge.

“Keel” is moderately wide, widest at the pit and continues far behind that. Pit is small, elongated, located about in the centre of the platform.

Relations: *M. longobardicus* differs from *M. mostleri* (KOZUR), from which it most probably developed, by its parallel or subparallel platform margins and broadly, bluntly pointed, even platform end, as well as by the marginal denticles, which grow in the direction of the platform margin and do not continue in ridges towards the carina in the latter species.

Stratigraphical range and occurrence: Upper Longobardian —? Cordevolian; “Dinaric” and “Asiatic” (?) faunal provinces sensu KOZUR, 1973.

Explanation of plates*)

Plate I*)

Figs. 1—4: *Gondolella foliata inclinata* n. subsp.

1 a—d: Form with transitional features from *G. excelsa*. Borehole Szólsardó-1, sample N. 41. Upper Longobardian. Gfi 4, MÁFI T-5536.

2 a—d: Borehole Szólsardó-1, sample N. 20. Upper Julian. Gfi 1, MÁFI T-5537.

3 a—d: Holotype. Borehole Szólsardó-1, sample N. 41. Upper Longobardian. Gfi 2, MÁFI T-5538.

4 a—d: Borehole Szólsardó-1, sample N. 56. Lower Longobardian. Gfi 5, MÁFI T-5539.

All magnifications 66 ×

Plate II*)

Figs. 1—2: *Gondolella foliata foliata* (Budurov).

1 a—c: Somewhat extreme form with strongly downward inclined posterior platform end. Borehole Szólsardó-1, sample N. 41. Upper Longobardian. Gfo 5, MÁFI T-5540.

2 a—d: Borehole Szólsardó-1, sample N. 17. Upper Julian. (Fig. 2a is lengthened, while figs. 2b—d are compressed longitudinally.) Gfo 2, MÁFI T-5541.

Figs. 3—4: *Gondolella tadpole* HAYASHI.

3 a—b: Form with transitional features from *G. foliata foliata*, still with a squared off platform end and subparallel platform margins. Telekes

*) Due to a defect of the scanning electron microscope, part of the pictures are deformed. The following ones are compressed longitudinally, so they are somewhat shorter and broader, than in reality:

Pl. 1, figs. 1—4; pl. 2, figs. 1 a—c, 2 b—c; pl. 3, figs. 1 a—b, 2 a—b, 3 a—c; pl. 4, figs. 2 a—d, 4 a—d; pl. 6, figs. 3 a—b.

The following ones are lengthened, so they are somewhat longer and narrower, than in reality: Pl. 2, fig. 2 a; pl. 3, fig. 1 c; pl. 6, figs. 1 d, 3 c.

valley, side valley N. 6, sample R-10. (Rudabánya Mts.) Julian. Gta 6, MÁFI T-5542.

4: Typical form from the same sample. Gta 5, MÁFI T-5543.

Fig. 5—6: *Gondolella polygnathiformis* BUDUROV & STEFANOV.

5: Western part of Alsóhegy Karstplateau, sample T-436. Lower part of Tuvalian-3. Gpo 2, MÁFI T-5544.

6: Alsóhegy, section N. 3 above village Komjáti, sample Ki-67. Upper part of Tuvalian-2. Gpo 3, MÁFI T-5545.

All magnifications 66 ×

Plate III

Figs. 1 a—c: *Gondolella foliata foliata* (BUDUROV). Borehole Szőlősardó-1, sample N. 39. Upper Longobardian. Gfo 4, MÁFI T-5546. 50 ×.

Figs. 2 a—b: *Gondolella foliata inclinata* n. subsp. Early ontogenetic stage. Eastern end of Alsóhegy, section N. 1, sample T-364. Middle Longobardian. Gfi 6, MÁFI T-5547. 100 ×.

Figs. 3 a—c: Transitional form between *G. foliata inclinata* and *G. polygnathiformis*. Submatured stage. Telekes valley, side valley N. 8, sample R-67. (Rudabánya Mts.) Upper Longobardian. 3 a—b: 75 × 3 c: 105 ×. Gfi-Gpo 1, MÁFI T-5548.

Figs. 4 a—c: Transitional form between *G. foliata inclinata* and *G. polygnathiformis*. Earlier ontogenetic stage. Eastern end of Alsóhegy, section N. 1, sample T-364/a. Upper Longobardian. (Lower part of anterior carina is broken on fig. 4 c.) Gfi-Gpo 2, MÁFI T-5549. 100 ×.

Figs. 5 a—b: *Gladigondolella malayensis budurovi* KOVÁCS & KOZUR. Refigured holotype. Telekes valley, side valley N. 6, sample R-5. (Rudabánya Mts.) Gl mb 5, MÁFI T-5550. 100 ×.

Plate IV

Figs. 1, 3, 4: *Gondolella szabói* n. sp. All specimens are from the same locality: pit Pécsely XVII., Balaton Highland (Hungary), together with "*Protrachyceras*" *reitzei* (Boeckh).

1 a—d: Holotype. Sample SzI-3. Gsz 1, MÁFI T-5551. 100 ×.

2 a—d: *Gondolella trammeri* n. subsp. Sample SzI-2. From the same locality. Gsz 3, MÁFI T-5552. 100 ×.

3 a—d: Sample SzI-3. Gsz 4, MÁFI T-5553. 100 ×.

4 a—d: Adult form. Sample SzI-7. Gsz 5, MÁFI T-5554.

4 a—b: 106 × ; 4 c: 100 × ; 4 d: 90 ×.

Plate V

Figs. 1—3: *Gondolella tornaënsis* n. sp. All specimens are from the same locality and sample: sample T-355/a, eastern end of Alsóhegy Karstplateau, basal part of section N. 8 (North Hungary).

1 a—d: Holotype. Gto 1, MÁFI T-5555.

1 a—c: 100 ×.

1 d: Crenulation of the platform margin. 400 ×.

2 a—c: Gto 2, MÁFI T-5556. 100 ×.

- 3: Lower view of the posterior part of Gto 3, MÁFI T-5557. 200 × .
 Figs. 4 a—c: Transitional form between *Gondolella hanbulogi* (SUDAR & BUDUROV) and *G. tornaënsis* n. sp. From the same locality and sample. Gto 4, MÁFI T-5558. 100 × .

Plate VI

- Figs. 1 a—d: *Metapolygnathus longobardicus* n. sp. Holotype. Borehole Szólsardó-1. sample N. 44. Upper Longobardian. Mko 1, MÁFI T-5559. 100 × .
 Figs. 2 a—d: *Metapolygnathus mostleri* (KOZUR). Borehole Szólsardó-1, sample N. 45. Upper Longobardian. Mmo 8, MÁFI T-5560. 100 × .
 Figs. 3 a—c: *Gondolella tornaënsis* n. sp. Eastern end of Alsóhegy Karstplateau, section N. 8, sample T-355/a. Gto 3, MÁFI T-5561. 100 × .

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1 a

1 b

1 c

1 d



3 a



3 b



3 c



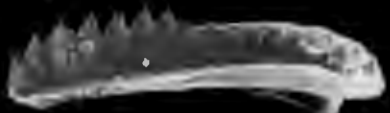
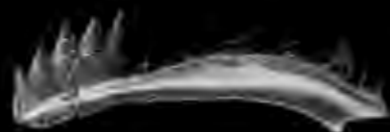
3 d

2 a

2 b

2 c

2 d



4 a

4 b

4 c

4 d



