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A CONODONT FAUNA OF THE DINANTIAN FROM THE KUZNETSK BASIN (SOUTHERN SIBERIA) (*)

by

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ABSTRACT.- Lower to middle Tournaisian conodonts are recorded for the first time from southern Siberia. An exact correlation with Belgian and West-German Tournaisian stratotypes seems impossible. The conodont assemblage is characteristic of shallow marine costal areas.

RESUME.- Pour la première fois une faune à conodontes du Tournaisien inférieur/moyen en provenance de la partie méridionale de la Sibérie est mentionnée. Une corrélation précise avec les stratotypes belges ou allemands est impossible. L'assemblage à conodontes caractérise un milieu côtier peu profond.

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I.- INTRODUCTION

During the VIII International Congress on Carboniferous Stratigraphy and Geology - Moscow 1975 - Excusion for the Kuznetsk Basin, Southern Siberia, one of us (J.B.) had the opportunity to visit and sample two sections situated along the Kondoma river, near the village of Kuzedeevo and along the Chumush river, near the village of Kostenkovo. (Fig. 1)

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FIGURE 1.-

Furthermore excursionists were allowed to the examination and sampling of borehole cores (Borehole 11700). From the 34 samples 12 revealed conodonts. No foraminefera have been observed. The conodont fauna and the biostratigraphical relationship will be discussed in the report.

II.- DESCRIPTION OF THE SECTIONS

1.- SECTION ALONG THE KONDOMA RIVER, NEAR THE VILLAGE OF KUZEDEEVO (Fig. 2 ans Fig. 3).

According to the Guidebook for the Kuznetsk Basin excursions the sequence is subdivided from base to top into five lithological horizons : Abyshevsky, Taidonsky, Fominsky, Podyakovsky and Verkotomsky.

In this section the *Abyshevsky horizon* is represented only by 2m of green and cherry coloured shales, representing the upper-most part of the horizon.

The *Taidonsky horizon* in this section is 170m thick, composed by grey, clayey, organoclastic limestones (12m, sample 1), black oolithic limestones light green calcareous shales (10m), black oolitic limestones (3m) and micrograined limestones with lenses, spots and interlayers of organic detritus (145m, samples 2 - 10).

The base of the *Fominsky horizon* is composed of grey and dark-grey coarse-grained slimy organoclastic limestones with interlayers and small lenses of cherts. (Samples 11 - 13) The top of the Fominsky horizon, along the right bank of the Kondoma river is represented by fine-grained sandstones and silty limestones with scare and thin interlayers of oolitic detrital limestones and shales. (Samples 14 - 16)

The *Podyakovsky horizon* (165m) is chiefly build up by green and greenish-grey sandstones alternating with shale beds with calcareous lenses and nodules (Samples 17 - 22). The top of this horizon is crowned by a layer of algal limestone (1,2m).

The *Verkotomsky horizon* is terrigeneous and consists of strongly calcareous greenisch-grey sandstones, overlain by a basal conglomerate of the "Ostrogskaya suite" wich is no further exposed.

2.- SECTION ALONG THE CHUMUSH RIVER, NEAR THE VILLAGE OF KOSTENKOVO (Fig. 4).

The exposure shows the Taidonsky, Fominsky, Podysakovsky and Verkotomsky horizons, forming a large syncline and a large anticline. According to the Guidebook the section is divided into four horizons :

The *Taidonsky horizon* is only exposed in his upper part and is represented by grey and dark-grey organoclastic crinoidal limestones.

The *Fominsky horizon* (160m) is composed of five members, from base to top :

(1) dark-grey organoclastic limestones with rare interbedded shales (30m)

(2) dark-grey limestones with small lenses of black chert, alternating with organoclastic limestones. (60m, samples 23 - 25)

(3) organoclastic light-grey limestones alternating with oolithic limestones and brachiopodal coquina. (15m, samples 26 - 27)

(4) dark-grey limestones with few layers of sandy limestones. (35m)

(5) grey limestones with interlayers of black shales and thin partings of coquina. (20m)

The *Podyakovshy horizon* consists of an alternation of sandstones and shales with a small amout of volcanic ashes and thin limestone lenses, followed by fine-grained limestones with an admixture of fine volcanic ashes and detritus of different kind of shells, intercalated with a rhyolitic porphyr bed. (Samples 28 - 30)

The *Verkotomsky horizon* (100m) is composed of shales with numerous nodules and lenses of limestone. (Samples 31 - 34)

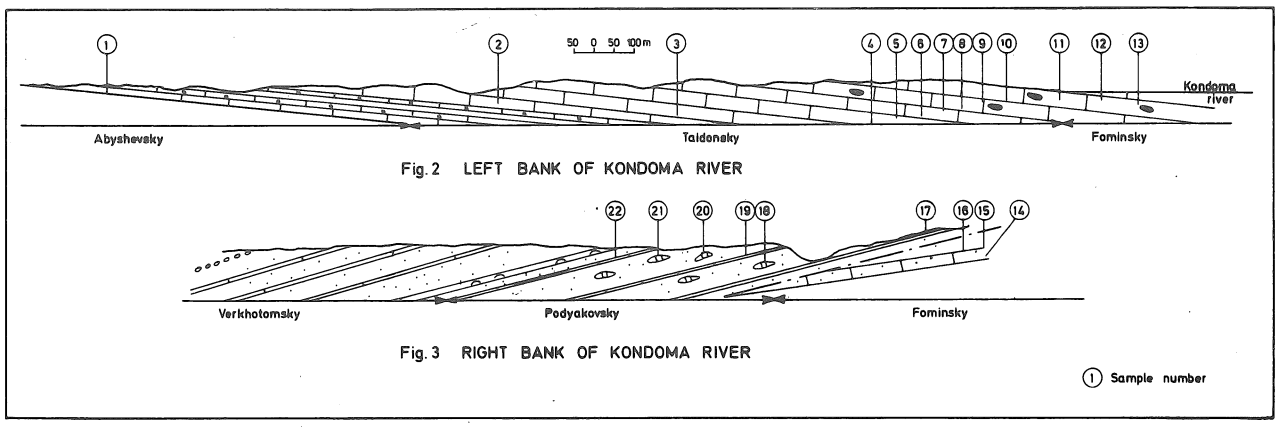

FIGURE 2 et 3.-

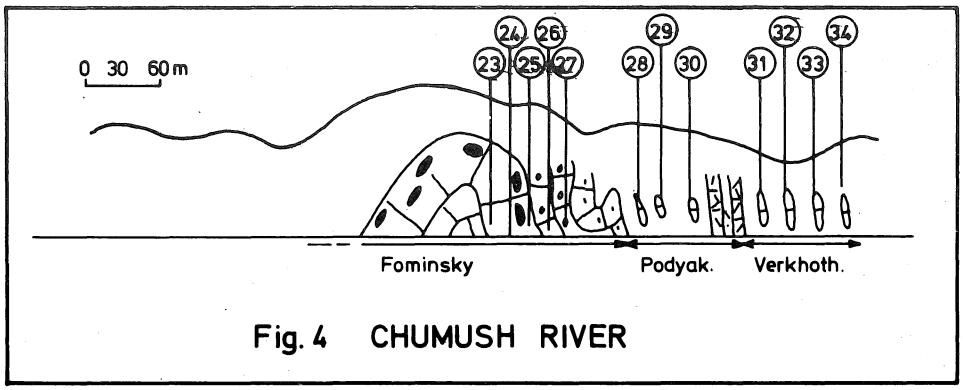

FIGURE 4.-

III.- BIOSTRATIGRAPHIC RELATIONSHIPS

A.- PREVIOUS INVESTIGATIONS

Abundant early Carboniferous fossils caracterise the *Abyshevsky horizon : Bisphaera malevkensis* Bir., *Thecostegites rossicus* Sokolov, *Cyathoclysia coniseptum* (Keyserl.), *Lioclema padunskiensis* Tr., *Fenestella juxtaserratila* Tr., *Schuchertella valentinae* Sok., *Mesoplica abyshevensis* Sar., *Semiproductus irregularicostatus* (Krest. et Karp.), *Cyrtospirifer ivanovae* Besn., *Tenticospirifer tychtensis* Besn., *Sphenospira julii* (Dehee), *Glyptopleura, Moorites, Bairdia, Eridoconcha socialis* (Eichwald). (Guidebook pp. 90 - 91)

Taidonsky and Fominsky horizons, according to the foraminefera :

in Taidonsky : *Tournayella discoidea* (Dain.), *Septaglomospiranella primaeva* var. *kasakhstani* Reitl., *Chernyshinella glomiformis* (Lip.), *Endothyra latispiralis* Lip., *E. kosvensis* Lip., *E. tuberculata* Lip.,

in Fominsky : *Septatournayella recta* Leb., *Tournayella moelleri* Malakh., *T. subangulata* Malakh., *Endothyra taimyrica* Lip., *Plectogyrina fomichaensis* (Leb.). *Endothyra perfida* Lip., *Planoendothyra evoluta* (Leb.), *Globoendothyra mrassiensis* Leb., *G. globulus* var. *parva* (N. Tcern.) and *Tetrataxis vulgaris* Malakh., are correlated with the Tournaisian and more precisely, compared with Belgian faunas, the Taidonsky horizon to the top lower and middle Tournaisian (*Chernyshinella glomiformis*).

The boundary between Fominsky and Podyakovsky horizons is estabished by the change of litholo-gical feactures. Any way the *Podyakovsky horizon* is characterised by early Visean foraminifera: *Endothyra elegia* Malakh., *E. amplis* Schlyk., *Globoendothyra globulus* (Eichw.), *G. ischimica* Raus., *Eoendothyra ermakiensis* (Leb.), *E. pressa* (Leb.), *Mediocris ovalis* (Viss.), *Tetrataxis perfidus* Malakh. and *T.* cf. *kiselicus* Malakh. (Guidebook p. 94) The occurrence of the genera *Mediocris* and *Eoendothyranopsis* allows us to correlate roughly the Podyakovsky horizon to lower and middle Visean.

According to typical macrofauna and the spores the *Verkotomsky horizon* can be correlated with the Visean of Eastern Europe and the Asiatic part of the USSR (Guidebook p. 95).

B.- CONODONT FAUNA

Out of 34 samples, taken in the two sections, 12 yielded conodonts. Because of the long and expensive transport the samples were kept very small, at least for conodont sampling, ranging from about 100 gr to about 800 gr. The faunas are small, consisting of very few species. Table 1 shows the distribution of the important species. The following conodonts were found in the different samples :

Section a, Kondoma river banks, Taidonsky horizon :

Sample 1 : *Polygnathus communis communis* BRANSON & MEHL 1934
Hindeodella sp.
Compounds indet.

Sample 2 : *Polygnathus communis communis* BRANSON & MEHL 1934
Compound indet.

Sample 3 : *Bispathodus aculeatus plumulus* RHODES, AUSTIN & DRUCE, 1969
Clydagnathus gilwernensis RHODES, AUSTIN & DRUCE, 1969
Clydagnathus sp.
Angulodus sp.
Hindeodella sp.
Compounds indet.

Sample 4 : *Hindeodella* sp.

Sample 9 : *Clydagnathus darensis* RHODES, AUSTIN & DRUCE, 1969.
Clydagnathus sp.

Sample 10 : *Clydagnathus cavusformis* RHODES, AUSTIN & DRUCE, 1969

Section 1, Kondoma river banks, Fominsky horizon :

Sample 11 : *Clydagnathus cavusformis* RHODES, AUSTIN & DRUCE, 1969
Clydagnathus sp.
Hindeodella sp.
Ozarkodina sp.

Sample 12 : *Clydagnathus* sp.

Sample 13 : *Clydagnathus cavusformis* RHODES, AUSTIN & DRUCE, 1969

Sample 15 : *Clydagnathus darensis* RHODES, AUSTIN & DRUCE, 1969

Section 1, Kondoma river banks, Podyakovsky horizon :

Sample 22 : Compound indet.

Section 2, Chumush river banks, Fominsky horizon :

Sample 23 : *Bispathodus aculeatus plumulus* (RHODES, AUSTIN & DRUCE), 1969
Polygnathus communis communis BRANSON & MEHL, 1934.

Borehole 11700 :

397 m : *Clydagnathus darensis* RHODES, AUSTIN & DRUCE, 1969

316 m : *Spathognathodus penescitulus* REXROAD & COLLINSON, 1965
Spathognathodus sp.
Apathognathus scalenus VARKER, 1967
Hibbardella (Hibbardella) ortha REXROAD, 1958
Hindeodella sp.
Neoprioniodus sp.
Ozarkodina sp.
Compounds indet.

Horizon	Taidonsky					Fominsky				Fominsky		
Locality	Kondoma river					Kondoma river				Chumush river	Borehole 11700	
Sample n°	1	2	3	9	10	11	12	13	15	23	397m	316m
Bispathodus aculeatu plumulus	–	–	1	–	–	–	–	–	–	1	–	–
Clydagnathus cavusformis	–	–	–	–	1	1	–	1	–	–	–	–
Cl. darensis	–	–	–	1	–	–	–	–	1	–	1	–
Cl. gilwernensis	–	–	2	–	–	–	–	–	–	–	–	–
Clydagnathus sp.	–	–	1	1	–	1	1	–	–	–	–	–
Polygnathus communis communis	8	1	–	–	–	–	–	–	–	1	–	–
Spathognathodus penescitulus	–	–	–	–	–	–	–	–	–	–	–	3
Spathognathodus sp.	–	–	–	–	–	–	–	–	–	–	–	1

TABLE 1.- Distribution of the important species.

C.- ATTEMPT FOR CORRELATION

According to RHODES, AUSTIN & DRUCE (1969) and DRUCE (1969) the genus *Clydagnathus* is found in the K-zone and in the lower part of the Z-zone in Great Britain and is confined to the Tournaisian in Australia. The lowest occurrence of the genus is represented by *Clydagnathus gilwernensis*. The lower Z-zone species are *Cl. darensis* and *Cl. unicornis*.

The presence of *Cl. gilwernensis, Cl. cavusformis* and *Cl. darensis* allows us to range roughly the Taidonsky and the Fominsky horizons in an interval between the *Patrognathodus variabilis* - *"Spathognathodus plumulus"* A.Z. to the *Polygnathus lacinatus* A.Z. More precisely according to DRUCE (1969) the Taidonsky horizon starts within the range of *Cl. gilwernensis* (*"Sp. plumulus"* A.Z. to *Cl. nodosus* A.Z.) while the top of this horizon and at least the Fominsky horizon are to compare with the top of the *"Sp. tridentatus"* A.Z. (Fig. 5)

Correlation of the Taidonsky and Fominsky horizons with Belgian stratotypes and with Western German lower Carboniferous sections on this base seems to be impossible. On the base of foraminifera (*Chernyshinella glomiformis*) the Taidonsky horizon can be broadly correlated with the upper part of the lower Tournaisian (Tn 1b) and/or middle Tournaisian (Tn 2).

In considering the distribution of conodont genera in the Upper Paleozoic DRUCE (1973) recognised three possible biofacies. Biofacies two is characterised in the lower Tournaisian by lateral nodose spathognathodids, pseudopolygnathids, polygnathids and *Clydagnathus*. This assemblage characterises the *Spathognathodus*-biofacies, considered by VEEVERS & ROBERTH (1968) to be a shallow, nearshore platform area.

SYSTEMATIC PALEONTOLOGY

Genus *Clydagnathus* RHODES, AUSTIN & DRUCE, 1969.

Type-species *Clydagnathus cavusformis* RHODES, AUSTIN & DRUCE, 1969

Diagnosis : A lanceolate curved platform unit with short anterior blade, elongate platform and medial trough. The blade is medial to lateral, the platform is ornamented, a posterior carina is possible, the basal cavity is assymetrical.

Clydagnathus differs from *Scaphignathus* by the distinct basal cavity and from *Cavusgnathus* by the general anterior closure of the oral trough, by the merging of the marginal ornament with the blade and by the lateral rather than longitudinal expansion of the cavity.

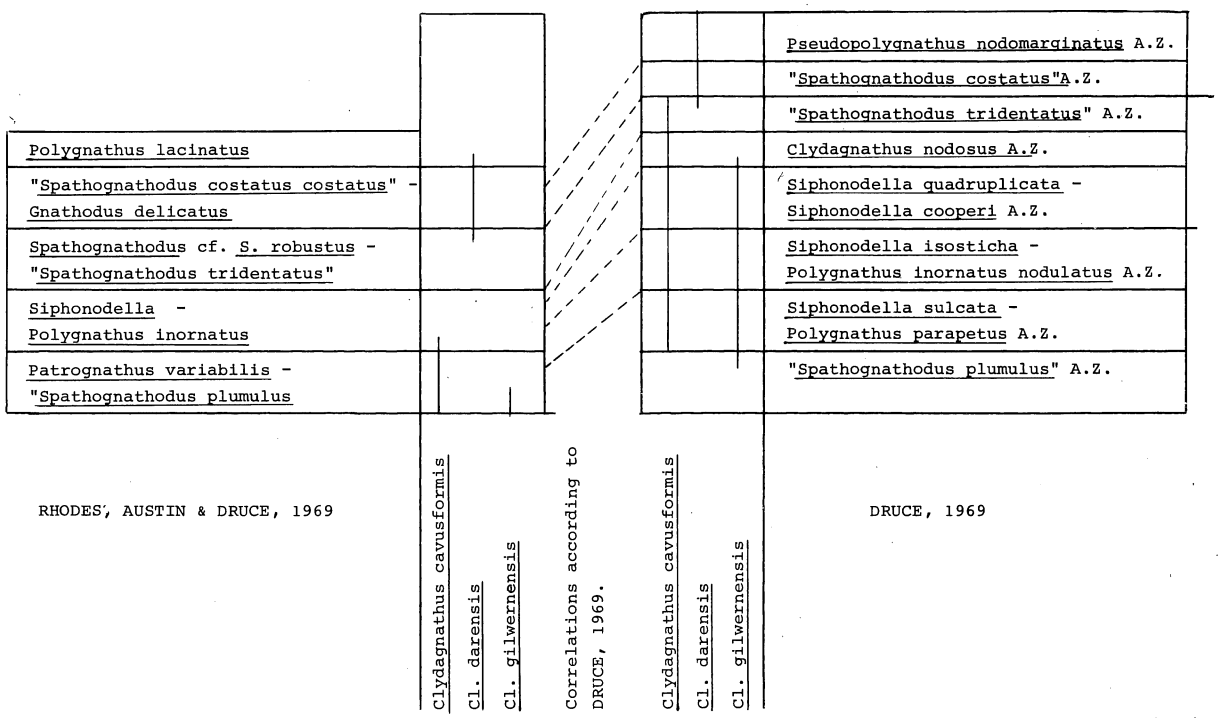

FIGURE 5.- Range of *Clydagnathus cavusformis, Cl. darensis* and *Cl. gilwernensis* in Great-Britain and in Australia.

The genus is described from the Lower-Carboniferous in Great-Britain (RHODES, AUSTIN & DRUCE, 1969) and Australia (DRUCE, 1969), and from the Upper-Devonian in the Western United States (BEINER, KLAPPER, SANDBERG & ZIEGLER, 1971). In Belgium one *Clydagnathus sp.* is recorded from the base of the Tn 2b (GROESSENS in Second international Symposium on fossil corals and reefs, guidebook, excursion C p. 29).

Seven species are known until yet. Three of them are present in our samples. Until now the entire range of each species of the genus is probably not fully known. Any way the species of our samples are restricted to the Lower Carboniferous, *Cl. gilwernensis* appears a bit earlier then *Cl. darensis* and *Cl. cavusformis*.

Clydagnathus cavusformis RHODES, AUSTIN & DRUCE, 1969

x1969 *Clydagnathus cavusformis* n.sp. - RHODES, F. H., AUSTIN, R.L. & DRUCE, E.C., pp. 85-86, pl. 1, fig. 9-13d.

1969 *Clydagnathus cavusformis* RHODES, AUSTIN & DRUCE, 1969 - DRUCE, E.C., p. 50, pl. 4, fig. 1a-b ; 5-7c.

Occurrence : Great Britain : Lower Cleistopora (K) zone (RHODES et al.)

Australia : *Siphonodella sulcata - Polygnathus parapetus* A.Z. to "*Spathognathodus tridentatus*" A.Z. (DRUCE, 1969)

Siberia : Taidonsky horizon, sample 10, Fominsky horizon samples 11 and 13.

Clydagnathus darensis RHODES, AUSTIN & DRUCE, 1969

x1969 *Clydagnathus darensis* n.sp. - RHODES, F.H., AUSTIN, R.L. & DRUCE, E.C., pp. 86-87, pl. 2, fig. 6a - 7d.

1969 *Clydagnathus darensis* RHODES, AUSTIN & DRUCE, 1969 - DRUCE, E.C., pp. 50-51, pl. 4, fig. 8a - 9c.

Occurrence : Great Britain : Uppermost Cleistopora (K) zone to lower Zaphrentis (Z) zone (RHODES et al.)

Australia : "*Spathognathodus tridentatus*" A.Z. to *Pseudopolygnathus nodomarginatus* A.Z. (DRUCE, 1969)

Siberia : Taidonsky horizon, sample 9, Fominsky horizon sample 15, Borehole 11700 - 397m.

Clydagnathus gilwernensis RHODES, AUSTIN & DRUCE, 1969.

x1969 *Clydagnathus gilwernensis* n. sm. - RHODES, F. H., AUSTIN, R.L. & DRUCE, E.C., pp. 87-88, pl. 2, fig. 1 a-d.

1969 *Clydagnathus gilwernensis* RHODES, AUSTIN & DRUCE, 1969 - DRUCE, E.C., pp. 51-52, pl. 4, fig. 2a - 4 ; pl. 30, fig. 8.

Occurrence : Great Britain : Lower Cleistopora (K) zone (RHODES et al.)

Australia : Upper "*Spathognathodus plumulus*" A.Z. to lower *Clydagnathus nodosus* A.Z. (DRUCE, 1969)

Siberia : Taidonsky horizon, sample 3.

Genus *Spathognathodus* BRANSON & MEHL, 1941.

Spathognathodus penescitulus REXROAD & COLLINSON, 1965

x1969 *Spathognathodus penescitulus* n. sp. - REXROAD, C.B. & COLLINSON, Ch., pp. 22-23, pl. 1, fig. 13-15.

Remarks : This species resembles to *Sp. scitulus* (HINDE, 1900) in lateral view, but the basal cavity is restricted to the mid third of the length and is strongly assymetrical.

In lateral view *Sp. penescitulus* ressembles also *Sp. cristulus* YOUNGQUIST & MILLER, 1949 wich has also a large basal cavity that extends over about 3/4 of the length. Comparison is very difficult because REXROAD & COLLINSON do not figure an aboral view of *Sp. penescitulus*.

In our sample B 11700 - 316m *Sp. penescitulus* is associated with *Ozarkodina sp., Neoprioniodus sp., Hindeodella sp., Hibbardella ortha* and *Apathognathus scalenus*. This association ressembles to the composition of the apparatus Type 1, described by KLAPPER & PHILIP (1971).

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PLATE 1.-

All specimens magnified X 50

1-2 : *Clydagnathus cavusformis*
1 : Lateral view, sample B13, Kondoma river, Fominsky horizon. 2 : Aboral view, sample B10, Kondoma river Taidonsky horizon.

3 : *Clydagnathus gilwernensis*
Oral view, sample B3, Kondoma river, Taidonsky horizon.

4 : *Clydagnathus sp.*
Lateral view, sample B3, Kondoma river, Taidonsky horizon.

5 : *Clydagnathus cavusformis*
Lateral view, sample B10, Kondoma river, Taidonsky horizon.

6-7 : *Clydagnathus darensis*
6 : Lateral view, 7 : Oral view ? sample B9, Kondoma river, Taidonsky horizon.

8, 11-12 : *Spathognathodus penescitulus*
8 : oral view, 11-12 : lateral view. sample Borehole 11700 - 316m.

9-10 : *Polygnathus communis commun is*
9 : oral view of a platform, 10 : oral view. sample B1, Kondoma river, Taidonsky horizon.

13 : *Apathognathus scalenus*
Sample borehole 11700 - 316 m.

14 : *Hibbardella ortha*
Sample borehole 11 700 - 316m.

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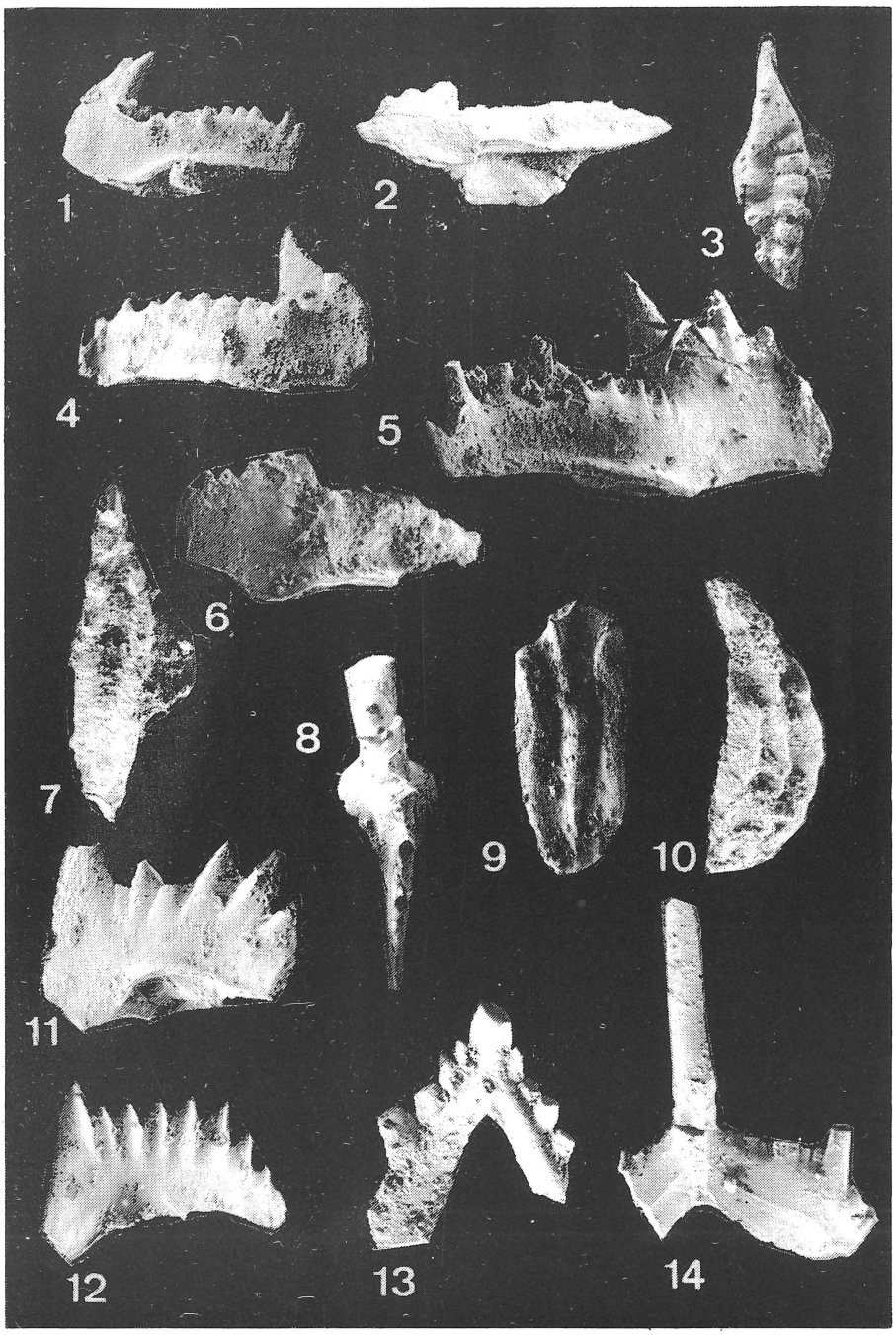
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