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CONODONTS FROM THE LOWER TRIASSIC SEQUENCE OF CENTRAL DOLPO, NEPAL

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Key-words: Stratigraphy, Conodonta, Lower Triassic, Scythian, Central Dolpo, Nepal.

Riassunto. Viene illustrata la fauna a Conodonti ritrovata in tre sezioni di dettaglio rilevate nella successione del Triassico inferiore affiorante in Dolpo (Nepal) nell'area Tarap-Atali. Nonostante la raccolta di campioni di piccole dimensioni ed in numero limitato, dovuto a motivi logistici, i risultati ottenuti sono molto interessanti. Combinando le faune delle tre sezioni è stato possibile individuare una successione di eventi che ricopre quasi per intero lo Scitico e parte dell'Anisico inferiore. Nell'insieme sono state individuate 11 associazioni che si estendono dalla base del Dineriano (Scitico) al Bitinico inferiore (Anisico).

Abstract. In the present paper, the conodont fauna from three detailed sections surveyed in the Lower Triassic sequence of Central Dolpo, Nepal (Tarap-Atali area) is illustrated. Combining faunas from the three sections, it was possible to recognize a succession of faunal events that covers most of the Scythian and the Lower Anisian. In the whole, 11 faunas have been recognized and discussed.

Introduction.

During the summer of 1990, the author and A. Tintori and E. Garzanti, Department of Earth Sciences, University of Milano, under the aegis of EV-K2-CNR, had the opportunity to visit and study the sedimentary sequence of Central Dolpo, Tarap-Atali area (1) (Fig. 1).

Dolpo and the surrounding areas were studied in the past by Fuchs, who produced very good geologic maps (1967, 1977). Macrofaunas from the region were studied by Waterhouse (1966, 1976), preliminary data on microfaunas (foraminifers, ostracodes, but mostly conodonts) were reported in Fuchs & Mostler (1969). Kozur &

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(1) In the present paper toponomy stated by Survey of India and used by Fuchs (1967, 1977) in his geological maps is adopted: Tarap) local name Do; Atali) local name Tok-Khyu. Further, two Italian words are used in connection with Atali: Campo) campsite; Alta) high, being the sequence at 4870 m a.s.l. and higher in respect to the campsite section.

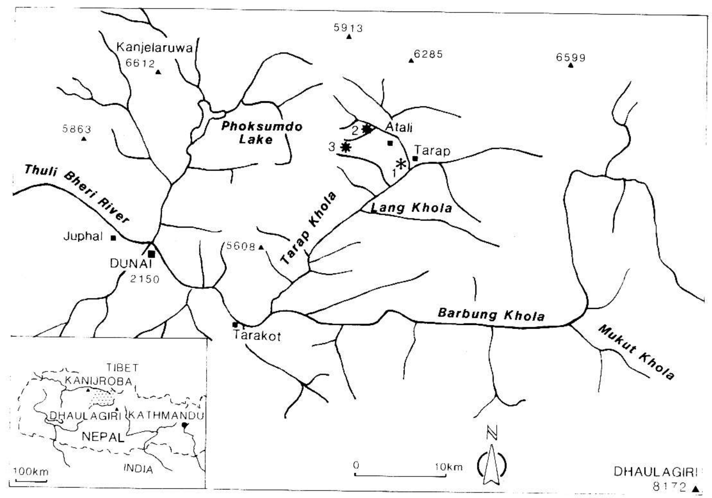


Fig. 1 - Index-map of the investigated area in Central Dolpo, Nepal. Asterisks with numbers indicate measured stratigraphic sections referred to in the text. 1*) Tarap section; 2*) Atali Campo section; 3*) Atali Alta section.

Mostler (1973) described the conodont fauna from Mukut-Tukot area, Dhaula Himal, having worked on material received from Fuchs. Recently, Clark & Hatleberg (1983) and Hatleberg & Clark (1984) refer the conodont faunas and biofacies from the Lower Triassic of Thakkhola (Nepal) and make comparisons with Svalbard.

In the present paper, the Lower Triassic sequence from the Tarap-Atali area has been particularly investigated by means of conodonts.

Lithology.

The Lower Triassic sequence of Central Dolpo is represented by the Tamba Kurkur Formation, a characteristic carbonate unit that has been recognized also in Zanskar, India (Baud et al., 1984; Gaetani et al., 1986; Fuchs, 1987), Thakkhola and Manang (Nepal) areas (Fuchs, 1967, 1977; Fuchs et al., 1988; Bordet et al., 1971). This unit shows slightly different lithologic succession in the Tarap and Atali areas, where our research has been concentrated in the 1990s.

At Tarap (Fig. 2), the formation consists of: 1) a lower part (2.60 m thick) characterized by grey, orange-weathering limestone (mudstone-wackestone) in 1-10 cm thick beds amalgamated or with thin shaly interlayers, nodular at the base (up to 0.53 cm) then in planar beds (2.07 m) resting on the black shales of the upper Thini Chu Formation.

At Atali, the Tamba Kurkur Formation, which has been studied in two different sections (Atali Campo, Fig. 3; Atali Alta, Fig. 4) consists of: 1) planar black, yellow-weathering marly limestones in 3-10 cm thick beds, extremely rich in ammonites, bivalves, ostracodes and radiolarians with thin black marly intercalations, but locally up to 3.10 m, resting on the black shales of the upper Thini Chu Formation (total thickness 1.90 m, Atali Campo; 4.55 m, Atali Alta); 2) black shales (16 m, Atali Campo; 22 m, Atali Alta); 3) planar black, yellow-weathering limestones (3-10 cm thick beds) with thin marly intercalations followed by grey, planar, laminated limestones (mudstone-wackestone) (5-20 cm thick beds) and higher up, thicker (10-15 cm) marly interlayers (5.50 m, Atali Campo; 6.20 m, Atali Alta). Toward the top, ammonites and bivalves can be present.

The Mukut Limestone (dark grey to black shales, with subordinate dark grey limestones, and marly limestones in 20-30 cm thick planar beds) follows in both areas.

The boundary with the underlying Thini Chu Formation, whose upper part closely resembles the Kuling Formation of Zanskar, is sharp and is marked by the appearance of carbonates. In the Atali Campo section, dolomitic sandstone (5 cm thick planar bed) is present at the base of the Tamba Kurkur Formation. The upper boundary with the Mukut Limestone is transitional for some (2-3) meters and was placed where pelitic intercalations become continuously very thick.

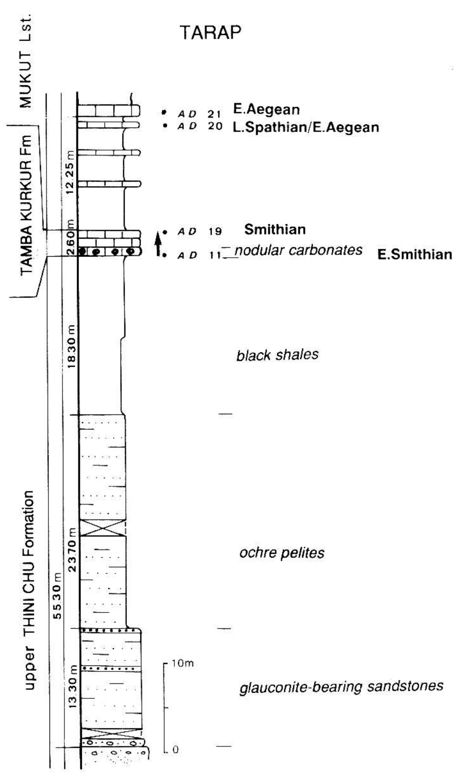


Fig. 2 - Tarap section with samples' location. White areas in the lithostratigraphic column represent black shales. The section is located in front of Tarap village, on the right-side of the river, at 4190 m a.s.l.

The Tamba Kurkur Formation represents pelagic sedimentation with minor terrigenous inputs at the base, which become more numerous and conspicuous in the middle-upper part.

The Tamba Kurkur Formation, as already pointed out, has been studied in three detailed sections: Tarap, Atali Campo and Atali Alta (Fig. 2, 3, 4). Conodont samples were not too big or numerous, mostly for logistic reasons and because we lacked porters. Nevertheless, good tools resulted from combining collections from the three sections.

Very important ammonoid horizons have also been found. A first and coarse determination of these ammonoid faunas has been done by A. Tintori and preliminary data on our 1990s research were presented as a poster at the 6th Himalaya-Karakorum-Tibet Workshop, in Aurins en Oisans, Grenoble, March 1991. Although further and detailed studies on this ammonoid fauna will be done in the future, determinations presented at Grenoble Meeting will be assumed in the present paper. In discussing our conodont faunas, zonations of Sweet (1970 a, b; 1988), Sweet et al. (1971), Solien

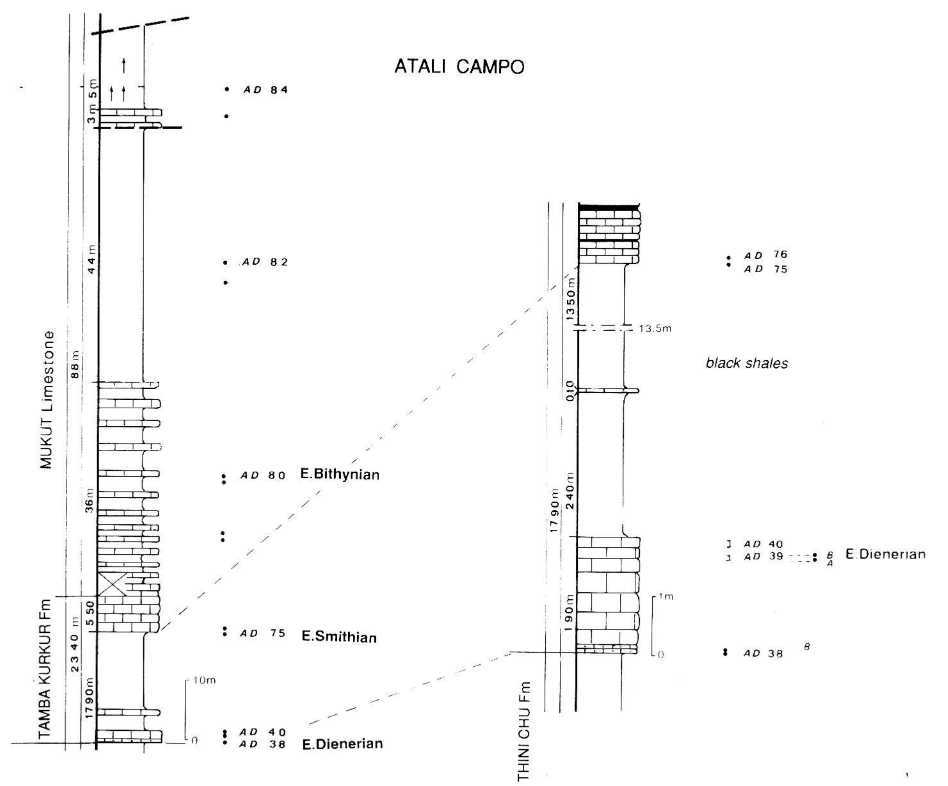


Fig. 3 - Atali Campo section with samples' location; on the right side, enlargement of the lower part. White and black areas in the lithostratigraphic column represent black shales. The section is located on the first river on the left going from Atali to NW, at 4500 m a.s.l.

(1979), Matsuda (1985), Sweet & Bergström (1986) are taken into account.

The conodont faunas represented document the following main events, from earliest to latest:

1) *Neospathodus kummeli* fauna. This is the oldest conodont fauna recognized, present only in Atali Campo section (AD 39 A), at 1.30 m from the base of the Tamba Kurkur Formation, the sample from the base (AD 38) was barren of condonts. *N. kummeli* represents a monospecific fauna, not rich but consisting of well-developed specimens. *N. kummeli* is confined to the Early Dienerian. Sweet (1988) refers *N. kummeli* till the lower part of his Milleri Zone (early Mid-Smithian).

Remarks. Sweet (1970 b, p. 215) defined the *N. kummeli* Zone on the range of *N. kummeli* yielded from "*Gyronites*-bearing limestones in the basal part of the Mittiwali Member of the "Mianwali Formation" from West-Pakistan, considering that in

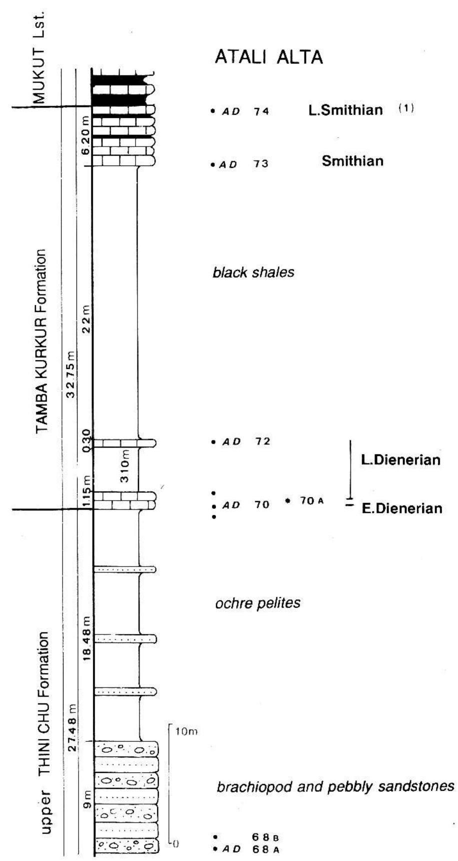


Fig. 4 - Atali Alta section with samples' location. White and black areas in the lithostratigraphic column represent black shales. The section is located toward the head of the first river valley, on the left going from Atali to NW, at 4870 m a.s.l. L. Smithian (1): according to Sweet (1988) the age of the fauna from Sample AD 74 should be Mid-Smithian.

Section	Debris-sample: A	Samples in place: AD	Sample-distance from section base: m	Conodonts																Ammonites								
				Neospathodus kummeli	*Gondolella carinata*	*Neospathodus dieneri*	*Neospathodus cristagalli*	*Neospathodus pakistanensis*	*Neospathodus conservativus*	*Neospathodus waageni*	*Gondolella milleri*	*Gondolella mosheri*	*Gondolella aff. elongata*	*Neospathodus homeri*	*Gondolella timorensis*	*Gondolella regale*	*Gondolella bulgarica*	RAMIFORMS	CONODONT FAUNAS *Present paper*	*Gyronites frequens*	*Clypeoceras yudishthira*	*Proptychites sp.*	*Submeekoceras mushbachanum*	*Koninckites kraffti*	*Hemiprionites typus*	*Meekoceras joharense*	*Anasibirites kingianus*	*Flemingites sp.*
TARAP (1)		21	16.60												103			29	10									
		20	14.85											6	2			13	9									
		19	2.60							9								3										
		18	1.60							30								15	7									
		17	1.30							15								13										
		16	1.00					3	1	54								27										
		15	0.70					10	2	30								16	6									
		14	0.53					5	2	18								15										
		13	0.38			3	3	1		10								10										
		12	0.25			4	2	3		4								12	5									
		11	0.05			1	2											1										
ATALI ALTA (3)		74	32.75							158	107	134	15					64	8								X	X
		73	27.35							3									7									
		72	4.55			1	3	6										5										
		71	1.15			30	55	28										30	4						X	X		
	70A					10	70	15										10					X	X				
		70	0.23		1	15	30	15										30	3	X	X	X						
ATALI CAMPO (2)		80	51.30													6	4		11									
		76	17.82			1	3	2		5								4	5									
		75	17.70			1	4	1		11								4										
		40	1.70		5	40	130	40										50	3			X			X			
		39 B	1.50		35													9	2									
		39 A	1.30	26														4	1									
		38	0.00																									

Tab. 1 - Conodont distribution, frequence and ammonites occurrence at Tarap, Atali Campo and Atali Alta sections (Central Dolpo, Nepal).

the *N. kummeli* Zone "the first distinctively Triassic conodont species appear, and they set the pattern by which we recognize subsequent Lower Triassic zones in West Pakistan". Subsequently, Sweet (1973, in Ziegler Ed.) reported as age and range of *N. kummeli* "Early Triassic: ? upper Griesbachian; Lower Dienerian (approximately *candidus* Zone in ammonoid chronology). Conodont zonation: ? *Neogondolella carinata* Zone; *N. kummeli* Zone (Sweet, 1970 b; Sweet et al., 1971)". He also reports *N. kummeli*-presence in Spiti District (India) where also Bhatt & Joshi (1978) and Bhatt et al. (1981a) describe the presence of *N. kummeli* in the *Ophiceras* beds of the Spiti River section. The species has been recognized also in British Columbia (Mosher, 1973), in southern Idaho and northwestern Utah (Paull, 1982), in central Nevada (Poole & Wardlaw, 1978). In North America, according to Collinson & Hasenmueller (1978) and particularly according to Paull (1982) as *N. kummeli* "occurs infrequently", their Zone 2 - *Neospathodus kummeli* is represented by "the range of *Neogondolella carinata* above *Hindeodus typicalis*". *N. kummeli* has been reported also by Matsuda (1982, 1985) from

Faunas	TARAP	ATALI Campo	ATALI Alta	Age
1. *Neospathodus kummeli*		AD 39 A		E.Dienerian
2. *Gondolella carinata*		AD 39 B		"
3. *G. carinata* *N. dieneri* *N. cristagalli* *N. pakistanensis*		AD 40	AD 70	"
4. *N. dieneri* *N. cristagalli* *N. pakistanensis*			AD 70 A AD 71 AD 72	L.Dienerian
5. *N. waageni* *N. pakistanensis* *N. dieneri* *N. cristagalli*	AD 11 AD 12 AD 13	AD 75 AD 76		E.Smithian
6. *N. waageni* *N. pakistanensis* *N. conservativus*	AD 14 AD 15 AD 16			E. Smithian
7. *N. waageni*	AD 17 AD 18 AD 19		AD 73	Smithian
8. *N. waageni* *Gondolella milleri* *G. mosheri* *G.* aff. *elongata*			AD 74	L. Smithian (1)
9. *N. homeri* *G. timorensis*	AD 20			L. Spathian/ E. Aegean
10. *G. timorensis*	AD 21			E. Aegean
11. *G. regale* *G. bulgarica*		AD 80		E. Bithynian

Tab. 2 - Conodont faunas, their distributions and ages in the Tarap, Atali Campo and Atali Alta sections (Central Dolpo, Nepal). L. Smithian (1): according to Sweet (1988) the age of this fauna (Sample AD 74) should be Mid-Smithian.

Kashmir (India) and Thakkhola (Nepal) in Lower Triassic limestone samples.

2) *Gondolella carinata* fauna. This fauna, almost monospecific, is represented only in sample AD 39 B, Atali Campo section, where also *Claraia aurita* (Hauer) occurs. It consists of several representatives of *G. carinata*, either with large or narrow platform, and few ramiform elements.

3) *Gondolella carinata, Neospathodus dieneri, N. cristagalli, N. pakistanensis* fauna. This assemblage is characterized by the occurrence of a few representatives of *Gon-*

dolella carinata, numerous specimens of *N. cristagalli*, and fewer specimens of *N. dieneri* and *N. pakistanensis*.

Remarks. This assemblage is present only in samples AD 40, Atali Campo section and AD 70, Atali Alta section. In sample AD 40 also *Hemiprionites typus* (Waagen, 1895) and *Proptychites* sp. are present and in sample AD 70 *Clypeoceras yudishthira* (Diener, 1897), *Gyronites frequens* Waagen, 1895 and *Proptychites* sp. occur.

According to Guex (1978) the base of the *Gyronites frequens* Zone is the base of the Nammalian.

Gondolella carinata has a world wide distribution and a long range being present from the Latest Permian up into Dienerian. Clark (1959), in North America, refers *G. carinata* also in the *Meekoceras* beds of Nevada. According to Sweet et al. (1971) and Matsuda (1985) our fauna 3) seems to be correlatable to the lower part of the *N. dieneri* Zone (base of late Early Dienerian). Infact both authors refer the latest occurrence of *G. carinata* in the lower part of *N. dieneri* Zone, immediately above the disappearance of *N. kummeli*. According to Sweet & Bergström (1986), our faunas 1, 2, 3) are represented in their Kummeli-Cristagalli Zone, which should embrace zones 3, 4, 5) of Sweet (1970b) and Sweet et al. (1971).

4) *Neospathodus dieneri, N. cristagalli, N. pakistanensis* fauna. This assemblage is mostly dominated by *N. dieneri* and *N. cristagalli* while *N. pakistanensis* is present with few specimens. The whole fauna is characterized by very massive elements and by contrast with the fauna described by Sweet (1970 b). *N. cristagalli* is always more frequent than *N. dieneri.*

Remarks. This fauna seems to correspond to the interval represented by the Pakistanensis Zone of Sweet (1970 b), Sweet et al. (1971) and Sweet & Bergström (1986). On the absence of *Gondolella nepalensis*, described by Fuchs, Widder & Tuladhar (1988) in Manang area occurring with the above-mentioned *Neospathodus* species, this fauna seems confined to the lower part of the *N. pakistanensis* Zone of Matsuda (1985) and thus to the Late Dienerian.

The assemblage occurs in samples AD 70 A, AD 71, AD 72, Atali Alta section. In sample AD 70 A, *Koninckites kraffti* Spath, 1930 and *Submeekoceras mushbachanum* (White, 1879) are present, while in sample AD 71 *Hemiprionites typus* (Waagen, 1895) and *Meekoceras joharense* Krafft, 1909 occur.

5) *Neospathodus waageni, N. pakistanensis* fauna. This assemblage is characterized by the presence of several *N. waageni* and rarer specimens of *N. pakistanensis; N. dieneri* and *N. cristagalli* are very rare. According to Sweet et al. (1971), Matsuda (1985) and Sweet (1988) an Early Smithian age can be inferred. This assemblage extends from sample AD 11 to AD 13, Tarap section; AD 75, AD 76, Atali Campo section.

6) *Neospathodus waageni, N. pakistanensis, N. conservativus* fauna. This fauna is mostly represented by a rich population of *Neospathodus waageni* with few typical *N. conservativus.* According to Sweet et al. (1971), this association corresponds to the middle portion of the "*Meekoceras*" interval in Nevada and thus to Middle Smithian.

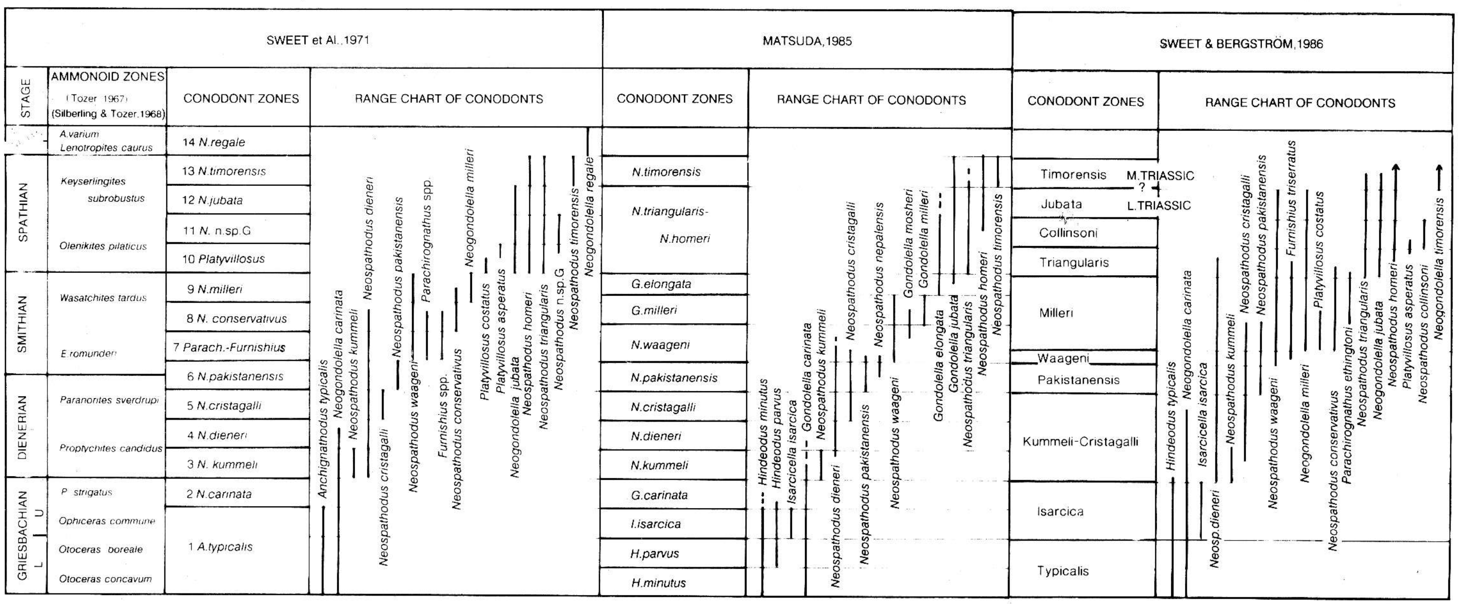
Matsuda (1985) refers this fauna to the Early Smithian. Considering Sweet (1988), fauna 6) seems to coincide with his upper Waageni Zone. It is present in samples AD 14, AD 15, AD 16, Tarap section.

7) *Neospathodus waageni* fauna. It is a monospecific fauna characterized by specimens that are not well preserved, but are very massive. It occurs in samples AD 17, AD 18, AD 19, Tarap section; AD 73, Atali Alta section.

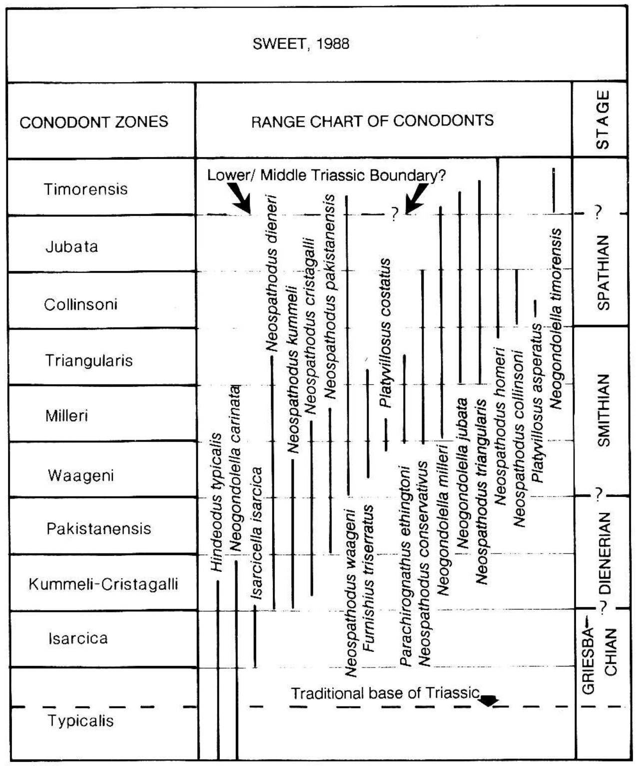
8) *Gondolella milleri, G.* aff. *elongata, G. mosheri, Neospathodus waageni* fauna. It is a characteristic fauna (limited to sample AD 74, Atali Alta section), with very abundant representatives of the previously mentioned species of the genus *Gondolella. G. milleri* and *G. mosheri* are the most abundant species, while *G.* aff. *elongata* is present only with few specimens. *N. waageni* although with several units, is less frequent than in lower stratigraphic samples. This assemblage is of Late Smithian age according to Sweet et al. (1971), Matsuda (1985), Collinson & Hasenmueller (1978). In the scheme of Sweet (1988), a Milleri Zone defined by "first appearance of the name-giver...upward to the first appearances of *Neospathodus triangularis* (Bender) and *Neogondolella jubata* Sweet" is regarded as Mid-Smithian. In the same sample *Anasibirites kingianus* Waagen, 1895 and *Flemingites* sp. are also present.

Remarks. Our faunas 5-6-7-8) are characterized by the occurrence of very numerous representatives of *Neospathodus waageni* at first with few representatives of *N. dieneri, N. cristagalli* and *N. pakistanensis* (5), then with few representatives of *N. pakistanensis* and *N. conservativus* (6), or without other species (7), next along with *Gondolella milleri, G. mosheri, G.* aff. *elongata* (8). Sweet (1970 b) defined a *N. waageni* Zone on the range of *N. waageni*, "approximately coextensive with the Smithian stage of Tozer (1965)". Subsequently, Sweet et al. (1971) divided this time-interval, on the base of material from Nevada, into three zones (Zone 7 - *Parachirognathus-Furnishius* Zone; Zone 8 - *Neospathodus conservativus* Zone; Zone 9 - *Neogondolella milleri* Zone). Paull (1982) reinstated the *N. waageni* Zone of Sweet (1970 b), considering some zones described by other authors (Sweet et al., 1971; Collinson & Hasenmueller, 1978; Clark et al., 1979; Solien, 1979) as subzones. She identified four subzones (Carr & Paull, 1983). Sweet & Bergström (1986) state a Waageni Zone defined between the first occurrence of *N. waageni* and that of *Gondolella milleri* that includes "the lower part of Sweet et al.'s (1971) *Parachirognathus-Furnishius* Zone, Collinson & Hasenmueller's (1978) *Furnishius triserratus* Zone, Solien's (1979) Furnishius Zone and at least subzone A of Carr & Paull's (1983) Zone 4", thus this zone should correspond to Early Smithian. Further, they propose a Milleri Zone between the first occurrences of *G. milleri* and *N. triangularis* that "would embrace the Conservativus and Milleri Zones of Sweet et al. (1971)". According to Sweet (1988), his Waageni and Milleri Zones represent Early and Mid-Smithian.

9) *Neospathodus homeri, Gondolella timorensis* fauna. This assemblage, present only in sample AD 20, Tarap section, is characterized by few, broken, but well-developed



Tab. 3 - a) Conodont zones and distribution of stratigraphically significant conodont species in the Lower Triassic (after Sweet et al., 1971; Matsuda, 1985; Sweet & Bergström, 1986). b) After Sweet (1988).



Tab. 3b.

and typical *N. homeri* and very rare and immature *Gondolella timorensis.* The occurrence of *N. homeri* along with primitive specimens of *G. timorensis* points to a Latest Spathian/Early Aegean age for this association.

10) *Gondolella timorensis* fauna. The presence of this monospecific fauna (AD 21, Tarap section) characterized by evolved *G. timorensis* at 14 m from the base of the Mukut Limestone suggests an Early Aegean age (Nicora, 1977).

11) *Gondolella regale, G. bulgarica* fauna. Several specimens of *G. regale*, at all growth stages are present along with characteristic *G. bulgarica*, less frequent. The occurrence of well-developed *G. regale*, along with *G. bulgarica* at 20.00 m from the base of the Mukut Limestone (Atali Campo section, AD 80) marks the Early Bithynian.

Conclusions.

The conodont fauna from the Tamba Kurkur Formation of the Tarap-Atali area ranges from the Early Dienerian to the Latest Smithian, so the formation developed

SWEET, 1970 b		SWEET et al., 1971	KOZUR and MOSTLER 1972	KOZUR and MOSTLER 1973	SOLIEN, 1979 CARR & PAULL 1983	MATSUDA 1985
Timorensis	SPATHIAN STAGE	Timorensis	Timorensis	Timorensis	8	Timorensis
Jubata		Jubata	Homeri	Homeri	7	Triangularis - Homeri
		Neosp. n. sp. G.			6	
		Platyvillosus			5 B / A	
Waageni	SMITHIAN STAGE	Milleri	Waageni	Elongata	4 D	Elongata
		Conservativus	Milleri	G. aff. Milleri	C	Milleri
		Parachirogn. Furnishius		Eotriassica	B	Waageni
Pakistanensis		Pakistanensis	N. gen. n. sp.	Gondonella n. sp. B.	A	Pakistanensis
Cristagalli	DIENERIAN STAGE	Cristagalli	Dieneri	(not discussed)	3 Dieneri	Cristagalli
Dieneri		Dieneri				Dieneri
Kummeli		Kummeli			2 Kummeli	Kummeli
Carinata	GRIES - BACHIAN	Carinata	Carinata	Carinata	1 Typicalis	Carinata
Typicalis		Typicalis	Typicalis	Parvus		Isarcica
				Isarcica		Parvus
	PER - MIAN					Minutus

Tab. 4 - Correlations of biozones plotted vs. stages (after Sweet & Bergström, 1986; Matsuda, 1985).

after the Griesbachian as also pointed out by Fuchs et al. (1988) in the Manang area. In Zanskar it was deposited in the Griesbachian (Nicora et al., 1984; Gaetani et al., 1986), as its base is characterized by the presence of *Hindeodus typicalis* along with *Gondolella carinata.*

On the analysis of the above-mentioned conodont fauna some remarks can be made:

1) in the Atali Campo section, the first conodont fauna, characterized by *N. kummeli* (AD 39 A), is 1.30 m above the base of the formation. A sample from the base (AD 38) was barren of conodonts, so these 1.30 m could represent Dienerian or even Griesbachian;

2) in the Atali Alta section, where assemblage 1) was not found, the base of the formation is somewhat disturbed tectonically, so the first layers may be missing;

3) at Tarap, where apparently no tectonic events deformed the sequence, at least at Thini Chu/Tamba Kurkur boundary, the first carbonate layer yielded a fauna with badly preserved *N. dieneri* and *N. cristagalli. N. dieneri* along with *N. cristagalli, N. pakistanensis* and *N. waageni* are definitely present 25 cm from the base of the Tamba Kurkur Fm. (AD 12).

Considering these facts, deposition of the Tamba Kurkur Formation occurred at slightly different times: Early Dienerian at Atali Campo and Atali Alta, Early Smithian at Tarap.

Systematic paleontology

Complete synonymies, descriptions and occurrences for all the species of this study are readily available in Sweet (1970 a, b), Sweet et al. (1971), Kuzur & Mostler (1976), Goel (1977), Solien (1979), Matsuda (1982, 1983). Because most of the species are very well known, only remarks are presented. SEM photomicrographs of each species recovered are included in Pl. 24-27. Material figured and described is retained at the Department of Earth Sciences, Geology and Paleontology Section, University of Milano, Via Mangiagalli 34, Milano, Italy.

Genus *Neospathodus* Mosher, 1968

Type-species: *Spathognathodus cristagalli* Huckriede, 1958

Neospathodus cristagalli (Huckriede, 1958)

Pl. 25, fig. 5, 7-11; Pl. 26, fig. 4

1958	*Spathognathodus cristagalli* Huckriede, p. 161, pl. 10, fig. 14, 15 (non 10-13, 18a, 18b = *N. dieneri*).
1970 a	*Neospathodus cristagalli* - Sweet, p. 9, pl. 1, fig. 18, 21.
1970 b	*Neospathodus cristagalli* - Sweet, p. 246, pl. 1, fig. 14, 15.
1971	*Neospathodus cristagalli* - Sweet et al., pl.1, fig. 13.
1973	*Neospathodus cristagalli* - Mosher, p. 170, pl. 20, fig. 4.
1973	*Neospathodus cristagalli* - Sweet in Ziegler, p. 169, pl. 1, fig. 14.
1982	*Neospathodus cristagalli* - Matsuda, p. 92, pl. 3, fig. 1-12.
1985	*Neospathodus cristagalli* - Matsuda, pl. 1, fig. 6.

Remarks. Our specimens fit perfectly with those described by Sweet (1970 a, b) and Matsuda (1982). Also in our material, as in Sweet's material, some mature specimens present midlateral rib very well developed, so protruded to form a narrow platform. In our collection from Central Dolpo, *N. cristagalli*, represented by a wide population, occurs with less abundant *N. dieneri*. The two species are represented by a large population with all growth stages. Juvenile representatives of *N. cristagalli* resemble *N. dieneri*, but we distinguish the former from the latter on the following characters: 1) *N. cristagalli* is longer, with a longer anterior process characterized by 6-7 denticles; 2) midlateral ribs is more prominent, also at juvenile growth stage; 3) basal cavity is more elongated and elliptical in shape.

Range. According to Sweet (1970 a, b), Sweet et al. (1971), *Neospathodus cristagalli* is confined to Late Dienerian. Matsuda (1985) refers *N. cristagalli*-range from Late Dienerian to Early Smithian. Sweet & Bergström (1986) refer *N. cristagalli* from the Kummeli-Cristagalli Zone up into the Milleri Zone (Late Dienerian-Upper Smithian).

Occurrence. Samples AD 11, AD 12, AD 13, Tarap section; AD 40, AD 75, AD 76, Atali Campo section; AD 70, AD 70 A, AD 71, AD 72, Atali Alta section.

Neospathodus conservativus (Muller, 1956)

Pl. 26, fig. 5

1956 *Ctenognathus conservativa* Muller, p. 821, pl. 95, fig. 25-27.
1971 *Neospathodus conservativus* - Sweet et al., pl. 1, fig. 6; pl. 2, fig. 21, 23, 24.
1973 *Neospathodus conservativus* - Sweet in Ziegler, p. 167, pl. 1, fig. 3.
1979 *Neospathodus conservativus* - Solien, p. 303, pl. 3, fig. 5, 6.
1984 *Neospathodus conservativus* - Dagis, p. 28, pl. 5, fig. 8.
1985 *Neospathodus conservativus* - Matsuda, pl. 1, fig. 23-25.

Remarks. We attribute to this species few elements almost straight with basal margin folded and turned upward beneath the posterior third. Denticles are fused for most of their length and posteriorly inclined. Basal cavity enlarges and expandes in lozange shape.

Range. The species is characteristic of Middle-Late Smithian (Sweet et al., 1971; Solien, 1979; Matsuda, 1985), Late Smithian (Sweet & Bergström, 1986).

Occurrence. Samples AD 14, AD 15, AD 16, Tarap section.

Neospathodus dieneri Sweet, 1970

Pl. 25, fig. 1-4, 6

1958 *Spatognathodus cristagalli* Huckriede, p. 161, pl. 10, fig. 10-13, 18a, 18b (non 14, 15).
1970 a *Neospathodus dieneri* Sweet, p. 9, pl. 1, fig. 17.
1970 b *Neospathodus dieneri* - Sweet, p. 249, pl. 1, fig. 1, 4.
1971 *Neospathodus dieneri* - Sweet et al., pl. 1, fig. 23.
1973 *Neospathodus dieneri* - McTavish, p. 293, pl. 2, fig. 3, 6.
1973 *Neospathodus dieneri* - Mosher, p. 171, pl. 20, fig. 2.

1973 *Neospathodus dieneri* - Sweet in Ziegler, p. 171, pl. 1, fig. 13.
1977 *Neospathodus dieneri* - Goel, p. 1093, pl. 1, fig. 13.
1982 *Neospathodus dieneri* - Matsuda, p. 90, pl. 2, fig. 1-11.
1984 *Neospathodus dieneri* - Dagis, p. 27, pl. 6, fig. 4-7.
1985 *Neospathodus dieneri* - Matsuda, pl. 1, fig. 5.

Remarks. We recognize several specimens of this species at all growth stages. Characters perfectly fit with those described by Sweet (1970 a, b) and Matsuda (1982). Blade-like elements with weak midlateral rib, and highest denticles at the posterior end. Denticles, commonly 7-9, vertical at anterior end, slightly reclined posteriorly from the middle part to the posterior end. A long, expanded terminal posterior cups is present; the basal margin, straight anteriorly, is prominently angled upward at the posterior end where a basal cavity wide and subtriangular is present.

Range. From Kummeli Zone to Jubata Zone (Sweet et al., 1971; Matsuda, 1985); from Kummeli-Cristagalli Zone into Triangularis Zone (Sweet & Bergström, 1986)- Lower Triassic, Dienerian-Spathian.

Occurrence. Samples AD 11, AD 12, AD 13, Tarap section; AD 40, AD 75, AD 76, Atali Campo section; AD 70, AD 70 A, AD 71, AD 72, Atali Alta section.

Neospathodus homeri (Bender, 1970)

Pl. 26, fig. 9

1970 *Spathognathodus homeri* Bender, p. 528, pl. 5, fig. 16, 18.
1970 b *Neospathodus homeri* - Sweet, p. 245, pl. 1, fig. 2, 3, 9, 10.
1971 *Neospathodus homeri* - Sweet et al., pl. 1, fig. 29.
1973 *Neospathodus homeri* - McTavish, p. 293, pl. 1, fig. 8, 11.
1973 *Neospathodus homeri* - Mosher, p. 171, pl. 20, fig. 14.
1973 *Neospathodus homeri* - Sweet in Ziegler, p. 177, pl. 1, fig. 2, 20.
1977 *Neospathodus homeri* - Goel, p. 1097, pl. 2, fig. 10, 11.
1979 *Neospathodus homeri* - Solien, p. 303, pl. 3, fig. 8, ? 11.
1983 *Neospathodus homeri* - Matsuda, p. 94, pl. 4, fig. 1-9; pl. 5, fig. 1-5.
1985 *Neospathodus homeri* - Matsuda, pl. 1, fig. 12, 13.

Remarks. Our material consists of only a few representatives, not well preserved. Notwithstanding, they fully recall the characters of the holotype.

Range. *Neospathodus homeri* is a worldwide species related to Latest Smithian and Spathian.

Occurrence. Sample AD 20, Tarap section.

Neospathodus kummeli Sweet, 1970

Pl. 24, fig. 1-3

1970 b *Neospathodus kummeli* Sweet, p. 251, pl. 2, fig. 17-21.
1971 *Neospathodus kummeli* - Sweet et al., pl. 1, fig. 29.
1973 *Neospathodus kummeli* - Mosher, p. 171, pl. 20, fig. 3.
1973 *Neospathodus kummeli* - Sweet in Ziegler, p. 181, pl. 1, fig. 1.
1981 a *Neospathodus kummeli* - Bhatt, Joshi & Arora, pl. 2, fig. 10.

1981 b *Neospathodus praekummeli* Bhatt, Joshi & Arora, p. 444, pl. 1, fig. 1-3.
1982 *Neospathodus kummeli* - Matsuda, p. 87, pl. 1, fig. 1-7.
1985 *Neospathodus kummeli* - Matsuda, pl. 1, fig. 4.

Remarks. Specimens at hand are long, very narrow, without any midlateral rib. In lateral view: denticles 10 to 13, nearly equal in height, almost vertical or slightly inclined posteriorly, fused, but discrete apically. In aboral view, some specimens show small pit with well developed loop located near posterior end and with narrow groove developed all length (Pl. 24, fig. 1, 2), others have a wider basal cavity, near posterior end, with flaring loop, gradually decreasing in a narrow groove (Pl. 24, fig. 3). According to Matsuda (1982), considering aboral view, the former refers to his Type 1 and the latter to his Type 2 of *N. kummeli.*

Range. *N. kummeli* characterizes the Early Dienerian (Sweet, 1970; Sweet et al., 1971; Matsuda, 1985; Sweet & Bergström, 1986).

Occurrence. AD 39 A, Atali Campo section.

Neospathodus pakistanensis Sweet, 1970

Pl. 26, fig. 1-3

1970 b *Neospathodus pakistanensis* Sweet, p. 254, pl. 1, fig. 16, 17.
1971 *Neospathodus pakistanensis* - Sweet et al., pl. 1, fig. 41.
1973 *Neospathodus pakistanensis* - McTavish, p. 295, pl. 1, fig. 1, 2.
1973 *Neospathodus novaehollandiae* McTavish, p. 294, pl. 1, fig. 4, 5, 14, 16-23.
1973 *Neospathodus pakistanensis* - Mosher, p. 172, pl. 20, fig. 6.
1973 *Neospathodus pakistanensis* - Sweet in Ziegler, p. 183, pl. 1, fig. 15.
1977 *Neospathodus novaehollandiae* - Goel, p. 1091, pl. 1, fig. 1, 2.
1979 *Neospathodus pakistanensis* - Solien, p. 303, pl. 3, fig. 1.
1983 *Neospathodus pakistanensis* - Matsuda, p. 87, pl. 1, fig. 1-5.
1984 *Neospathodus pakistanensis* - Dagis, p. 26, pl. 5, fig. 9-11.
1985 *Neospathodus pakistanensis* - Matsuda, pl. 1, fig. 7.

Remarks. Specimens at hand fit well with specimens described by Sweet (1970 b) and Matsuda (1983). According to Matsuda (1983), we also consider *Neospathodus novaehollandiae* MacTavish, that presents large and rounded, downcurved basal cavity, straight aboral surface with a long anterior process with 9-10 denticles, as synonym of *N. pakistanensis.*

Range. *N. pakistanensis* is typical of the Late Dienerian and Early Smithian (Sweet, 1970 b; Sweet et al., 1971; Matsuda, 1985; Sweet & Bergström, 1986). According to Sweet (1988), it extends up to Mid-Smithian.

Occurrence. Samples AD 12 to AD 16, Tarap section; AD 40, AD 75, AD 76, Atali Campo section; AD 70, AD 70 A, AD 71, AD 72, Atali Alta section.

Neospathodus waageni Sweet, 1970

Pl. 26, fig. 6-8, 11

1970 b *Neospathodus waageni* Sweet, p. 260, pl. 1, fig. 11, 12.
1971 *Neospathodus waageni* - Sweet et al., pl. 1, fig. 26.

1973 *Neospathodus waageni* - McTavish, p. 300, pl. 20, fig. 5.
1973 *Neospathodus waageni* - Sweet in Ziegler, p. 193, pl. 1, fig. 9.
1977 *Neospathodus waageni* - Goel, p. 1094, pl. 2, fig. 1-4.
1977 *Neospathodus* aff. *waageni* Goel, p. 1094, pl. 2, fig. 5-9.
1979 *Neospathodus waageni* - Solien, p. 304, pl. 3, fig. 9.
1983 *Neospathodus waageni* - Matsuda, p. 88, pl. 1, fig. 6-10; pl. 2, fig. 1-7.
1984 *Neospathodus waageni* - Dagis, p. 24, pl. 7, fig. 1-10; pl. 8, fig. 1-7; pl. 15, fig. 3 (= *N.* aff. *waageni*).
1985 *Neospathodus waageni* - Matsuda, pl. 1, fig. 10.

Remarks. Our specimens strictly resemble characters described in Sweet (1970 b) and in Matsuda (1983). Particularly, Matsuda (1983) describes three morphotypes distinguished mainly by length of posterior process and shape of aboral surface. We recognized these morphotypes in our material from Central Dolpo, in particular morphotype 3 characterized by a wide basal cavity (Pl. 26, fig. 6).

Range. *Neospathodus waageni* has a worldwide distribution and characterizes the Smithian (Sweet, 1970 b; Sweet et al., 1971; Matsuda 1983, 1985). Sweet & Bergström (1986) refer *N. waageni* range as Smithian-Spathian.

Occurrence. Samples AD 12 to AD 19, Tarap section; AD 75, AD 76, Atali Campo section; AD 73, AD 74, Atali Alta section.

Genus *Gondolella* Stauffer & Plummer, 1932

Type-species: *Gondolella elegantula* Stauffer & Plummer, 1932

Gondolella carinata Clark, 1959

Pl. 24, fig. 4-11

1959 *Gondolella carinata* Clark, p. 308, pl. 44, fig. 15-19.
1959 *Gondolella nevadensis* Clark, p. 308, pl. 44, fig. 11-14.
1959 *Gondolella planata* Clark, p. 309, pl. 44, fig. 8-10.
1966 *Gondolella carinata* - Clark & Mosher, p. 390, pl. 47, fig. 21-23.
1970 b *Neogondolella carinata* - Sweet, p. 240, pl. 3, fig. 1-17, 24, 26, 27.
1971 *Neogondolella carinata* - Sweet et al., pl. 1, fig. 1, 6, 7.
1973 *Neogondolella carinata* - Mosher, p. 165, pl. 19, fig. 1-3, 9.
1973 *Neogondolella carinata* - Sweet in Ziegler, p. 129, pl. 1, fig. 3.
1985 *Gondolella carinata* - Matsuda, pl. 1, fig. 18.
1989 b *Clarkina carinata* - Kozur, pp. 414, 424-426, 428-429.

Remarks. We include in this species both specimens either with a characteristically wide platform (Pl. 24, fig. 4, 5, 8) occasionally with constriction at posterior end (Pl. 24, fig. 9, 10), or with a narrow platform (Pl. 24, fig. 6, 7, 11). Specimens with wide platform closely resemble material represented by Sweet (1970 b) on pl. 3, fig. 1-17, 24, 26, 27. Specimens with narrow platform (related to *Gondolella nevadensis* Clark, 1959) represent immature stage of growth. Considering in Pl. 24, fig. 4 to fig. 11 an evident evolutionary trend can be noted. On these remarks, we agree with Sweet (1970 b) considering *Gondolella nevadensis* Clark as synonym of *G. carinata* Clark. Specimens with wide or narrow platform are present in the same samples and in the same amount in our material.

Range. *Gondolella carinata* is developed in the Griesbachian and ranges up to Early Dienerian.

Occurrence. Samples AD 39 B, AD 40, Atali Campo section; AD 70, Atali Alta section.

Gondolella aff. elongata (Sweet, 1970)

Pl. 27, fig. 1

Remarks. We attribute to *G.* aff. *elongata* a few specimens found only in sample AD 74, Atali Alta section, in association with very abundant *G. milleri, G. mosheri* and *Neospathodus waageni.* Platform is thick and extends more than in Sweet's *G. elongata.* Platform margins are parallel and upturned, denticles are shorter and more fused than illustrated by Sweet (1970 b). Some specimens present very long platform (Pl. 27, fig. 1), they resemble those represented by Sweet (1970 b) in pl. 3, fig. 23, 25, but denticles are quite different, more fused and free blade is lower. These specimens seem to represent ontogenetic transitions between *G. milleri* and *G. elongata.*

Range. According to Sweet (1970 b), *G. elongata* ranges from Pakistanensis Zone up to Timorensis Zone, Dienerian/Smithian to Spathian. Matsuda (1985), restricts its range from uppermost Smithian (*G. elongata* Zone) to Late Spathian (*N. triangularis* - *N. homeri* Zone).

Occurrence. Sample AD 74, Atali Alta section.

Gondolella milleri Muller, 1956

Pl. 27, fig. 2-5, 7

1956 *Gondolella milleri* Muller, p. 823, pl. 95, fig. 1-9.
1956 *Gondolella eotriassica* Muller, p. 823, pl. 95, fig. 10, 11.
1971 *Neogondolella milleri* - Sweet et al. , pl. 1, fig. 37.
1973 *Neogondolella milleri* - Mosher, p. 167, pl. 19, fig. 22, 23, 25.
1973 *Neogondolella crenulata* Mosher, p. 166, pl. 19, fig. 7, 10-14, 16.
1973 *Neogondolella milleri* - Sweet in Ziegler, p. 139, pl. 1, fig. 11.
1976 *Gondolella milleri parva* Kozur & Mostler, p. 7, pl. 1, fig. 7.
1979 *Neogondolella milleri* - Solien, p. 302, pl. 2, fig. 19-26.
1985 *Gondolella milleri* - Matsuda, pl. 1, fig. 20.
1989 b *Scythogondolella milleri* - Kozur, pp. 414, 423-424, 429, pl. 7, fig. 2.

Remarks. A very wide population represents this species in our màterial from Dolpo. The characters of our specimens agree well with the original description. In our fauna, all growth stage are represented. Particularly quite long units are present, with denticles strongly posteriorly inclined. Several specimens show platform margins strongly upturned also in early growth stage. Platform generally extends throughout the whole length of the unit, but in some specimens it is developed only in the posterior third. Denticles, crenulations or ondulations are present on platform margins also in small specimens (= *G. milleri parva* Kozur & Mostler, 1976).

Range. According to Sweet et al. (1971), *G. milleri* is confined to the Latest Smithian (Milleri Zone). Matsuda (1985) refers *G. milleri* - range to the middle part of the Late Smithian (*W. tardus* Zone) while Sweet & Bergström (1986) and Sweet (1988) from the Mid-Smithian up to Latest Spathian/Anisian.

Occurrence. Sample AD 74, Atali Alta section.

Gondolella mosheri Kozur & Mostler, 1976

Pl. 27, fig. 6

1973	*Neogondolella nevadensis* - Mosher, pl. 19, fig. 17, 18, 24.
1976	*Gondolella mosheri* Kozur & Mostler, p. 8, pl. 1, fig. 9-12.
1979	*Neogondolella nevadensis* - Solien, pl. 2, fig. 7, 9.
1984	*Neogondolella nevadensis* - Dagis, p. 14, pl. 4, fig. 2.
1985	*Gondolella mosheri* - Matsuda, pl. 1, fig. 19.
1989 b	*Scythogondolella mosheri* - Kozur, p. 429.

Remarks. Representatives of the species are small, but quite massive. Platform is broad and squared off posteriorly, locally inflected, it tapers abrutply anteriorly. Platform margins upturned with microornamentation confined into brim. High carina with 8-9 massive denticles, fused at the base, lower in the middle part. Posterior cusp projects to posterior. Basal keel broad and flat with narrow central groove. It terminates in a small pit at the centre of a widely flaring posterior loop. Specimens from Dolpo (also the holotype is from this region) resemble those represented by Matsuda (1985) from Pakistan and by Mosher (1973, quoted as *G. nevadensis* Clark) from British Columbia and Northern Arctic Islands.

Range. According to Kozur & Mostler (1976) and Matsuda (1985) the species' range is confined to the lower Tardus Zone, lower part of Late Smithian.

Occurrence. Sample AD 74, Atali Alta section.

Gondolella timorensis Nogami, 1968

Pl. 26, fig. 10

1968	*Gondolella timorensis* Nogami, p. 127, pl. 10, fig. 17-21.
1970	*Neogondolella aegaea* Bender, p. 516, pl. 3, fig. 25, 26, 29.
1970 b	*Neospathodus timorensis* - Sweet, p. 256, pl. 2, fig. 22, 23.
1971	*Neospathodus timorensis* - Sweet et al., pl. 1, fig. 25.
1973	*Spathognathodus gondolelloides* - Sweet in Ziegler, p. 189.
1977	*Neogondolella timorensis timorensis* Nicora, p. 92, pl. 1, fig. 1-6; pl. 2, fig. 1-10; pl. 3, fig. 1, 2, 4, 5; pl.4, fig. 7-10.
1981	*Neospathodus timorensis* - Chhabra & Sahni, pl. 1, fig. 35, 38, 39, 41, 42, 43, 46.
1985	*Neospathodus timorensis* - Matsuda, pl. 1, fig. 14, 15.
1989 b	*Chiosella timorensis* - Kozur, pp. 415-416, 429, pl.15, fig. 1-3.

Remarks. Several specimens have been recorded. The characters perfectly fit with those of the holotype. In our material massive and more evolved specimens are rarer than juvenile specimens.

Range. *G. timorensis* has a worldwide distribution and its first occurrence characterizes the Scythian/Anisian boundary. Particularly, when *G. timorensis* has a well developed platformlike rib, it characterizes the Earliest Anisian (Nicora, 1977;

Assereto et al., 1980). Most authors refer *G. timorensis* to Latest Spathian. Sweet (1970 b, p. 218) discussed the possibility that his Timorensis Zone might be Anisian. More recently (1988, pp. 269-271), he points out that "Nicora's (1977) conclusions (= Timorensis Zone is lowest Anisian (Aegean)) seem now to be supported by the results of graphic correlation."

Occurrence. Samples AD 20, AD 21, Tarap section.

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PLATE 24

Fig. 1 b, c - *Neospathodus kummeli* Sweet. Sample AD 39 A; x 60.
Fig. 2 b, c - *Neospathodus kummeli* Sweet. Sample AD 39 A; x 65.
Fig. 3 b, c - *Neospathodus kummeli* Sweet. Type 2, according to Matsuda (1982). Sample AD 39 A; x 50.
Fig. 4 a, b, c - *Gondolella carinata* Clark. Mature stage with wide platform. Sample AD 38 B; a) x 60; b, c) x 40.
Fig. 5 a, b, c - *Gondolella carinata* Clark. Mature stage with moderatly wide platform. Sample AD 39 B; a, b) x 65; c) x 45.
Fig. 6 a, b, c - *Gondolella carinata* Clark. Medium ontogenetic stage with moderatly narrow platform. Sample AD 39 B; a, b) x 65; c) x 45.
Fig. 7 a, b, c - *Gondolella carinata* Clark. Mature stage with narrow platform. Sample AD 39 B; a, b) x 65; c) x 45.
Fig. 8 a, b, c - *Gondolella carinata* Clark. Mature stage with wide platform. Sample AD 40; a, b) x 40; c) x 65.
Fig. 9 a, b, c - *Gondolella carinata* Clark. Medium ontogenetic stage with wide platform. Sample AD 40; a, c) x 48; b) x 50.
Fig. 10 a, b, c - *Gondolella carinata* Clark. Medium ontogenetic stage with wide platform. Sample AD 40; a) x 48; b, c) x 50.
Fig. 11 a, b, c - *Gondolella carinata* Clark. Late juvenile stage with narrow platform, compare fig. 4, 5, 7. Sample AD 40; a) x 62; b) x 65; c) x 45.

All samples from Atali Campo section, Central Dolpo, Nepal.
a) Upper view; b) lateral view; c) lower view.

PLATE 25

Fig. 1 a, b - *Neospathodus dieneri* Sweet. Sample AD 71; a, b) x 85.
Fig. 2 a, b - *Neospathodus dieneri* Sweet. Sample AD 40; a, b) x 90.
Fig. 3 a, b - *Neospathodus dieneri* Sweet. Sample AD 40; a, b) x 90.
Fig. 4 a, b - *Neospathodus dieneri* Sweet. Sample AD 71; a, b) x 68.
Fig. 5 a, b - *Neospathodus cristagalli* (Huckriede). Sample AD 71; a, b) x 75.
Fig. 6 a, b - *Neospathodus dieneri* Sweet. Sample AD 40; a, b) x 75.
Fig. 7 a, b - *Neospathodus cristagalli* (Huckriede). Sample AD 40; a, b) x 75.
Fig. 8 a, b - *Neospathodus cristagalli* (Huckriede). Sample AD 40; a, b) x 55.
Fig. 9 a, b - *Neospathodus cristagalli* (Huckriede). Sample AD 70 A; a, b) x 55.
Fig. 10 a, b - *Neospathodus cristagalli* (Huckriede). Sample AD 70 A; a, b) x 55.
Fig. 11 a, b - *Neospathodus cristagalli* (Huckriede). Sample AD 71; a, b) x 65.

Samples AD 70 A, AD 71 from Atali Alta section; AD 40 from Atali Campo section. Both sections from Central Dolpo, Nepal.
a) Lateral view; b) lower view.

PLATE 26

Fig. 1 a, b - *Neospathodus pakistanensis* Sweet. Atali Alta section, sample AD 70 A; a, b) x 45.
Fig. 2 a, b - *Neospathodus pakistanensis* Sweet. Atali Campo section, sample AD 40; a, b) x 50.

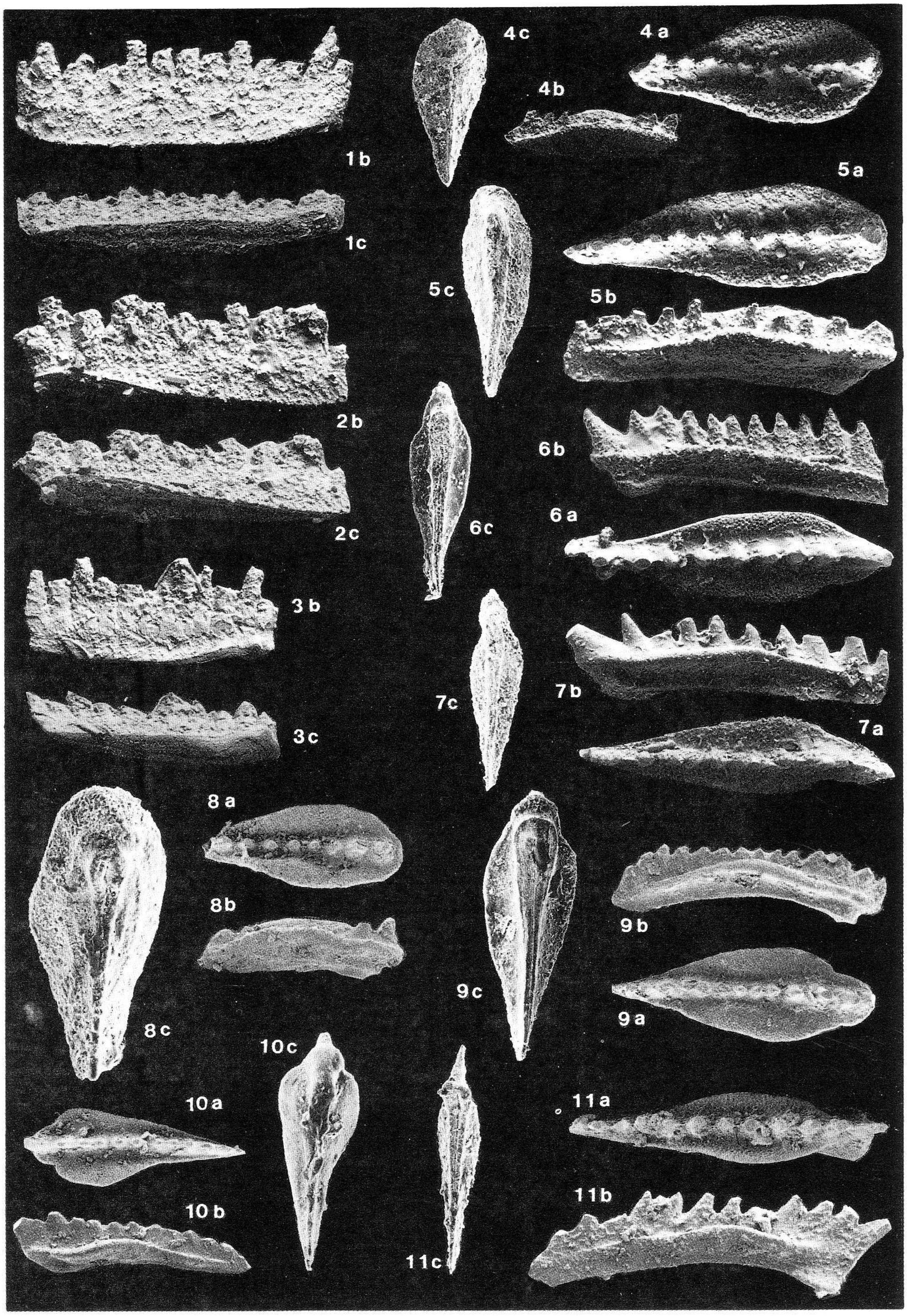
Fig. 3 a, b - *Neospathodus pakistanensis* Sweet. Atali Campo section, sample AD 40; a, b) x 50.
Fig. 4 a, b - *Neospathodus cristagalli* (Huckriede). Atali Alta section, sample AD 70 A; a) x 55; b) x 50.
Fig. 5 a, b - *Neospathodus conservativus* (Muller). Tarap section, sample AD 15; a, b) x 55.
Fig. 6 a, b - *Neospathodus waageni* Sweet. Morphotype 3, according to Matsuda (1983). Tarap section, sample AD 19; a, b) x 55.
Fig. 7 a, b - *Neospathodus waageni* Sweet. Atali Alta section, sample AD 74; a, b) x 70.
Fig. 8 a, b - *Neospathodus waageni* Sweet. Atali Alta section, sample AD 74; a, b) x 60.
Fig. 9 a, b - *Neospathodus homeri* (Bender). Tarap section, sample AD 20; a, b) x 65.
Fig. 10 a, b - *Gondolella timorensis* Nogami. Tarap section, sample AD 21; a, b) x 60.
Fig. 11 a, b - *Neospathodus waageni* Sweet. Atali Alta section, sample AD 74; a, b) x 70.

All sections from Central Dolpo, Nepal.
a) Lateral view; b) lower view.

PLATE 27

Fig. 1 a, b, c - *Gondolella* aff. *elongata* (Sweet). a, b, c) x 48.
Fig. 2 a, b, c - *Gondolella milleri* Muller. a, b, c) x 50.
Fig. 3 a, b, c - *Gondolella milleri* Muller.Juvenile stage. a, b, c) x 80.
Fig. 4 a, b, c - *Gondolella milleri* Muller. a, b, c) x 50.
Fig. 5 a, b, c - *Gondolella milleri* Muller. a, b) x 50; c) x 40.
Fig. 6 a, b, c - *Gondolella mosheri* Kozur & Mostler. a, b, c) x 60.
Fig. 7 a, c, d, e - *Gondolella milleri* versus *elongata*. a, c, d, e) x 50.

All specimens from sample AD 74, Atali Alta section, Central Dolpo, Nepal.
a) Upper view; b) lateral view; c) lower view; d) upper/oblique view; e) lateral/oblique view.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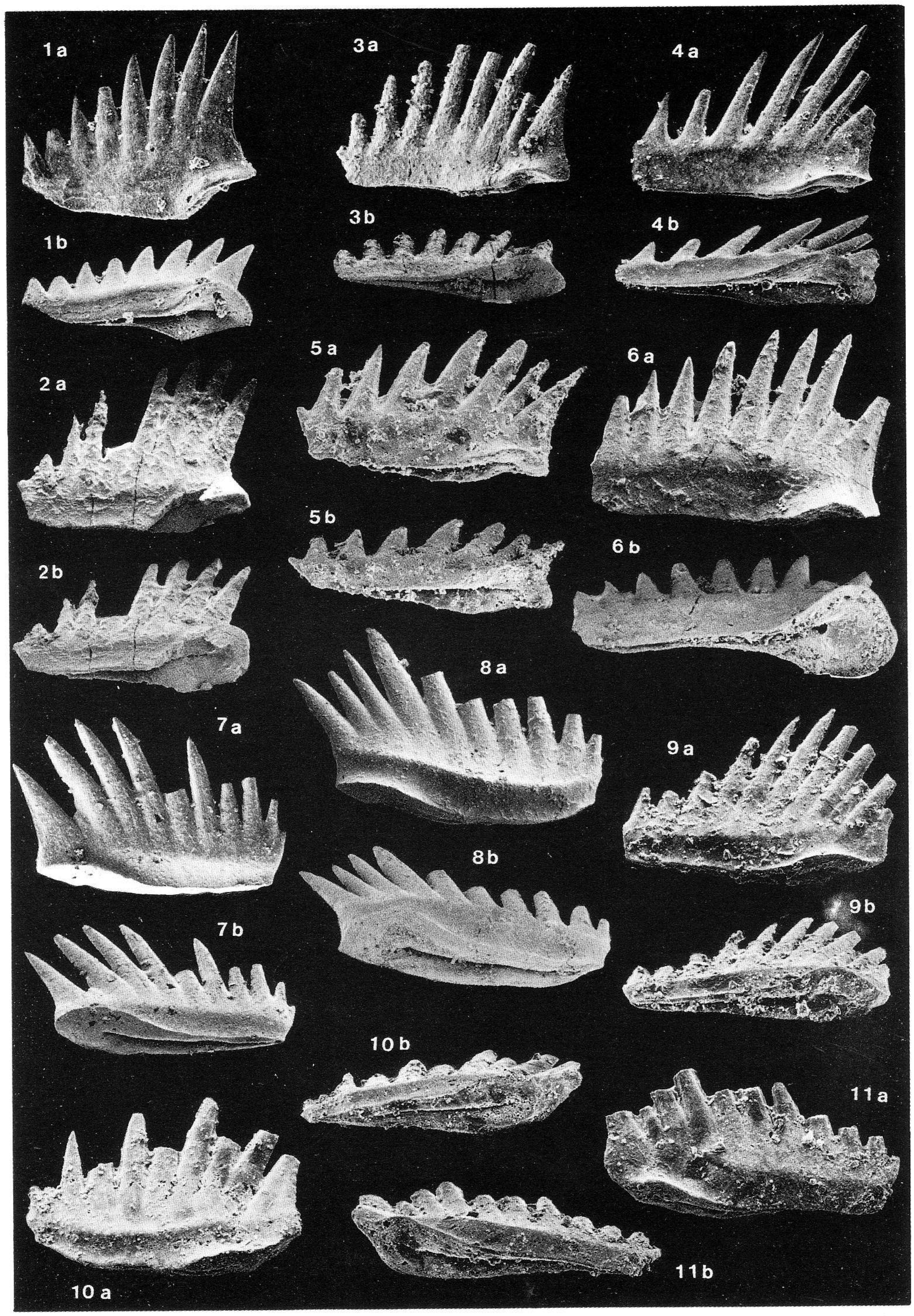
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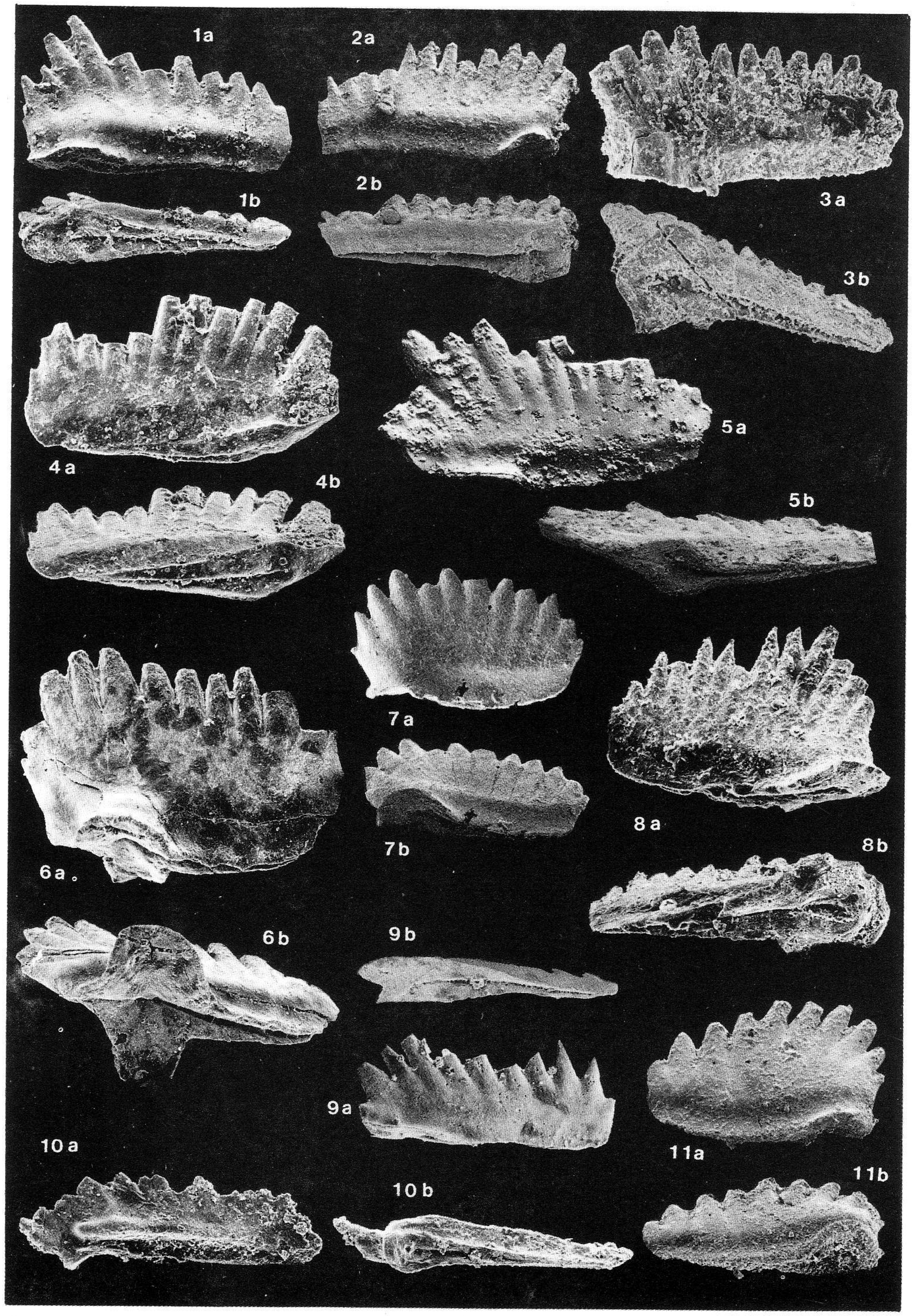
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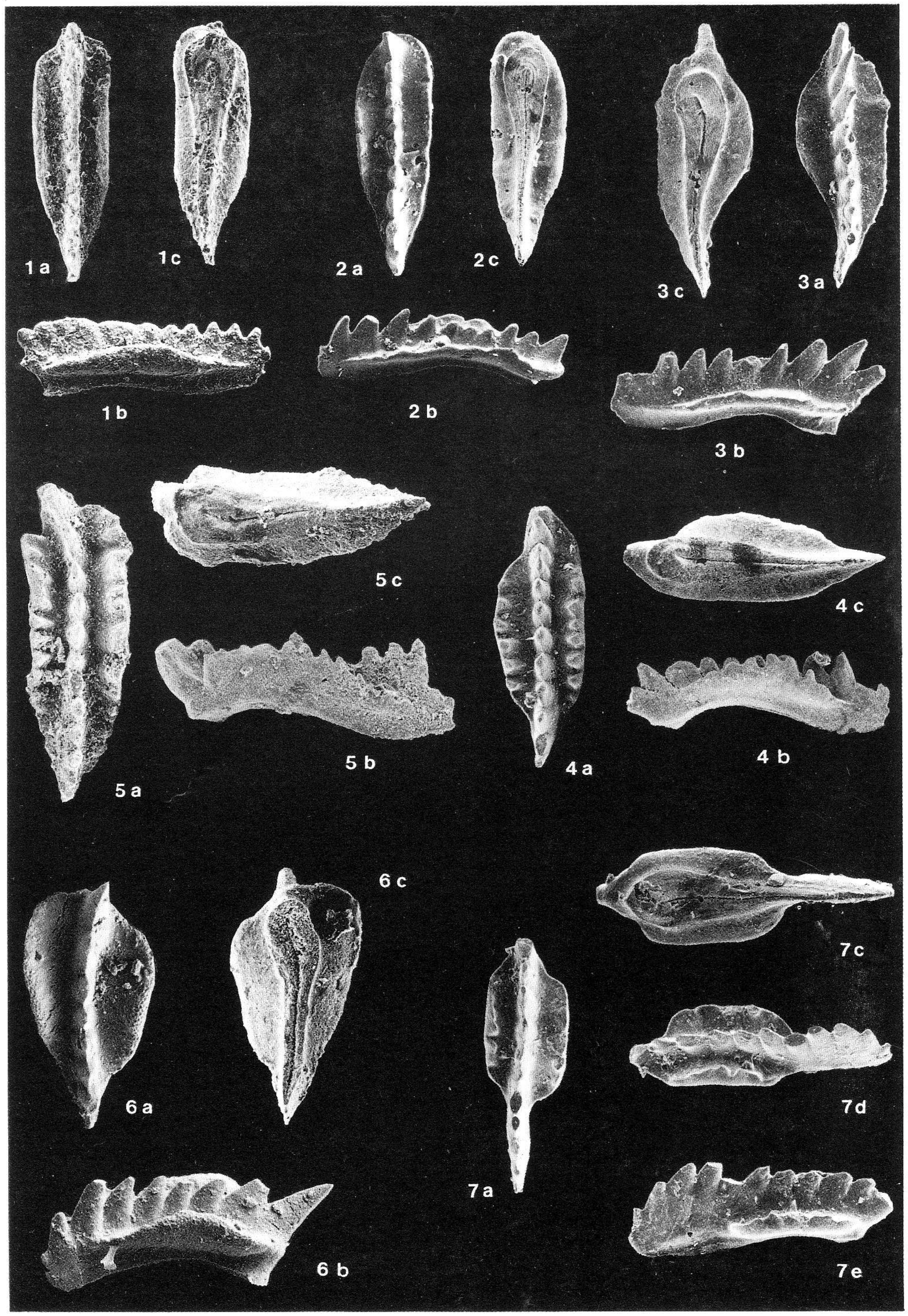
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