CONODONT FAUNA FROM THE ROTELLIFORME, MEEKI AND OCCIDENTALIS ZONES (MIDDLE TRIASSIC) OF HUMBOLDT RANGE, NEVADA, WESTERN–NORTH AMERICA

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Riassunto. Viene descritta la fauna a conodonti ritrovata nelle zone a Rotelliforme, Meeki ed Occidentalis e nella parte inferiore della Zona a Subasperum del Nevada (Humboldt Range). Le prime tre zone ad Ammoniti rappresentano, secondo gli autori del Nord America, l'Anisico Superiore, mentre il limite Anisico/Ladinico è posto alla base della Zona a Subasperum. Sono proposti emendamenti e revisioni di tre taxa di conodonti: *Gondolella constricta* Mosher & Clark, *Gondolella mombergensis mombergensis* Tatge e *Gondolella mombergensis longa* (Budurov & Stefanov). Sono discusse le possibili relazioni con faune coeve epicontinentali europee. Sono individuati elementi che suggeriscono di porre il limite Anisico/Ladinico, in base ai conodonti, alla base della Zona ad Occidentalis.

Abstract. The conodont fauna of the Rotelliforme, Meeki, Occidentalis and lower Subasperum zones of Nevada (Humboldt Range) is here described. The first three zones represent, by means of the American authors, the Upper Anisian of North America, while at the base of the Subasperum Zone is located the Anisian/Ladinian boundary. Three species–groups of conodonts have been emended and revised, they are: *Gondolella constricta* Mosher & Clark, *Gondolella mombergensis mombergensis* Tatge and *Gondolella mombergensis longa* (Budurov & Stefanov). Comparisons with the possible coeval faunas of epicontinental sequences from Europe have been discussed. Within the conodont fauna, the main change has been noted at the base of the Occidentalis Zone. On the base of the conodont fauna, the Anisian/Ladinian boundary at the base of the Occidentalis Zone seems to be the most supported in Nevada.

Introduction.

In the present paper the conodont fauna found in the middle part of the Prida Formation where Silberling and Tozer (1968) defined the three standard zones Rotelliforme, Meeki and Occidentalis, is described. These standard zones represent, by the American Authors, the Uppermost Anisian.

The sections here examined have been already studied, on the basis of conodonts, by Mosher and Clark (1965) and Mosher (1968). These two authors

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noted that the conodont association was very monotonous, poorly diversified and almost identical along the three zones and therefore how «conodonts were not evolving as rapidly as the ammonoids» (Mosher & Clark, 1965, p. 555).

One of the present authors (A. N.) had the possibility, in 1972, to collect samples, bed by bed, from the above mentioned ammonoid zones in two sections in the type–locality, under the guidance of Prof. N. Silberling at that time at the Stanford University, Stanford, California.

The taxonomic and biostratigraphic studies on conodonts carried out in the last ten years, essentially by the European Authors, lead actually a better taxonomic subdivision and zonation on the basis of conodonts in the Triassic. Therefore we have reconsidered the Prida Formation material in the tentative to better define the conodont fauna of the Rotelliforme, Meeki and Occidentalis zones.

In the present paper are discussed:

1) the conodont fauna of the three zones;

2) the evolutionary trend of some species;

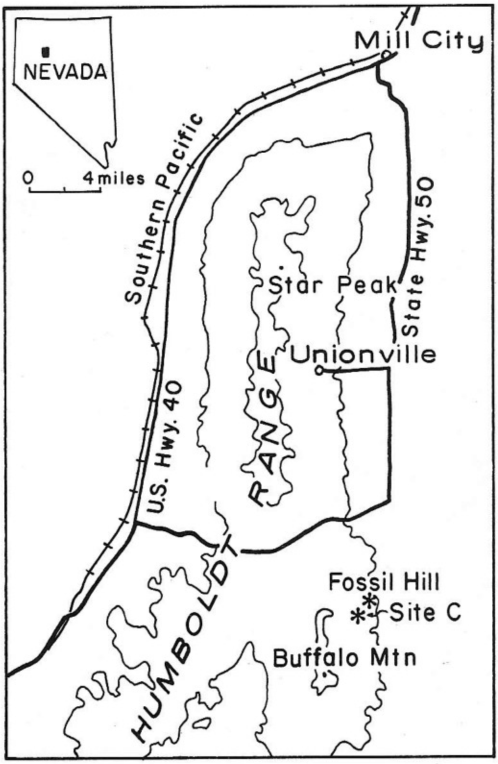
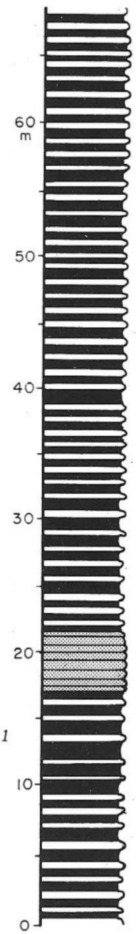


Fig. 1 – Map of the Humboldt Range region (Nevada) and location of the stratigraphic sections (for better details see Silberling & Nichols, 1982, pl. 1).

3) the possible time equivalent faunas of epicontinental sequences of Europe.

Discussion on the ammonoid zones do not deal with this paper.

Fossil Hill - Site A - Humboldt Range (Nevada)



STANDARD ZONES	AMMONOIDS & DAONELLAS	SAMPLES	*Gondolella constricta* juvenile stage	*Gondolella constricta* cornuta morphotype	*Gondolella constricta* balkanica morphotype	*constricta/mombergensis* juvenile stage	*Gondolella mombergensis* juvenile stage	*mombergensis mombergensis*	*mombergensis longa*	*mombergensis* ssp.	*G. pridaensis*	*G. n. sp. A*	*G. excelsa*	*G. aff. trammeri*	Ramiform elements
SUBASPERUM		N62	1				2					2	1		1
		N61													
		N60													
		N59													
		N58	8		1		24		2		11			2	30
		N57					7	1			2				25
		N56	1											1	
		N55	1												5
	D. moussoni	N54					1		2						
OCCIDENTALIS		N53bis													
	A. gabbi = M146#10	N53	1				50	3	5		6	1	3		127
		N52	only fragments												
	A. furlongi = M145#9	N51	3		1		30	18	10			5			72
	N. humboldtensis	N50					139	94	52		7	7	6		263
	#18	N49	5				38	23	24		5	7	5		114
		N48	13	4	1		4	7	5				1		11
MEEKI		N47	3						2	3					8
		N46	7			47		5	2		1				81
		N45	3	1		22		6	1	11		4			44
		N44		11	25	144	2	2			1	1	2		45
	G. meeki = M960#13	N43	10												2
	F. nevadanus = M143#11B#11	N42	24	17	11										10
ROTELLIFORME		N41													
		N40	24	9	4										20
	G. blakei	N39bis	59	13	1										36
		N39	37	13	4										74
	P. cricki = M967#20	N38	154	41	19		9	7			45	1			283
	P. vodgesi	N37	240	31	21		5		3?		18	14			157
	D. americana	N36	5	3	4										5
	P. clarkei = M966	N35	39	29	6						1				49
	P. burckhardti = M965	N34	34	13	9						4				16
		N33	17												4

Fig. 2 — Fossil Hill, Site A section. Numbers near macrofossils species names indicate US Geological Survey's samples and/or Silberling's samples (see pl. 2 in Silberling & Nichols, 1982).

Lithostratigraphy.

The two collected sections belong to the middle part of the Prida Formation which is the lowermost formation of the Star Peak Group (Ferguson et al., 1951; Silberling, 1961, 1962; Mosher & Clark, 1965; Mosher, 1968; Silberling & Wallace, 1967, 1969; Wallace et al., 1969–70; Silberling & Nichols, 1982).

They are located at Fossil Hill, Humboldt Range, Nevada (Fig. 1) and have been selected because they represent the type–locality of the Rotelliforme, Meeki and Occidentalis zones that have been recognized in a unique and uninterrupted succession by Silberling (1961, 1962). The ammonoid fauna was described at first by Smith (1914), subsequently revised by Silberling (1962) and then discussed by Silberling and Tozer (1968), Tozer (1967, 1971, 1974), Silberling and Nichols (1982). The lithologic sequence is illustered in Fig. 2, the sections'location is on map in Fig. 1.

Conodont fauna of the Rotelliforme, Meeki and Occidentalis zones.

General trend.

As already noted by Mosher and Clark (1965), the conodont fauna of the Rotelliforme, Meeki and Occidentalis zones seems to be characterized by an extremely monotonous association with only a few changes (1). The dominant features are: a) the presence of the *constricta* group (see Paleontological Appendix), with a very conspicuous number of specimens especially developed in the Rotelliforme and Meeki zones, but less developed in the upper zones; b) the abundance of specimens belonging to the *mombergensis* group (see Paleontological Appendix) in the Occidentalis and Subasperum zones; this species–group is also present in the lower zones, but with few representatives. Generally, samples from Site C section yielded less conodonts (Fig. 3).

Rotelliforme Zone.

In the Rotelliforme Zone the dominant character is the great abundance of the *constricta* group. In this group, as better explained in the Paleontological Appendix, we include morphotypes that have been attributed to three different species: *Gondolella constricta* Mosher & Clark, *G. cornuta* (Budurov & Stefanov), *G. balkanica* (Budurov & Stefanov). The study of the wide populations of conodonts found in the Prida Fm. material allowed us to relate the above mentioned morphotypes only to *G. constricta*. In the figure of lithostra-

(1) Quantitative analysis on the specimens of the species–groups mentioned did not produce any finer recognition of species in the conodont fauna.

Fossil Hill - Site C - Humboldt Range (Nevada)

MMONOIDS & DAONELLAS	SAMPLES	Gondolella constricta: juvenile stage	G. constricta: cornuta morphotype	G. constricta: balkanica morphotype	constricta/mombergensis juvenile stage	Gondolella mombergensis: juvenile stage	G. mombergensis: mombergensis mombergensis	G. mombergensis: mombergensis longa	G. mombergensis: mombergensis ssp.	G. pridaensis	G. n. sp. A	G. excelsa	G. aff. trammeri	Ramiform elements
otrachyceras=M627#10	N77	1	1	1		64	12	7	16	19	1	1		37
. furlongi = M625#23	N75	10	3			259	129	21	68		6	8		242
. humboldtensis = M622#21	N74	4	3	5		14	10	7	8	2	13	8		151
. dunni = M619#20	N72		4	8					3	1				2
	N67								1					7
617	N71	15	21	19		1			10	1	1	1		48
. nevadanus = M614 / M612	N69/66	3/55	3/51	2/17			/5			/4				5/28
. blakei = M613#19 / M611	N70/65	/11	5/7	1/13						/6				3/20
610	N68	43	40	7		2			6	1				44
vodgesi = M606#14	N64	35	1	5					1		2			29
clarckei	N63	8	1	1						1				6

– Fossil Hill, Site C section. Numbers near macrofossils species names indicate US Geological Survey's samples and/or Silberling's samples (see pl. 3 in Silberling & Nichols, 1982).

tigraphic sections and conodonts' distribution we have taken into account the three different morphotypes that we have listed in the *G. constricta* file. To this group we have also attributed forms that present protruded basal cavity and a small step behind the protruded margin of the pit (see Pl. 8, fig. 5). In this zone are also present since the base *G. pridaensis* Nicora, Kozur & Mietto and *G.* sp. n. *A* which starts from the *Paraceratites vodgesi* beds. These two species are represented by a limited number of specimens. From sample N 37 of Site A section and N 64 of Site C section (*Paraceratites vodgesi* beds) are present, in a very few units, forms that we have attributed to the *mombergensis* group (see Pl. 7, fig. 5).

Meeki Zone.

In the Meeki Zone almost the same species' occurrence has been found. Since the beginning of the zone longer morphotypes of the *constricta* and *mombergensis* groups are present. Changes in some morphologic features have been noted in the *constricta* group. The carina has more isolated denticles at the anterior end while in the middle part is very low and with very fused denticles. From sample N 44 of Site A section the first *G. excelsa* (Mosher) has been found. Towards the upper part of the zone morphotypes belonging to the *mombergensis* group become more frequent (see Fig. 2, 3).

Occidentalis Zone.

Already at the base of the zone the *mombergensis* group is dominant (see Fig. 2, 3) with very long units. The *constricta* group is still present, but with few representatives which are also very long in respect to the specimens from lower zones. Especially the *balkanica* morphotype is very rare.

G. pridaensis, G. sp. n. *A* and *G. excelsa* are present with few representatives.

Subasperum Zone.

Almost the same conodonts' occurrence of the Occidentalis Zone has been noted. In samples N 56 and N 58 of Site A section *Gondolella* aff. *trammeri* Kozur has been found. From this zone Mosher and Clark (1965) figured on their pl. 66, fig. 13 one specimen as «*Polygnathus tethydis*» Huckriede. Such form has not been found by the present authors,but the figured one belongs to the balkanide–stock, to the morphogroup of *Gondolella transita* Kozur & Mostler – *Gondolella bakalovi* (Budurov & Stefanov).

Remarks.

The conodont associations from the possible equivalent time–interval of the Rotelliforme, Meeki and Occidentalis zones are widely known in the epicontinental sequences of Europe (Kozur, 1968a, b, 1974; Budurov & Stefanov, 1972, 1975a, b; Trammer, 1975; Zawidzka, 1975; Budurov, 1979). Unfortunally the European sequences are not so well and continuously controlled by means of the macrofossils as the North–American ones. This caused some discrepances and discussions on their attribution to the Upper Illyrian or Lower Fassanian.

Conclusions.

At present there are three current opinions about the position of the Anisian/Ladinian boundary:

1) at the base of the «*Ceratites*» *reitzi* Zone, established by Böckh, 1873, in the Balaton Highland, Hungary (see Szabò, Kovács et al., 1980). Actually, according to the opinion of many Triassic stratigraphers, this zone should be abandoned and replaced by a lower Parakellnerites and a higher Nevadites zones (cf. Kovács & Kozur, 1980; Krystyn, 1980, pers. comm. and 1983);

2) between the Parakellnerites and Nevadites zones, defined by Krystyn (1983) in the Epidauros section, Greece;

3) between the *Frechites occidentalis* and Subasperum zones of Nevada (Silberling, 1962; Tozer, 1967; Silberling & Tozer, 1968).

In the middle Prida Formation of Nevada, as discussed in details above, the following changes can be recognized in the conodont fauna:

1) rare occurrence of the first representatives of *Gondolella mombergensis* in the *Paraceratites vodgesi* beds of the Rotelliforme Zone (samples N 37 in Site A and N 64 in Site C);

2) turning of juvenile forms from *G. constricta*–type into *G. mombergensis* in the higher part of the Meeki Zone, especially in sample N 44 in Site A, this means that there is a transition between the two morphotypes;

3) predominance of representatives of *G. mombergensis* and occurrence of long morphotypes (*G. mombergensis longa*) in a great number from the base of the Occidentalis Zone.

From these three events, the third one is the most pronounced and is easy to recognize even in samples with only few conodont specimens, on the contrary there is no change in conodonts between the Occidentalis and Subasperum zones, where Silberling and Tozer (1968) suggested the Anisian/Ladinian boundary. Consequently, on conodont biostratigraphical ground this boundary can be more useful drawn at the base of the Occidentalis Zone. This would meet, or would be closer to the current most widespread European opinions about the position of the Anisian/Ladinian boundary that is generally assumed at the base of the Nevadites Zone (see Tab. 1).

In spite of the more advanced stage of the Middle Triassic conodont studies, the same conodont zones could have been already recognized as suggested in North America by Mosher (1968) and Sweet et al. (1971): a lower *constricta* Assemblage Zone and an upper *mombergensis* A. Z. Respect to their zonations, in the present paper the *mombergensis* A. Z. has a lower basal boundary. Infact, it has been proposed at the base of the Occidentalis Zone (see Tab. 1).

	MOSHER, 1968	SWEET et Al., 1971	Present Paper	SILBERLING & NICHOLS, 1982 (Humboldt Range, Nevada)	ZAPFE, 1983
	↑	↑			
Lower Ladinian	Gondolella mombergensis A.Z.	16 Neogondolella mombergensis	? ? ? Gondolella mombergensis A.Z.	Subasperum	E. curionii
Upper Anisian	Gondolella constricta A.Z.	15 Neogondolella constricta		Occidentalis	Nevadites - Zone
			Gondolella constricta A.Z.	Meeki	Parakellnerites - Z
				Rotelliforme	P. trinodosus

Tab. 1 – Correlation chart of the conodont zones with ammonoid zones and stages of North America (Humboldt Range, Nevada) and Tethys. Arrows indicate that *Gondolella mombergensis* A. Z. (Mosher, 1968) and *Neogondolella mombergensis* Zone (Sweet et al., 1971) extend also higher up. Question marks indicate that the middle and upper part of the *Subasperum* Zone have not been investigated in the present paper.

However, at present a correlation can be attempted only with the epicontinental Triassic sequences of Europe (Germanic Basin, NW Bulgaria), that is, towards the type-area of *Gondolella mombergensis* s. s., where a similar conodont evolution can be recognized. But also this correlation is a tentative one, which needs more detailed comparative taxonomical and stratigraphical work on the conodonts of the mentioned area. In the Germanic Basin the time equivalent of the Rotelliforme Zone and probably part of the Meeki Zone is developed in the evaporitic «Middle Muschelkalk» (Kozur, 1974). When conodonts occurred here with the beginning of the calcareous «Upper Muschelkalk», *G. mombergensis* s. s. had already developed from *G. constricta* emend. Both species are frequent here in the Trochitenkalk of Germany and in the *Pecten discites* beds of Holy Cross Mts., Poland, though the latter one is reported as «*G. cornuta*» (see Trammer, 1975; Zawidzka, 1975; Rafek, 1977). The Anisian/Ladinian boundary in the Holy Cross Mts. with the occurrence of *G. mombergensis longa*, suggested by Trammer (1975, pp. 200–202, text–fig. 6) and by Kozur (1968, 1974) for the whole Germanic Triassic seems to fit more or less with the one proposed by the present authors in Nevada.

The same seems to be probable for the Anisian/Ladinian boundary in NW Bulgaria suggested by Budurov and Stefanov (1972) and Budurov (1979) with the disappearance of «*Neogondolella cornuta*» (= *G. constricta* emend.) and appearance of «*Neogondolella excentrica*» (= *G. transita*: see Triassic Conodont Working Group, in press; cf. Kozur, 1980).

A correlation with the Tethyan sequences, however, would not be satisfactory substantiated on the present stage of our knowledge. There, outside the type–area of *G. mombergensis* s. s., another conodont evolutionary line (s) developed, although a few features, such as appearance of long morphotypes and anterior ward shifting of basal pit seem to be homeomorphic. Also not only the conodonts, but the ammonoids are rather different too, and it is not yet proved that the first occurrence of representatives of the ammonoid genus *Nevadites* in the Tethys was synchronous with the beginning of the Occidentalis Zone in Nevada, which itself contains several subzones.

Though results of our study seem rathermost to support the second possibility to draw the Anisian/Ladinian boundary, favoured by Krystyn's investigations, this boundary problem cannot yet be accepted as fully solved and further detailed works are necessary in the Tethyan Triassic. However, the Anisian/Ladinian boundary currently used in the Germanic Basin does not seem to correlate with the base of the Reitzi Zone of Balaton Highland, Hungary, (as proposed by Kozur, 1975) but with the base of the Nevadites Zone.

Paleontological appendix

A taxonomic analysis (1) of the most important species recognized is here provided. All the described species–groups belong to the genus *Gondolella* Stauffer & Plummer, 1932. They are:

Gondolella constricta Mosher & Clark
Gondolella mombergensis mombergensis Tatge
Gondolella mombergensis longa (Budurov & Stefanov)
Gondolella sp. n. *A*
Gondolella excelsa (Mosher)
Gondolella aff. *trammeri* Kozur

Ramiform elements of the *Gondolella*–multielement (enanthiognathiform, hibbardelliform, metaprionidiform, ozarkodiniform, cypridodelliform) do not show any change and they are considerably under–represented against platform elements along the whole sections.

Genus *Gondolella* Stauffer & Plummer, 1932

Type–species *Gondolella elegantula* Stauffer & Plummer, 1932

(1) We use here the taxonomy accepted by the Triassic Conodont Working Group during the revision of the Middle and Upper Triassic conodonts (1979 November, Budapest and 1980 October, Bratislava; Triassic Conodont Working Group, in press) with exception of the inclusion of *Neogondolella cornuta* Budurov & Stefanov and *Neogondolella balkanica* Budurov & Stefanov in *Gondolella constricta* Mosher & Clark which was not yet recognized. Also *Neogondolella longa* Budurov & Stefanov (sensu stricto) is acknowledged here as a subspecies of *Gondolella mombergensis* Tatge.

Gondolella constricta Mosher & Clark, 1965

– 1958 *Gondolella mombergensis* – Huckriede, pl. 10, fig. 10.
○ 1965* *Gondolella constricta* Mosher & Clark, p. 560, pl. 65, figs. ?11, 18, 21, 24, 25.
○ 1965 *Gondolella mombergensis* – Mosher & Clark, pl. 65, figs. 23, ?26, 27, 28 (nearly medium ontogenetic stage).
– 1965 *Gondolella navicula* – Mosher & Clark, pl. 66, figs. 10, 17–21.
○ 1965 *Gondolella mombergensis* – Budurov & Stefanov, pl. 1, fig. 2.
– 1965 *Gondolella mombergensis* – Budurov & Stefanov, pl. 1, fig. 5.
– 1968a *Gondolella (Gondolella) mombergensis prava* Kozur, p. 134, pl. 1, fig. 2a, b.
– 1968b *Gondolella (Gondolella) mombergensis mombergensis* – Kozur, pl. 1, fig. ?1.
+ 1972 *Neogondolella mombergensis* – Budurov & Stefanov, pl. 3, figs. 16–19.
– 1972 *Neogondolella cornuta* Budurov & Stefanov, pp. 839–840, pl. 3, figs. 9,10,13–15, 20–22.
○ 1972 *Neogondolella constricta* – Budurov & Stefanov, pl. 4, figs. 29–36.
+ 1975a *Neogondolella balkanica* Budurov & Stefanov, pp. 792–794, pl. 1, figs. 28–31.
– 1975a *Neogondolella balkanica* Budurov & Stefanov, pl. 1, figs. 24–27.
– 1975b *Neogondolella mombergensis* – Budurov & Stefanov, pl. 2, figs. 20–23.
○ 1975b *Neogondolella constricta* – Budurov & Stefanov, pl. 3, figs. 1, 2.
– 1975 *Gondolella cornuta* – Trammer, pl. 22, figs. 9, 10.
– 1975 *Gondolella* cf. *basisymmetrica* Trammer, pl. 23, fig. ?1.
○ 1975 *Gondolella constricta* – Trammer, pl. 24, figs. 3, 7.
+ 1975 *Gondolella mombergensis mombergensis* – Zawidzka, pl. 41, fig. 1; pl. 43, fig. 4.
– 1975 *Gondolella prava* – Zawidzka, pl. 41, fig. 5; pl. 44, fig. 4.
– 1975 *Gondolella cornuta* – Zawidzka, pl. 43, figs. 8, 9.
– 1975 *Gondolella mombergensis mombergensis* – Zawidzka, pl. 44, fig. 5.
– 1977 *Neogondolella* cf. *cornuta* Rafek, pl. 1, figs. 26, 27.
– 1977 *Neogondolella acuta* – Rafek, pl. 2, figs. ?7, ?8.
– 1977 *Neogondolella navicula* – Rafek, pl. 3, figs. 7–10.
+ 1977 *Neogondolella balkanica* – Rafek, pl. 3, figs. 19, 20.
○ 1977 *Neogondolella huckriedei* – Rafek, pl. 4, figs. 12, 16.
○ 1977 *Neogondolella constricta* – Rafek, pl. 4, figs. 23, 24, 25, 30.
– 1977 *Metapolygnathus lindstroemi* – Rafek, pl. 5, figs. 15, 16.
– 1977 *Neogondolella* sp. indet. 1 Rafek, pl. 5, figs. 22, 23.
– 1977 *Neogondolella constricta* – Rafek, pl. 5, fig. 26.

Remarks. *Gondolella constricta* Mosher & Clark, 1965, has been established still in the early stage of the Triassic conodont studies, when only two *Gondolella* species were known in the Middle Triassic, *Gondolella mombergensis* Tatge, 1956 and *Gongolella navicula* Huckriede, 1958.

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* The forms figured by Mosher & Clark (1965) as *G. constricta, G. mombergensis* and *G. navicula* belong to *G. constricta*, emended or *G. mombergensis*, except the ones in figs. 14, 16 (= *G. excelsa*) of pl. 66; however, because of the juvenile stage or lack of lateral view, it is not always possible to decide to which of the two species do they belong.

In the synonymy of *Gondolella constricta* Mosher & Clark, emend., three special marks have been used: ○ represents specimens attributed to the juvenile stage of *G. constricta*; – represents specimens attributed to the *"cornuta"* morphotype; + represents specimens attributed to the *"balkanica"* morphotype.

At that time and in most cases even a decade later, mature and hypermature forms of Middle Triassic gondolelloids were referred to as *G. navicula*. *G. constricta* has eventually been erected for juvenile forms having a remarkable constriction near to the posterior end, to distinguish them from those lacking this feature and attributed to *G. mombergensis*. In the fairly rich material of the present collection it is without any doubt, that small, medium–sized and large forms, occurring in the same level, represent different ontogenetic stages of the same species. The holotype (Mosher & Clark, 1965, pl. 65, figs. 21, 24, 25) derives from the *Paraceratites clarkei* beds of the Rotelliforme Zone (sample FH–3 of Mosher & Clark, 1965) where mature and submature forms correspond to *Gondolella cornuta* (Budurov & Stefanov, 1972) and *Gondolella balkanica* (Budurov & Stefanov, 1975). These two species have been described from similar epicontinental sequences of NW Bulgaria, where *G. constricta* and *G. mombergensis* have also been reported and figured (see Budurov & Stefanov, 1965 and 1972 on the synonymy list).

«*Cornuta*» types and «*balkanica*» types occur together throughout the sections and all transitions are present between them; therefore it is obvious, that they represent two morphotypes of the same species (see also at the description). Constriction of platform near to the posterior end may occur in the early ontogenetic stages of many Triassic platform conodonts, as well as sometimes on adult forms, consequently this feature is generally regarded now as lacking taxonomical importance (discussion of the Triassic Conodont Working Group, October 1980, Bratislava, lead by one of the authors, S. Kovács). Also in the present collection it can be observed that the platform sometimes may grow without a remarkable constriction, but in most cases a more or less expressed constriction is produced, which, however, generally disappears or will be very slight during later ontogenetic stages (see also at the description). Representatives of the typical Germanic *G. mombergensis* (adult and sub–adult forms) occur only higher in the sections, so in the level of the holotype also the non–constricted juvenile forms («*G. mombergensis*» sensu Mosher & Clark, 1965), along with the constricted ones («*G. constricta*» Mosher & Clark, 1965) may only represent earlier ontogenetic stages of the above mentioned «*cornuta*» and «*balkanica*» morphotypes.

However, independently from the fact that *G. constricta* Mosher & Clark, 1965 in the original sense may represent the juvenile stage of many Middle Triassic *Gondolella* species, according to the rules of the ICZN it has the priority both against *Gondolella cornuta* (Budurov & Stefanov, 1972) and *Gondolella balkanica* (Budurov & Stefanov, 1975).

Emended diagnosis. Representatives of *Gondolella constricta* in early ontogenetic stages are slender and moderately arched in lateral view. Platform begins to develop as a lateral swelling on both sides of the carina as well as around the last denticle therefore it is widest near the center and often constricted before the posterior end. Platform end pointed or rounded more or less asymmetrically developed around the end of the carina which is straight in upper view. Upper edge of carina, similarly to the basal edge, is arched, denticles are considerably fused, strongly posteriorly inclined, relatively higher in the anterior part. The last denticle is fused with the platform end. The next to the last one is usually stronger than the others and represents the cusp. Keel narrow; the small pit is terminally located on it, with strongly protruding margin.

Medium ontogenetic stages are also slender, moderately arched in lateral view. Platform extends along the whole length of the unit, only the first denticle may be free, usually widest near the center, may be either constricted or non–constricted before the posterior end. The last denticle fused with the platform end is already stronger developed in this stage and takes over the role of the cusp.

Mature and especially hypermature forms are massive, usually less arched, often straight in lateral view. Platform margins are considerably thickened, with the exception of the anterior third, may be parallel or subparallel, or, according to the morphology in earlier stages, widest near the center and slightly constricted before the posterior end, which is pointed, rounded or blunted. Denticles in the anterior part of carina are relatively higher, considerably fused, but with free tips and mostly totally fused in a low, median ridge in the middle; before the cusp there are 1–3 low, more distinct ones. Cusp usually very strong, prominent, either grown together with the platform end and more or less posteriorly oriented («*cornuta*» morphotype), or stands in the right angle to the platform and a brim is developed behind it («*balkanica*» type). Keel wide, with narrow groove ending in a small, inverted, usually anteriorly shifted pit.

Juvenile stage

Pl. 7, figs. 1, 4, 8, 9, 10, 11, 12, 14; Pl. 8, fig. 3

Description. In the early juvenile stage the platform begins to develop on both sides of the carina as a lateral swell, as well as around the last denticle (Mosher & Clark, 1965, pl. 65, figs. 11, 18, 21, 24, 25), in this way a constriction appears before the posterior end, which usually disappears or becomes less prominent during later ontogenetic stages.

The growth of the element takes place anteriorly by adding newer and newer denticle to the anterior end of the carina. At the same time, lengthening of carina goes also slightly downward, so that the arched nature of the unit in lateral view is formed. Denticles of carina are strongly posteriorly inclined, are partly free in its anterior part, but become almost completely fused in the middle, as the unit grows. When the platform begins to develop as a lateral swell, the number of denticles is still less then 10. By the stage when the platform is developed in full length, their number reaches the final amount (generally 14–18) and does not change during further growth. The upper edge of the carina similarly to the basal edge, is arched in lateral view, being highest in the middle part, as opposed to the *mombergensis* type of carina (see later). The cusp is usually the next to the last denticle, somewhat more distinct and wider, but not higher. The last denticle is always grown together with the platform end; during further ontogenetic stages it grows more rapidly than the other and takes over the role of the cusp, that is, it will be the most prominent, strongest denticle of the carina.

The keel is narrow, the basal groove ends in a generally posteriorly located small pit, with strongly protruding margins. In mature stages, on «*cornuta*» and «*balkanica*» morphotypes, the pit is often more or less anteriorly shifted. However, in higher stratigraphical levels, such forms can be observed among juvenile and submature specimens, as well; they are characterized by a small step at the posterior end of the keel (cf. Mosher & Clark, 1965, pl. 65, figs. 18, 22, 29 and present paper Pl. 7, figs. 10, 11, 12, 14). They occur first in the *Paraceratites vodgesi* beds (sample N 37 in Site A and N 64 in Site C), and upwards become quite frequent.

On pure morphological grounds they were assigned by Kovács, Kozur and Mietto (1980) to *G. pseudolonga*, a species, however, which belongs to another homeomorph evolutionary line in the Tethys, outside the distributional area of the epicontinental *G. mombergensis* (Kovács, in preparation). This former assignement should be modified on the basis of the present material. The occurrence of these forms among juvenile forms can be interpreted as the first sign of the development of *G. mombergensis mombergensis* and *G. mombergensis longa*, in which the anteriorly shifted pit is quite normal, from *G. constricta* emend.

G. constricta in the original sense can be the juvenile form of many Middle Triassic *Gondolella* species; a sure recognition is possible only in medium and mature ontogenetic stages.

«Cornuta» morphotype

Pl. 7, fig. 6; Pl. 8, figs. 1, 2; Pl. 9, figs. 1, 2, 3, 4, 5; Pl. 10, fig. 1

Description. This morphotype develops if in medium ontogenetic stage the platform end grows together with the strengthened last denticle and a horn–like, more or less posteriorly inclined cusp forms without a platform brim behind it. In adult stage the platform extends along the whole length of the unit, or only the first denticle of the carina may be free. Platform margins are thickened, but not significantly upturned, so that only shallow furrows are present along both sides of the carina. Thickened margins extend until the anterior third of the unit and from this point there is only a rudimentary continuation untill the anterior end. In the posterior two–third the platform margins may be parallel, but mostly there is a certain conservatorism from the early juvenile stage: as the platform began to develop in that stage, it is broadest in the middle and very often there is a faint constriction before the posterior end, which is pointed or sometimes squared–off. In lateral view the unit is mostly only gently arched and may tend to be straight especially in adult and hyperadult stages. The upper edge of the carina which is arched in juvenile stage, is now in most cases straight in the middle part and its denticles are often completely fused to a low medium ridge. Denticles have free tips in the relatively high anterior third and in the posterior part, where there are 1–3 low, more distinct denticles before the prominent cusp. The keel is fairly wide, with narrow groove ending in a small, inverted pit, which is generally more or less anteriorly shifted. The holotype of *G. mombergensis prava* Kozur (1968a, pl. 1, figs. 2a–b), with an asymmetrical posteriormost denticle, which is very common on representatives of *G. mombergensis* group in the Germanic Basin, belongs also to this morphotype.

All *G. cornuta* reported from pelagic Tethyan sequences belong to another homeomorphic evolutionary line outside the distributional area of the epicontinental *G. mombergensis* (Kovács, in preparation).

«Balkanica» morphotype

Pl. 9, fig. 6

Description. This morphotype develops when in medium ontogenetic stage the cusp does not grow completely with the platform end. In this case a more or less pronounced brim develops behind it and, further more, it stands perpendicularly to the platform. Other characters are the same as in «*cornuta*» morphotype.

Stratigraphic range and occurrence. Rotelliforme, Meeki and Occidentalis zones, rarer in the Subasperum Zone in Nevada. It occurs also in Illyrian–Fassanian epicontinental sequences of the Germanic Basin (West Germany and NE France: Rafek, 1977; Upper Silesia: Zawidzka, 1975; Holy Cross Mts.: Trammer, 1975) and NW Bulgaria (Budurov & Stefanov, 1972; Budurov, 1979).

Gondolella mombergensis Tatge, 1956 (1)

Remarks. In late juvenile and medium ontogenetic stages, representatives of *G. mombergensis*, in the present material, are distinguished from those of *G. constricta* by the looser denticulation in the anterior part of the carina, the straight and lower middle part of that and the presence of 1–2 higher denticles before the cusp, by which that is not so prominent. In mature stages two subspecies can be distinguished according to the length. Also in this stage the anterior and the posterior ends of the carina distinguishes specimens of this species from those of *G. constricta*.

The anterior carina in *G. constricta* has considerably fused denticles, while in *G. mombergensis* they are looser and free in most of their length. In the posterior end the cusp is less prominent, the transition from the low middle carina towards it is not so abrupt, because there are 1–2 higher, distinct denticles before it. According to the revision carried out by the Triassic Conodont Working Group (in press), this species is restricted now to the typical Germanic type–forms characteristic of epicontinental regions in the Upper Illyrian–Lower Fassanian. All other forms reported as *G. mombergensis* from pelagic Tethyan sequences or from different ages should be revised.

Gondolella mombergensis mombergensis Tatge, 1956

Pl. 7, figs. 2, 3, 5, 7, 13, 15; Pl. 8, figs. 6, 7, 8, 9, 10, 11, 12;
Pl. 9, figs. 7, 8, 9, 10, 11, 12, 13, 14; Pl. 10, figs. 3, 5

1956 *Gondolella mombergensis* Tatge, p. 132, pl. 6, figs. 1, 2.
1958 *Gondolella mombergensis* – Huckriede, only pl. 10, fig. 46.
1959 *Gondolella mombergensis* – Hirschmann, only text–fig. ?10, 15, 21, 22.
1965 *Gondolella mombergensis* – Budurov & Stefanov, pl. 1, only figs. 1, 9.
1965 *Gondolella constricta* Mosher & Clark, pl. 65, figs. ? 14, ? 15, 19, 22 (transitional form between *G. constricta* and *G. mombergensis*).
1965 *Gondolella mombergensis* – Mosher & Clark, pl. 65, ?20, ?29 (transitional forms between *G. constricta* and *G. mombergensis*).
1968b *Gondolella mombergensis mombergensis* – Kozur, pl. 2, figs. 3, 4; pl. 3, fig. 8.
1972 *Neogondolella cornuta* Budurov & Stefanov, pl. 3, figs. ?11, 12 (transitional form between *G. constricta* and *G. mombergensis*).
1973 *Neogondolella constricta* – Mosher, pl. 19, figs. 30, ?31.
1975b *Neogondolella mombergensis* – Budurov & Stefanov, only pl. 2, figs. 24, 25; pl. 3, figs. 14, 15, 22, 23.
1975 *Gondolella mombergensis* – Habbasch, p. 75, text–fig. 3; pl. 1, figs. 11–14.
1975 *Gondolella navicula* – Habbasch, pl. 2, figs. ?16, 17, ?18, 19.
1975 *Gondolella acuta* – Trammer, pl. 24, figs. 4, 5.

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(1) The synonymy is only given for the two subspecies *Gondolella mombergensis mombergensis* Tatge and *Gondolella mombergensis longa* (Budurov & Stefanov).

1975 *Gondolella constricta* – Trammer, pl. 24, only fig. 2.
1975 *Gondolella* cf. *basisymmetrica* Trammer, pl. 24, fig. 6.
1975 *Gondolella mombergensis mombergensis* – Zawidzka, pl. 41, fig. 2; pl. 43, fig. 7.
1976 *Neogondolella mombergensis* – Budurov, pl. 3, figs. 1–5.
1977 *Metapolygnathus* sp. ident. Rafek, pl. 1, figs. 10, 11, ?23, 24, 25.
1977 cf. *Metapolygnathus* sp. Rafek, pl. 2, figs. 21, 22, 23.
1977 *Neogondolella bifurcata* – Rafek, pl. 4, figs. ?20–22.
1977 *Neogondolella prava* – Rafek, pl. 5, fig. ?30.
1977 *Neogondolella* cf. *cornuta* Rafek, pl. 1, only fig. 17; pl. 5, figs. 17–19.
1977 *Neogondolella* sp. ident. 1 Rafek, pl. 1, figs. ?32, 33.
1977 *Neogondolella* sp. ident. 3 Rafek, pl. 2, figs. 16, 17.
1980 *Gondolella mombergensis* – Kovács & Kozur, pl. 4, figs. 4, 5.

Remarks. Shorter morphotypes identical with the typical Germanic *G. mombergensis* are assigned to the nominate subspecies.

Stratigraphical range and occurrence. Upper Illyrian–Lower Fassanian in epicontinental sequences: Nevada, Germanic Basin (Tatge, 1956; Kozur, 1968a, b; Trammer, 1975; Zawidzka, 1975; Rafek, 1977); NW Bulgaria (Budurov & Stefanov, 1965, 1972); northern part of Western Carpathians (Kozur, 1980).

Gondolella mombergensis longa (Budurov & Stefanov, 1973)

Pl. 10, figs. 2, 4, 6, 7, 8, 9, 10

1965 *Gondolella mombergensis* – Budurov & Stefanov, pl. 1, figs. 3, 4, 6, ?8.
1971 *Gondolella mombergensis mombergensis* – Trammer, pl. 2, fig. 5.
1972 *Gondolella mombergensis mombergensis* – Trammer, text–fig. 4, A.
1973 *Neogondolella longa* Budurov & Stefanov, p. 805, pl. 1, figs. 16–19.
1975b *Neogondolella longa* – Budurov & Stefanov, pl. 3, figs. ?9–10, 11–13.
1975 *Gondolella longa* – Trammer, pl. 23, figs. 2, 3.
1975 *Gondolella longa* – Zawidzka, pl. 43, fig. ?2.
1977 *Neogondolella* cf. *longa* Rafek, pl. 1, figs. ?12, 13, ?34, 35.
1979 *Neogondolella longa* – Budurov, pl. 57, fig. 11.

Remarks. This subspecies is only distinguished by its longer form from the nominate subspecies; otherwise all characters are the same, therefore *Neogondolella longa* Budurov & Stefanov, 1973 is assigned here as a subspecies of *G. mombergensis* Tatge.

Stratigraphic range and occurrence. Rare in the Upper Illyrian; fairly abundant and characteristical in the Lower Fassanian of epicontinental Triassic regions: Nevada, Germanic Basin (Trammer, 1975); NW Bulgaria (Budurov & Stefanov, 1973).

Gondolella excelsa (Mosher, 1968)

Pl. 10, fig. 13

1965 *Spathognathodus cristagalli* – Mosher & Clark, p. 564, pl. 66, fig. 8.
1965 *Gondolella navicula* – Mosher & Clark, p. 561, pl. 66, figs. 14, 16.
1968 *Paragondolella excelsa* Mosher, pp. 938–939, pl. 118, figs. 1–8. Holotype: figs. 7, 8.

Remarks. The species, in the studied sections, is rare. Only a few specimens strictly resamble the holotype and they are small and short even in mature stage. Generally the *excelsa* specimens of these sections present a low carina from the central part towards the posterior end. In lateral view, the carina appears to be very low, straight and sharped cutted and not so characteristically arched and high in the middle part as generally in typical *G. excelsa*. The basal cavity is always very small and elliptical. The specimen figured by Mosher & Clark (1965) on pl. 66, fig. 8 from the *Paraceratites vodgesi* beds of Site C as *Spathognathodus cristagalli* Huckriede in fact is a juvenile, platformless *Gondolella excelsa.*

Stratigraphical range and occurrence. This species is very well known and developed in all the world. It ranges from uppermost Pelsonian to middle Longobardian.

Gondolella aff. **trammeri** Kozur, 1972

Pl. 10, fig. 12

Remarks. This form is rare in the studied sections, only two specimens from the Subasperum Zone of Site A (sample N 58) and a juvenile one from sample N 56. They show mostly similar characters to the type–material from the Balaton Highland, Hungary (collection of Kovács). Their main features are: thick platform margins strongly upturned to produce deep furrows along the carina that is very low since 1/4 of the length of the unit. The platform is developed along the total length of the unit. Characteristic of our forms are the three anterior denticles that are high and strongly fused as in a saw–blade. The last posterior denticle, which is separated from the others, is node–like. The units are narrow, slender, moderately long.

In general, our forms are similar to *G. trammeri* Kozur, 1972 (emend.), but distinguished by their anteriorly shifted and smaller pit. At present, it is uncertain, whether the typical pelagic *G. trammeri* evolutionary line occurs also in epicontinental facies. The *G. excelsa*– *G.* sp. n. *A.* – *G.* aff. *trammeri* line here may represent a homeomorph line, as well.

Stratigraphical range and occurrence. Upper Occidentalis Zone and lower part of the Subasperum Zone of Nevada.

Gondolella sp. n. **A**

Pl. 10, fig. 11

Remarks. The specimens belonging to this form, which represents a transition between *G. excelsa* and *G.* aff. *trammeri* are not too numerous but we could recognized juvenile, medium and adult stages. In the juvenile stage no platform is present, but only a brim. The carina is composed by/of 9–11 denticles, strongly fused till 2/3 of the height and elliptical in section. The basal cavity is wide, elongate, flender and it is developed for half of the unit. In medium stage units, the platform is well developed and develops from the anterior to the posterior end where it totally surrounds the last denticle that is also the cusp. The platform margins are almost thin, rounded, upturned in the central part of the unit while the platform is generally straight or downcurved at the posterior end. In general outline, the carina is slightly arched, the denticles are higher at the anterior end, where a free–blade of 1 or 1 and 1/2 denticles can be present. Towards the posterior end they decrease in size. They are posteriorly downcurved and almost fused. The basal cavity is subcircular and small. In mature stage units, the platform can leave a free–blade of 2,3 denticles. The denticles in the central part can be almost totally reduced and fused so that the carina is very low. Generally the last posterior denticle is node–like.

Stratigraphical range and occurrence. Rotelliforme, Meeki and Occidentalis zones of Nevada. Present also in samples N 62 and N 77 of the Subasperum Zone. Forms resembling of this *G.* sp. n. *A* have been found in many Tethyan sections: in the Prezzo Limestone and Buchenstein Fm. of Southern Alps and in the Ammonitico Rosso of Bithynia (Nicora, unpubl.), as well as in the Buchenstein Fm. of Balaton Highland, Hungary (with *Parakellnerites*) and in the Nàdaska Lmst of North Hungary (Kovács, unpubl.). They are under intense study by the present authors and will be treated together with the present form in another paper.

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PLATE 7

Fig. 1 a, b, c – *Gondolella constricta* Mosher & Clark. Juvenile stage; sample N 35, Site A, Fossil Hill, Humboldt Range, Nevada, Rotelliforme Zone; x 70.

Fig. 2 a, b, c – *Gondolella mombergensis mombergensis* Tatge. Juvenile stage; sample μ_0 2 β, Momberg, Germany; a, c, x 80; b, x 50.

Fig. 3 a, b, d – *Gondolella mombergensis mombergensis* Tatge. Juvenile stage; sample N 49, Site A, Fossil Hill, Humboldt Range, Nevada, *Nevadites humboldtensis* beds, lower Occidentalis Zone; a, d, x 40; b, x 50.

Fig. 4 b, c, d – *Gondolella constricta* Mosher & Clark. Juvenile stage; sample N 37, Site A, Fossil Hill, Humboldt Range, Nevada, *Paraceratites vodgesi* beds, Rotelliforme Zone; b, x 80; c, d, x 70.

Fig. 5 a, b, d – Primitive *Gondolella mombergensis mombergensis* Tatge. Juvenile stage; sample N 37, Site A, Fossil Hill, Humboldt Range, Nevada, *Paraceratites vodgesi* beds, Rotelliforme Zone; x 40.

Fig. 6 a, b, d – *Gondolella constricta* Mosher & Clark. «*Cornuta*» morphotype, juvenile stage; sample N 37, Site A, Fossil Hill, Humboldt Range, Nevada, *Paraceratites vodgesi* beds, Rotelliforme Zone; x 40.

Fig. 7 a, b, d – *Gondolella mombergensis mombergensis* Tatge. Juvenile stage; sample N 38, Site A, Fossil Hill, Humboldt Range, Nevada, *Paraceratites cricki* beds, upper Rotelliforme Zone; x 40.

Fig. 8 a, b, c – *Gondolella constricta* Mosher & Clark. Juvenile stage; sample N 37, Site A, Fossil Hill, Humboldt Range, Nevada, *Paraceratites vodgesi* beds, Rotelliforme Zone; x 40.

Fig. 9 a, b, d – *Gondolella constricta* Mosher & Clark. Juvenile stage; sample N 37, Site A, Fossil Hill, Humboldt Range, Nevada, *Paraceratites vodgesi* beds, Rotelliforme Zone; x 40.

Fig. 10a, b, c – *Gondolella constricta* Mosher & Clark. Juvenile stage; sample N 37, Site A, Fossil Hill, Humboldt Range, Nevada, *Paraceratites vodgesi* beds, Rotelliforme Zone; x 40.

Fig. 11a, b, c – *Gondolella constricta* Mosher & Clark. Juvenile stage; sample N 75, Site C, Fossil Hill, Humboldt Range, Nevada, *Nevadites furlongi* beds, upper Occidentalis Zone; x 40.

Fig. 12a, b, d – *Gondolella constricta* Mosher & Clark. Juvenile stage; sample N 38, Site A, Fossil Hill, Humboldt Range, Nevada, *Paraceratites cricki* beds, upper Rotelliforme Zone; x 40.

Fig. 13a, b, d – *Gondolella mombergensis mombergensis* Tatge. Juvenile stage; sample N 38, Site A, Fossil Hill, Humboldt Range, Nevada, *Paraceratites cricki* beds, upper Rotelliforme Zone; x 40.

Fig. 14a, b, d – *Gondolella constricta* Mosher & Clark. Juvenile stage; sample N 38, Site A, Fossil Hill, Humboldt Range, Nevada, *Paraceratites cricki* beds, upper Rotelliforme Zone; x 40.

Fig. 15a, b, c – *Gondolella mombergensis mombergensis* Tatge. Juvenile stage; sample N 75, Site C, Fossil Hill, Humboldt Range, Nevada, *Nevadites furlongi* beds, upper Occidentalis Zone; x 40.

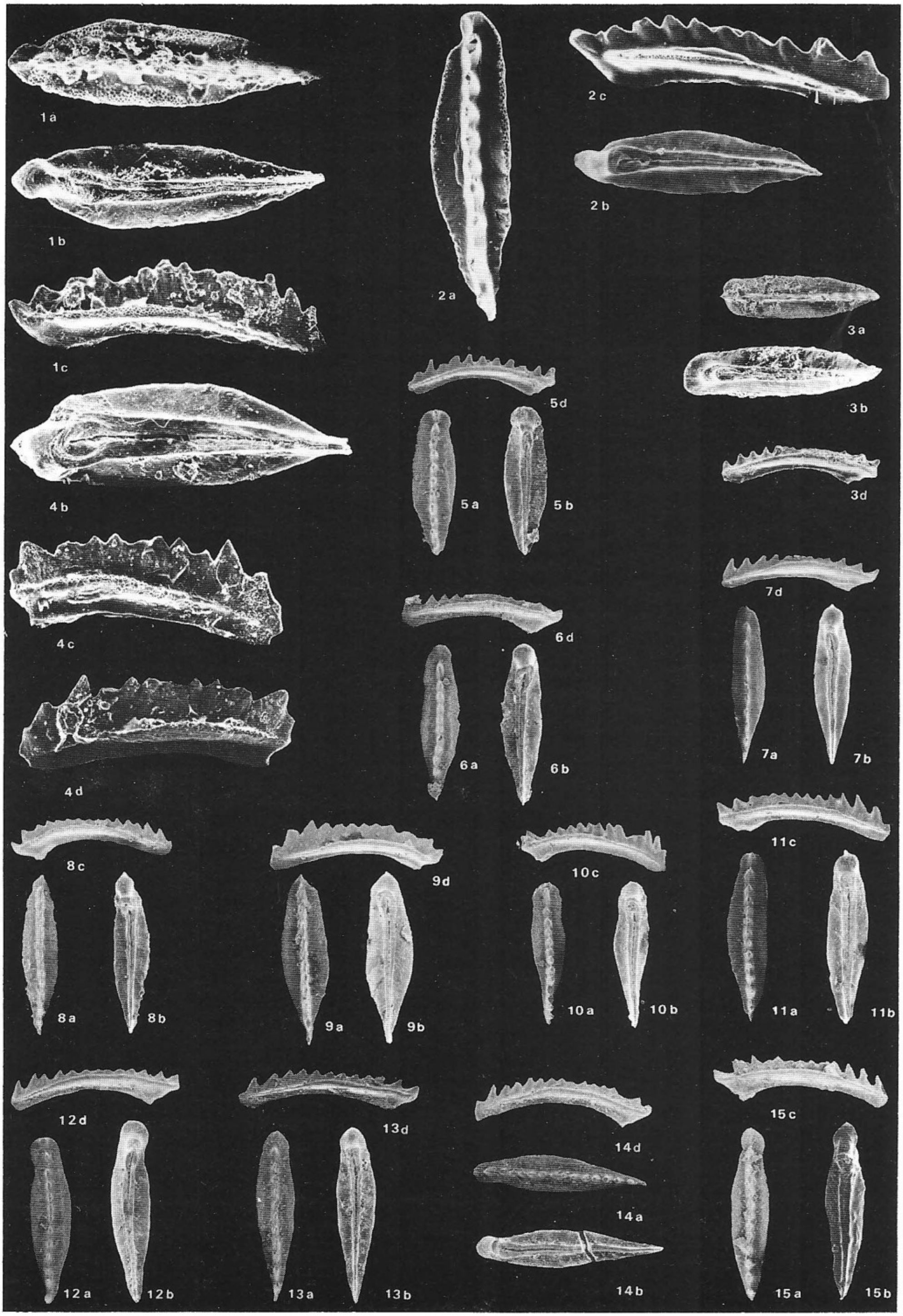
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PLATE 8

Fig. 1 a, b, c – *Gondolella constricta* Mosher & Clark. «*Cornuta*» morphotype, medium ontogenetic stage; sample N 37, Site A, Fossil Hill, Humboldt Range, Nevada, *Paraceratites vodgesi* beds, Rotelliforme Zone; x 50.

Fig. 2 a, b, d – *Gondolella constricta* Mosher & Clark. «*Cornuta*» morphotype, medium ontogenetic stage; sample N 37, Site A, Fossil Hill, Humboldt Range, Nevada, *Paraceratites vodgesi* beds, Rotelliforme Zone; x 50.

Fig. 3 a b, d – *Gondolella constricta* Mosher & Clark. Juvenile stage; sample N 50, Site A, Fossil Hill, Humboldt Range, Nevada, lower Occidentalis Zone; x 50.

Fig. 4 a, d – *Gondolella constricta* Mosher & Clark. Medium ontogenetic stage; sample μ_0 2β, Momberg, Germany; x 50.

Fig. 5a, b, c, d – *Gondolella constricta* Mosher & Clark. Medium ontogenetic stage; sample N 37, Site A, Fossil Hill, Humboldt Range, Nevada, *Paraceratites vodgesi* beds, Rotelliforme Zone; x 50.

Fig. 6 a, b, c – *Gondolella mombergensis mombergensis* Tatge. Medium ontogenetic stage; sample N 50, Site A, Fossil Hill, Humboldt Range, Nevada, lower Occidentalis Zone; x 50.

Fig. 7 a, b, c – *Gondolella mombergensis mombergensis* Tatge. Late juvenile stage; sample N 66, Site C, Fossil Hill, Humboldt Range, Nevada, *Frechites nevadanus* beds, lower Meeki Zone; x 50.

Fig. 8 a, b, d – *Gondolella mombergensis mombergensis* Tatge. Medium ontogenetic stage; sample N 49, Site A, Fossil Hill, Humboldt Range, Nevada, *Nevadites humboldtensis* beds, lower Occidentalis Zone; x 50.

Fig. 9 a, b, c – *Gondolella mombergensis mombergensis* Tatge. Medium ontogenetic stage; sample N 49, Site A, Fossil Hill, Humboldt Range, Nevada, *Nevadites humboldtensis* beds, lower Occidentalis Zone; a, c, x 50; b, x 70.

Fig. 10 a, b, d – *Gondolella mombergensis mombergensis* Tatge. Medium ontogenetic stage; sample N 75, Site C, Fossil Hill, Humboldt Range, Nevada, *Nevadites furlongi* beds, upper Occidentalis Zone; x 50.

Fig. 11 a, d – *Gondolella mombergensis mombergensis* Tatge. Medium ontogenetic stage; sample N 75, Site C, Fossil Hill, Humboldt Range, Nevada, *Nevadites furlongi* beds, upper Occidentalis Zone; x 50.

Fig. 12 a, b, c – *Gondolella mombergensis mombergensis* Tatge. Medium ontogenetic stage; sample N 75, Site C, Fossil Hill, Humboldt Range, Nevada, *Nevadites furlongi* beds, upper Occidentalis Zone; x 50.

a = upper view; b = lower view; c, d = lateral views.

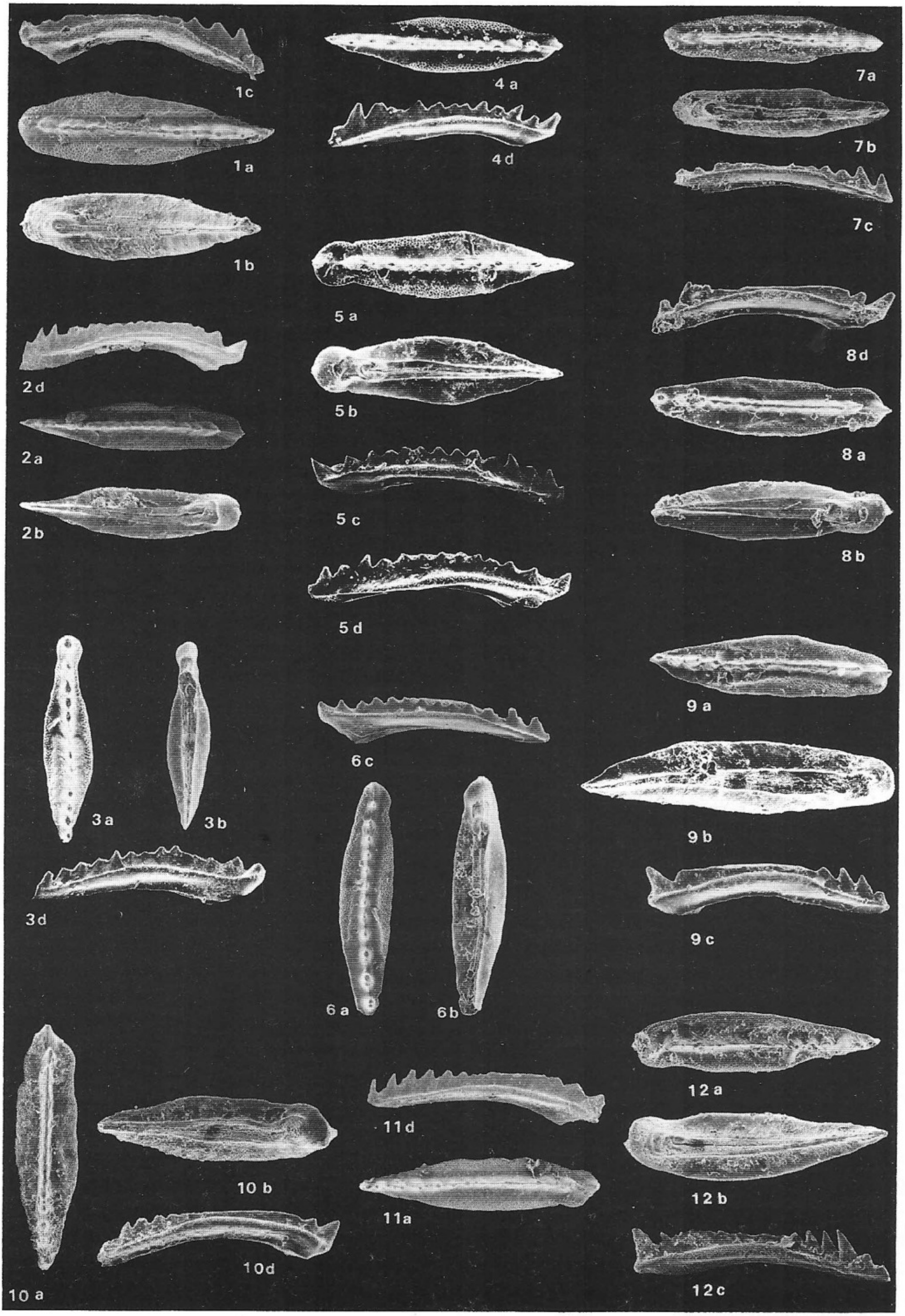
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PLATE 9

Fig. 1 a, b, d – *Gondolella constricta* Mosher & Clark. «*Cornuta*» morphotype, adult stage; sample N 38, Site A, Fossil Hill, Humboldt Range, Nevada, *Paraceratites cricki* beds, upper Rotelliforme Zone; x 40.

Fig. 2 a, b, d – *Gondolella constricta* Mosher & Clark. «*Cornuta*» morphotype, adult stage; sample N 35 with *Daonella americana* Smith, Site A, Fossil Hill, Humboldt Range, Nevada, Rotelliforme Zone; x 50.

Fig. 3a, b, c, d – *Gondolella constricta* Mosher & Clark. «*Cornuta*» morphotype, adult stage; sample N 35 with *Daonella americana* Smith, Site A, Fossil Hill, Humboldt Range, Nevada, Rotelliforme Zone; x 50.

Fig. 4d, 5c – *Gondolella constricta* Mosher & Clark. «*Cornuta*» morphotype, adult stage; sample N 37, Site A, Fossil Hill, Humboldt Range, *Paraceratites vodgesi* beds, Rotelliforme Zone; x 50.

Fig. 6 b, d – *Gondolella constricta* Mosher & Clark. «*Balkanica*» morphotype, adult stage; sample N 68, Site C, Fossil Hill, Humboldt Range, Nevada, upper Rotelliforme Zone; x 40.

Fig. 7 a, b, d – *Gondolella mombergensis mombergensis* Tatge. Adult stage; sample N 75, Site C, Fossil Hill, Humboldt Range, Nevada, *Nevadites furlongi* beds, upper Occidentalis Zone; x 40.

Fig. 8 a, b, c, d – *Gondolella mombergensis mombergensis* Tatge. Adult stage; sample N 75, Site C, Fossil Hill, Humboldt Range, Nevada, *Nevadites furlongi* beds, upper Occidentalis Zone; x 50.

Fig. 9 a, b, c – *Gondolella mombergensis mombergensis* Tatge. Adult stage; sample N 66, Site C, Fossil Hill, Humboldt Range, Nevada, *Frechites nevadanus* beds, lower Meeki Zone; x 40.

Fig. 10 a, b, d – *Gondolella mombergensis mombergensis* Tatge. Adult stage; sample N 50, Site A, Fossil Hill, Humboldt Range, Nevada, lower Occidentalis Zone; a, d, x 50; b, x 40.

Fig. 11 a, b, d – Primitive *Gondolella mombergensis mombergensis* Tatge. Adult stage; sample N 38, Site A, Fossil Hill, Humboldt Range, Nevada, *Paraceratites cricki* beds, upper Rotelliforme Zone; x 40.

Fig. 12 a, b, c, d – *Gondolella mombergensis mombergensis* Tatge. Supermature stage; sample N 49, Site A, Fossil Hill, Humboldt Range, Nevada, *Nevadites humboldtensis* beds, lower Occidentalis Zone; a, c, d, x 70; b, x 50.

Fig. 13 a, b, c – *Gondolella mombergensis mombergensis* Tatge. Adult stage; sample N 50, Site A, Fossil Hill, Humboldt Range, Nevada, lower Occidentalis Zone; a, c, x 50; b, x 70.

Fig. 14 a, b, d – *Gondolella mombergensis mombergensis* Tatge. Adult stage; sample N 75, Site C, Fossil Hill, Humboldt Range, Nevada, *Nevadites furlongi* beds, upper Occidentalis Zone; x 50.

a = upper view; b = lower view; c, d = lateral views.

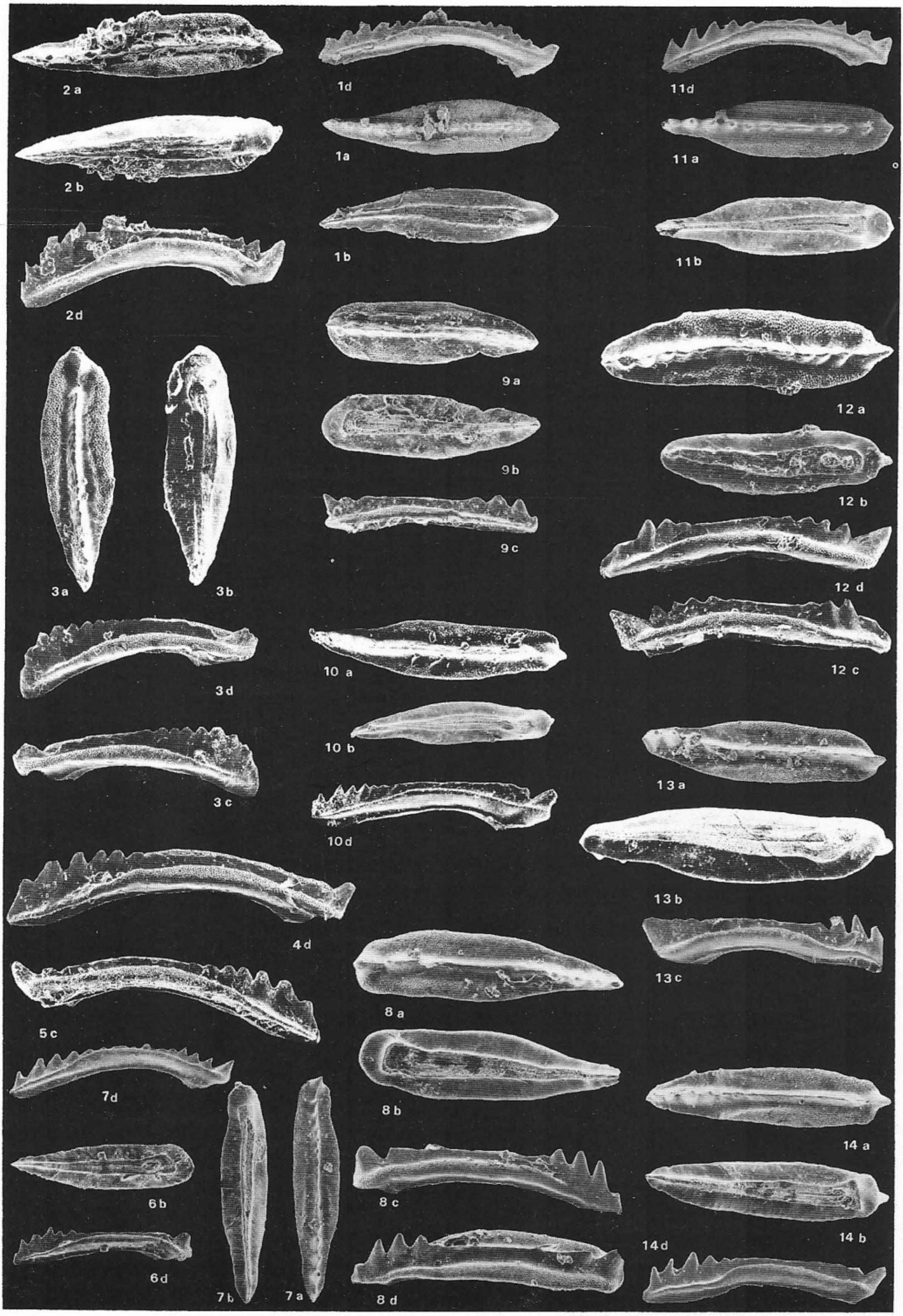
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PLATE 10

Fig. 1 a, b, c – *Gondolella constricta* Mosher & Clark. «*Cornuta*» morphotype, adult stage; sample N 75, Site C, Fossil Hill, Humboldt Range, Nevada, *Nevadites furlongi* beds, upper Occidentalis Zone; x 40.

Fig. 2 a, b, d – *Gondolella mombergensis longa* (Budurov & Stefanov). Adult stage; sample N 45, Site A, Fossil Hill, Humboldt Range, Nevada, upper Meeki Zone; a, d, x 50; b, x 40.

Fig. 3 a, b, d – *Gondolella mombergensis mombergensis* Tatge. Adult stage; sample N 75, Site C, Fossil Hill, Humboldt Range, Nevada, *Nevadites furlongi* beds, upper Occidentalis Zone; x 40.

Fig. 4 a, b, d – *Gondolella mombergensis longa* (Budurov & Stefanov). Adult stage; sample N 49, Site A, Fossil Hill, Humboldt Range, Nevada, *Nevadites humboldtensis* beds, lower Occidentalis Zone; a, d, x 50; b, x 40.

Fig. 5 a, b, c, d – *Gondolella mombergensis mombergensis* Tatge. Adult stage; sample N 75, Site C, Fossil Hill, Humboldt Range, Nevada, *Nevadites furlongi* beds, upper Occidentalis Zone; x 40.

Fig. 6 a, b, d – *Gondolella mombergensis longa* (Budurov & Stefanov). Adult stage; sample N 50, Site A, Fossil Hill, Humboldt Range, Nevada, lower Occidentalis Zone; a, d, x 50; b, x 40.

Fig. 7 a, b, d – *Gondolella mombergensis longa* (Budurov & Stefanov). Adult stage; sample N 50, Site A, Fossil Hill, Humboldt Range, Nevada, lower Occidentalis Zone; a, d, x 50; b, x 40.

Fig. 8 a, b, c – *Gondolella mombergensis longa* (Budurov & Stefanov). Adult stage; sample N 50, Site A, Fossil Hill, Humboldt Range, Nevada, lower Occidentalis Zone; a, c, x 70; b, x 50.

Fig. 9 a, b, d – *Gondolella mombergensis longa* (Budurov & Stefanov). Adult stage; sample N 49, Site A, Fossil Hill, Humboldt Range, Nevada, *Nevadites humboldtensis* beds, lower Occidentalis Zone; a, d, x 70; b, x 50.

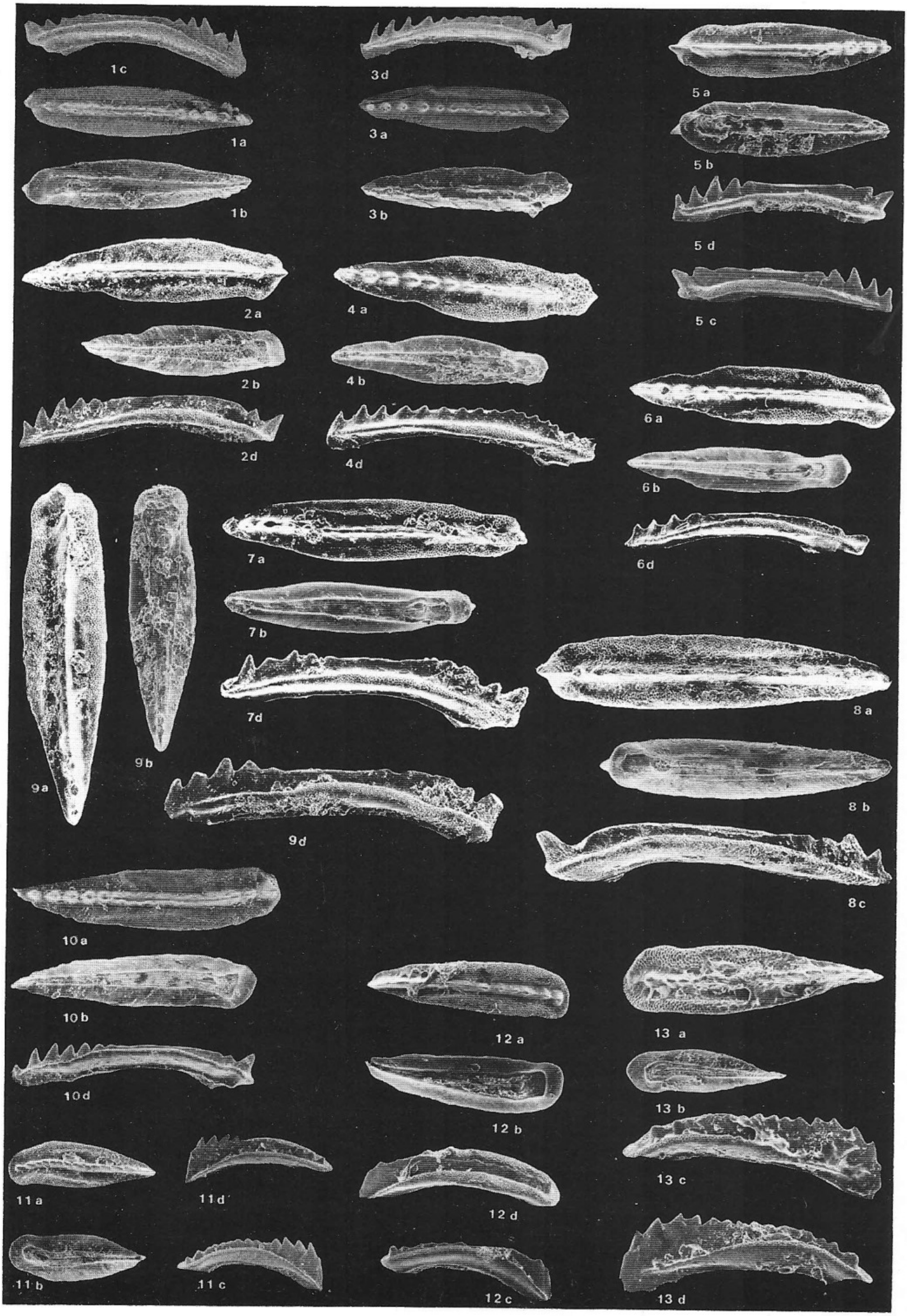
Fig. 10 a, b, d – *Gondolella mombergensis longa* (Budurov & Stefanov). Adult stage; sample N 75, Site C, Fossil Hill, Humboldt Range, Nevada, *Nevadites furlongi* beds, upper Occidentalis Zone; a, d, x 50; b, x 40.

Fig. 11 a, b, c, d – *Gondolella* sp. n. *A*. Sample N 75, Site C, Fossil Hill, Humboldt Range, Nevada, *Nevadites furlongi* beds, upper Occidentalis Zone; x 40.

Fig. 12 a, b, c, d – *Gondolella* aff. *trammeri* Kozur. Adult stage; sample N 58, Site A, Fossil Hill, Humboldt Range, Nevada, Subasperum Zone; x 40.

Fig. 13 a, b, c, d – *Gondolella excelsa* (Mosher). Adult stage; sample N 75, Site C, Fossil Hill, Humboldt Range, Nevada, *Nevadites furlongi* beds, upper Occidentalis Zone; a, c, d, x 70; b, x 40.

a = upper view; b = lower view; c, d = lateral views.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