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CHITRALINA UNDULATA GEN. N. SP. N. (FORAMINIFERIDA) FROM THE LATE PERMIAN OF KARAKORUM (PAKISTAN)

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Key-words: Foraminiferida, Earlandiacea, New Family, New Genus, New Species, Brachiopoda, Late Permian, Karakorum.

Riassunto. *Chitralina undulata* gen. n. sp. n. (Foraminiferida) è stata riconosciuta per la prima volta nelle successioni permiane del Karakorum (Pakistan). Lo studio biostratigrafico di dettaglio basato su Fusulinidi, Brachiopodi, Conodonti e piccoli Foraminiferi, ha messo in evidenza che *Chitralina undulata* gen. n. sp. n. compare per la prima volta nel Kubergandiano e si estende fino al Murgabiano superiore-Midiano. Si tratta di una forma morfologicamente simile a *Rectostipulina quadrata* Jenny-Deshusses, 1985, dalla quale differisce principalmente per la composizione e lo spessore del guscio e per la presenza di coste longitudinali marcate. La distribuzione stratigrafica di *R. quadrata* comprende inoltre l'intervallo stratigrafico Midiano-Dorashamiano. *Chitralina* gen. n. è morfologicamente affine al genere permiano *Giraliarella* Crespin, dal quale si distingue per l'assenza di costrizioni trasversali del guscio. La nuova famiglia Chitralinidae fam. n. è inoltre qui istituita.

Abstract. *Chitralina undulata* gen. n. sp. n. (Foraminiferida) has been found for the first time in the Permian successions of Karakorum (Pakistan). Biostratigraphic analysis based on fusulinids, brachiopods, conodonts and small foraminifers pointed out that *Chitralina undulata* gen. n. sp. n. occurs from the Kubergandian to the Late Murgabian-Midian. Morphologically, *Chitralina undulata* gen. n. sp. n., is comparable to *Rectostipulina quadrata* Jenny-Deshusses, 1985, differing from it by means of the thickness and composition of the test and for the presence of marked longitudinal costae. The stratigraphic range of *Rectostipulina quadrata* spans the Midian-Dorashamian time-interval. The new genus *Chitralina* is very similar to the Permian genus *Giraliarella* Crespin, differing from it by means of the absence of transverse growth constrictions. The new family Chitralinidae fam. n., is also described herein.

Introduction.

Chitralina undulata gen. n. sp. n. has been found in Chitral (western Karakorum) in the fourth member of the Lashkargaz Formation (Gaetani et al., in prep.) and in the Upper Hunza valley (Central sector of Karakorum) in the second

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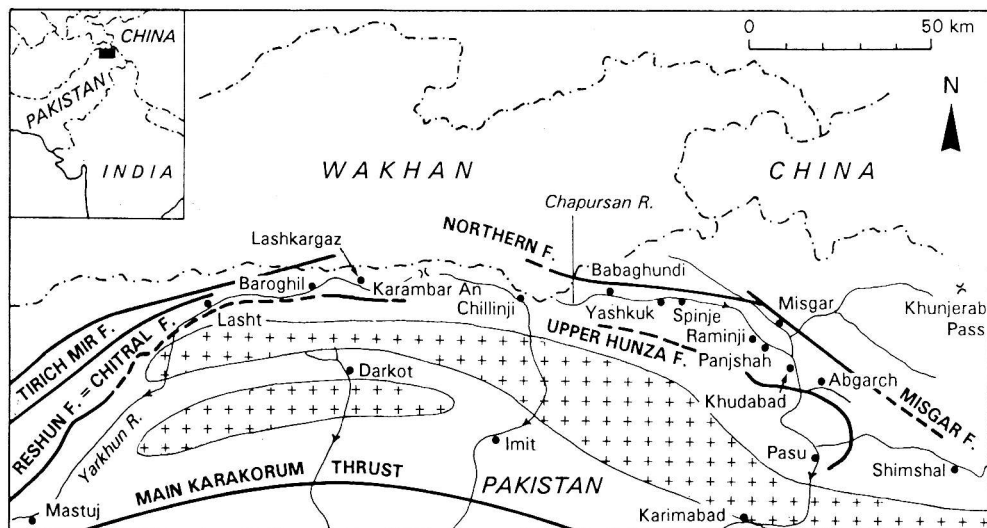


Fig. 1 - Geographic sketch map of Northern Pakistan.

member of the Panjshah Formation (Zanchi & Gaetani, 1994; Gaetani et al., in prep.) (Fig. 1). Several specimens of *C. undulata* have been found only in these two members, whose age is respectively Kubergandian and Late Murgabian-Midian on the basis of brachiopods (Angiolini, 1994), fusulinids and conodonts (Gaetani et al., in prep.). *C. undulata* gen. n. sp. n. never occurs below or above these stratigraphic levels.

Geological setting.

In Karakorum (Pakistan) Permian rocks crop out extensively from Chitral to Upper Hunza valley (Fig. 1, 2).

In Chitral the Early Permian (Asselian-Sakmarian) is represented by a quartzarenitic unit (Gircha Fm.). Then a mixed carbonate-terrigenous succession, several hundreds meters-thick follows, named Lashkargaz Fm., consisting of four members, spanning from Early to Late Permian (Sakmarian to Kubergandian). Foraminifers (*Parafusulina* (*Skinnerella*) assemblage), brachiopods (*Waagenochoncha* (subgen. A) sp. A, *Callytharella sinensis* (Sun), *Enteletes* sp., *Neochonetes* sp. A, *N. (Sommeriella) baroghilensis* (Reed), *N. (S.) vialis* (Reed), *Paramesolobus sinuosus* (Schellwien), *Orthothesina convergens* Merla, *Reticulatia* sp. A, *Retimarginifera praelecta* (Reed), *Transennatia* sp. A, *Magniplicatina* sp. A, *M. vindicata* (Reed), corals, bryozoans, gastropods, bivalves and conodonts have been detected in this formation. At the top of the Lashkargaz Fm. an erosional surface, with local emersions and a thin terrigenous unit (Gharil Fm.), is present (Gaetani et al., in prep.). Above a huge peritidal dolomitic formation (Ailak Fm.), 700 m-thick, follows. The paleontological control is poor and we suppose it represents the Upper Permian and may be the Triassic (Gaetani et al., in prep.).

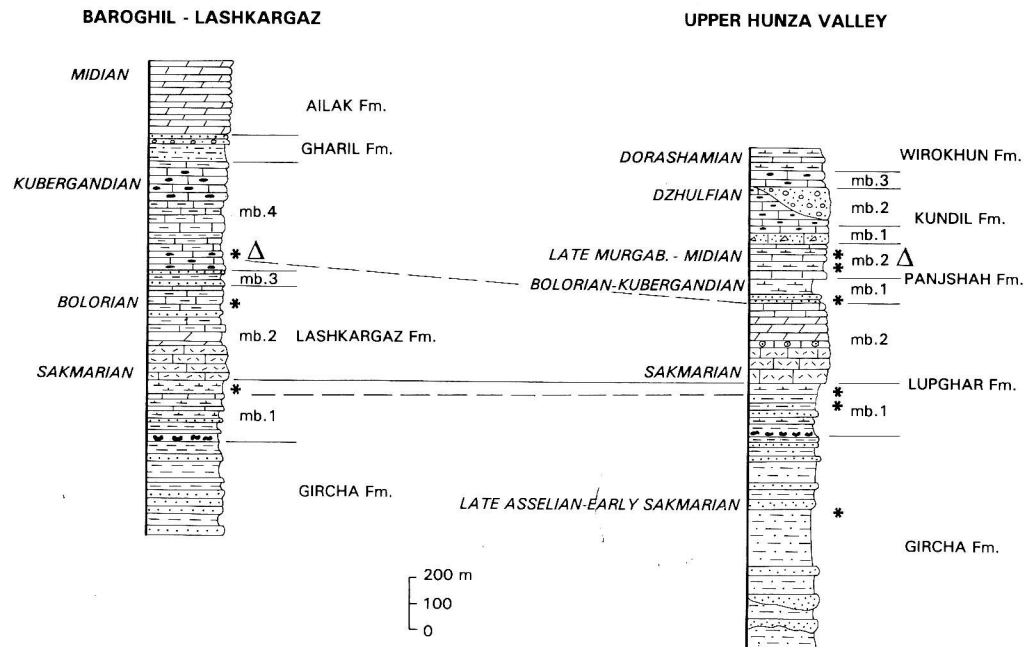


Fig. 2 - Synthetic stratigraphic sections of the Permian successions of Baroghil-Lashkargaz (Chitral) and Upper Hunza valley. * Indicates the brachiopod assemblages and Δ indicates the stratigraphic position of the bearing *Chitralina undulata* gen. n. sp. n. samples. Correlations between the brachiopod assemblage zones are also reported. Modified after Angiolini (1994).

In the eastern sector of the Karakorum (Upper Hunza valley) the Permian succession consists of five lithostratigraphic units (Gircha Fm., Lupghar Fm., Panjshah Fm., Kundil Fm. and Wirokhun Fm.) (Zanchi & Gaetani, 1994). In Chapursan and Shimshal valleys, laterals of the Hunza valley, the base of the succession is represented by the Gircha Fm. which consists of arkose to quartzarenites with upper Asselian-Lower Sakmarian brachiopods. The overlying Lupghar Fm. (Zanchi & Gaetani, 1994) consists of limestones and hybrid sandstones rich in crinoids, bryozoans and brachiopods and by fusulinid packstones and grainstones, oolitic grainstones and, at the top, peritidal dolomites. The age is Sakmarian-?Early Artinskian. With a sharp contact the sandstones and siltstones with brachiopods of the first member of the Panjshah Fm. follow (Zanchi & Gaetani, 1994). At the contact, a paraconformity with a gap, roughly corresponding to the time interval Late Artinskian-Bolorian, probably occurs. At the top, the second member of the Panjshah Fm. consists of cyclic terrigenous-calcareous sedimentation characterized by marls and hybrid limestones. Bioclastic levels rich in foraminifers, bryozoans, corals, crinoids, brachiopods (*Retimarginifera* sp. A, *Magniplicatina* sp., *Compressoproductus* cf. *mongolicus* (Diener), *Lirellaria* sp., *Stenoscisma armenica* Sokolskaja, *Martinia* sp., *Tiramnia tschernyschewi* (Grunt), *Martiniopsis* sp., *Martiniidae* gen. A sp. A) are present. The age is Late Murgabian-Midian (Zanchi & Gaetani, 1994; Gaetani et al., in prep.). The Kundil Formation consists of cherty

limestones with Late Midian-Early Dzhulfian conodonts (Gaetani et al., 1990). Finally the Wirokhun Fm. consists of black shales and marly limestones with Dzhulfian-Dorashamian conodonts at the base, and Early Triassic conodonts at the top (Gaetani et al., in prep.).

Systematic Palaeontology

Suborder Fusulinina Wedekind, 1937

Superfamily *Earlandiacea* Cummings, 1955

Remarks. Loeblich & Tappan (1987, p. 198) defined the superfamily Earlandiacea as follows: "Test with globular proloculus and undivided straight or enrolled second chamber. U. Silurian (Ludlovian) to U. Permian". The Authors include in the Earlandiacea the families Earlandiidae Cummings, Pseudoammodiscidae Conil & Lys and Pseudolituotubidae Conil & Longersaey.

Family *Chitralinidae* fam. n.

Type-genus: *Chitralina* gen. n.

Diagnosis. Test free, proloculus not observed but probably globular in shape followed by a long undivided tubular chamber. Marked longitudinal costae on the test surface. Wall calcareous microgranular. Aperture at the open end of the tube.

Composition of the family. The new family Chitralinidae fam. n. is composed only by the genus *Chitralina* gen. n.

Remarks. The new family differs from all the other families included by Loeblich & Tappan (1987) in the superfamily Earlandiacea Cummings for the presence of longitudinal marked costae on the test surface. Chitralinidae fam. n. can be also distinguished from the family Hyperamminoididae Loeblich & Tappan (U. Devonian-L. Cretaceous) by means of the absence of constrictions at irregular growth intervals along the test.

Stratigraphic and geographic distribution. Late Permian of Karakorum (Pakistan).

Genus *Chitralina* gen. n.

Type-species: *Chitralina undulata* gen. n. sp. n.

Derivation of name. After Chitral (NW Pakistan) where the new genus appears in the lowermost stratigraphic levels.

Diagnosis. Test free triangular to quadrate, composed of a proloculus not observed in any of the described specimens, but probably globular in shape, followed by a long, narrow tube. Septation or pseudoseptation are not present. Presence of marked

longitudinal costae on the test surface. Wall calcareous microgranular. Aperture at the open end of the tube.

Remarks. The new genus can be distinguished by the homeomorph Dzhulfian genus *Rectostipulina* Jenny-Deshusses, 1985 (= *Stipulina* Lys in Lys & Marcoux, 1978), with type-species *Rectostipulina quadrata* Jenny-Deshusses, by means of the structure of the wall. In fact *Rectostipulina* shows a thick two-layer wall having a dark inner layer of microgranular calcite and a clear outer layer of radial fibrous calcite.

We want to emphasise that the dark wall of *Chitralina* gen. n. is not due to micritization processes, but to its original microgranular nature. In fact the Geinitzinaea associated with *Chitralina* gen. n. always show the preserved original two-layer wall.

Furthermore *Chitralina* gen. n. can be distinguished from the Paleozoic genera *Earlandia* Plummer (= *Gigasbia* Strank in Vachard, 1994) because this latter never shows the presence of longitudinal ribs. The new genus can be also distinguished from *Aeolisaccus* Elliot by means of the presence of costae. Furthermore Vachard (1994) refers *Aeolisaccus* to blue algae and not to Foraminifera.

Chitralina gen. n. is very similar in shape to *Giraliarella* Crespin (type-species: *G. angulata* Crespin, 1958; family Hyperamminoididae in Loeblich & Tappan, 1987), a genus from the Permian of Carnarvon Basin (Western Australia), but differs from it by means of the absence of transverse growth constrictions (see longitudinal sections in Pl. 4, fig. 1-6).

Stratigraphic and geographic distribution. Late Permian (Kubergandian to Late Murgabian-Midian) of Karakorum (Pakistan).

Chitralina undulata gen. n. sp. n.

Pl. 1, fig. 1-13; Pl. 2, fig. 1-12; Pl. 3, fig. 1-9; Pl. 4, fig. 1-6

Derivation of name. From the Latin *undulatus, a, um* = undulating.

Holotype. The specimen (sample KK73) in transverse cross section figured in Pl. 1, fig. 1.

Paratypes. The specimens figured in Pl. 1, fig. 2-13; Pl. 2, fig. 1-12; Pl. 3, fig. 1-9; Pl. 4, fig. 1-6. The non-figured specimens KK265 and CK195.

Type-locality. Panjshah, Chapursan valley, Upper Hunza valley, Karakorum, N Pakistan.

Type-level. KK73, Panjshah Fm., Mb. 2, Late Murgabian-Midian.

Figured material. Six specimens in longitudinal cross sections (KK72, KK73, Panjshah). Thirty six specimens in transverse cross sections (KK72, KK73, Panjshah; CK366, Lashkargaz). The material is housed at the Museo di Paleontologia del Dipartimento di Scienze della Terra dell'Università di Milano.

Diagnosis. Test free, elongate, proloculus never observed, but possibly globular, followed by a long tubular, undulating second chamber, increasing in width during the growth. The test shows a first stage, triangular in transverse cross section, characterized by the occurrence of three thick longitudinal costae on the test surface. During the growth a second long stage, quadrangular in transverse cross section, is determined by the development of a fourth longitudinal costa, possibly starting from a bending point. Septation or pseudoseptation have never been observed in longitudinal section.

The wall is calcareous microgranular, dark in transmitted light. Tube terminating abruptly at the larger end; aperture at the open end of the tube.

Dimensions. Diagonal of the quadrangular section: 0.100-0.200 mm. Maximum observed length: 0.890 mm. Thickness of the wall: 0.010-0.030 mm.

Remarks. The morphology of *Chitralina undulata* gen. n. sp. n. (Fig. 3) has been deduced by the presence of triangular and quadrangular transverse cross sections. Generally the triangular section are smaller than the quadrangular ones. As the width of the tube increases during the growth (Pl. 4, fig. 3), we deduced that the occurrence of three costae is a peculiar feature of the first stage of the test, which is always shorter than the second part, characterized by four costae. We suppose that the fourth costa arises from a bending point, to strengthen the test when the tube enlarges and undulates. Few triangular transverse cross sections result to be as large as the quadrangular ones; this could be explained by a more developed first stage or by the abrupt disappearance of the fourth costa.

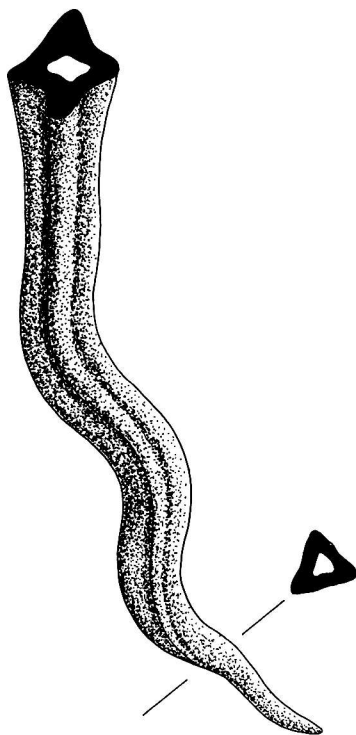


Fig. 3 - Schematic reconstruction of *Chitralina undulata* gen. n. sp. n. showing the triangular transverse cross section of the first stage of the test and the quadrangular one of the second stage. Not in scale.

Stratigraphic and geographic distribution. *C. undulata* gen. n. sp. n. is present in the Late Permian of Western Karakorum (Chitral) and Central Karakorum (Upper Hunza valley), Pakistan. In Chitral *C. undulata* gen. n. sp. n. has been detected in the fourth member of Lashkargaz Fm., samples CK366 (Lashkargaz section), CK195 (East

Baroghil section), together with Kubergandian brachiopods (*Waagenoconcha* (subgen. A) sp. A - *Callytharrella sinensis* zone, in Angiolini, 1994), fusulinids and conodonts (Gaetani et al. in prep.). In Upper Hunza valley *C. undulata* gen. n. sp. n. is present in the second member of Panjshah Fm., samples KK72, KK73 (Panjshah section) and KK265 (Shimshal section), together with Late Murgabian-Midian brachiopods (*Stenosisma armenica* - Martiniidae gen. A sp. A zone, in Angiolini, 1994), fusulinids and conodonts (Gaetani et al., in prep.). So *C. undulata* gen. n. sp. n. appears in the Kubergandian and it lasts to Late Murgabian-Midian in Karakorum, Pakistan.

Conclusions.

In our phylogenetic reconstruction the new genus *Chitralina*, appearing in the Late Permian (Kubergandian), represents a morphologic phylogenetic derivation of the genus *Earlandia*. According to Vachard (1994) the presence of *Earlandia* over the Bashkirian should be doubtful and in his phylogenetic interpretation the genus gives origin to three main different groups of foraminifers, developed during Devonian-Early/Middle Carboniferous: Semitextulariidae Pokorny originated by a drastic unknown mutation; Eogeinitzinae Vachard characterized by the occurrence of septation (*Tikhinella* Bykova) and by modification in the wall (*Frondilina* Bykova - *Eogeinitzina* Lipina); Syzranidae Vachard, hyaline forms originated by a mutation during Middle Carboniferous.

Furthermore *Earlandia* is also at the base of the two different phylogenetic lineages which, in the Late Permian, originated *Chitralina* gen. n. (*Chitralinidae* fam. n.) and *Rectostipulina* Jenny-Deshusses. The two genera result to be homeomorphous, but they can be distinguished on the basis of the wall. In fact the wall of *Chitralina* gen. n. is simple, microgranular, whereas *Rectostipulina* shows a two-layer wall of the same medium thickness.

In conclusion it is possible to distinguish, from Carboniferous to Permian, two lineages: the lineage *Earlandia-Syzrania-Rectostipulina* as proposed by Vachard (1994) and the lineage *Earlandia?-Chitralina* gen. n. In fact it is not possible to exclude the existence of a still unknown form representing the intermediate term in the lineage *Earlandia-Chitralina* gen. n. during Middle Carboniferous-Early Permian.

It is not clear the right meaning of the Permian genus *Giraliavella*, morphologically close to *Chitralina* gen. n. It could represent a lateral evolutionary term linked to *Chitralina* gen. n., but characterized by a more complex morphology due to the development of transverse growth constrictions.

From a stratigraphic point of view the two homeomorphous genera *Chitralina* gen. n. and *Rectostipulina* are Late Permian in age. *Chitralina* gen. n. is restricted to the Kubergandian/Late Murgabian-Midian of Pakistan and it has never been found either above or below this time interval (Fig. 4). As regards *Rectostipulina*, Jenny-Deshusses (1985) records the genus in the Dzhulfian of Rudbarak in Central Elburz (Iran), Kharbed in Afghanistan, Greece and also in material of the Permo-Triassic


LATE PERMIAN	DORASHAMIAN		
	DZHULFIAN		<i>Rectostipulina quadrata</i>
	MIDIAN		
	MURGABIAN		
	KUBERGANDIAN		<i>Chitralina undulata</i>

Fig. 4 - Stratigraphic distribution of *Chitralina undulata* gen. n. sp. n. and *Rectostipulina quadrata* Jenny-Deshusses, 1985. Time scale after Ross et al. (1994).

levels of Armenia. Zaninetti et al. (1981) figured in pl. 12, fig. 3, 8, 9, 11, 12, 14-19, 21 several specimens in transverse cross section, determined by the authors as "*Stipulina*" Lys and later attributed to *Rectostipulina quadrata* by Jenny-Deshusses (1985). These specimens come from the Dzhulfian of Western Taurus (Turkey). In pl. 12, fig. 7, 13, 20, Zaninetti et al. (1981) figured as "*Stipulina*" sp. longitudinal cross section of specimens coming from the Murgabian of Western Taurus (Turkey). As already pointed out by Jenny-Deshusses (1985), these specimens do not belong to the genus *Rectostipulina*, because of the presence of internal septation. *Rectostipulina* has been also recorded in the Dzhulfian-Dorashamian of Thailand by Fontaine & Nguyen Duc Tien (1989) and in the Midian of New Zealand (Vachard & Ferrière, 1991).

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PLATE 1

- Fig. 1 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Holotype, sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 2 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Sample KK72, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 3 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 4 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Sample KK72, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 5 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 6 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Sample KK72, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 7 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Sample KK72, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 8 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 9 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 10 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 11 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Sample KK72, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 12 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 13 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Sample KK72, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).

PLATE 2

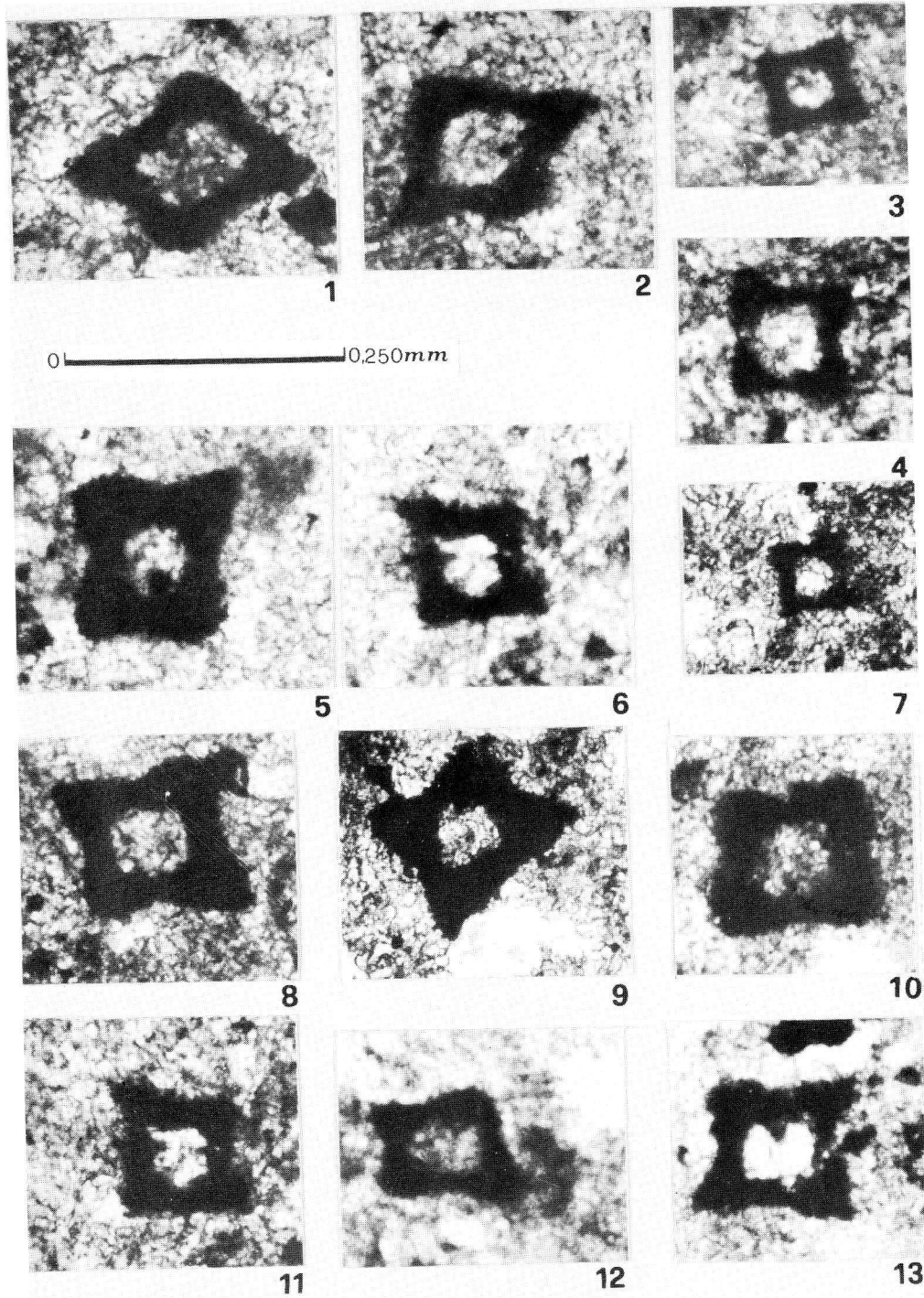
- Fig. 1 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Sample KK72, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
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- Fig. 5 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Sample KK72, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 6 - *Chitralina undulata* gen. n. sp. n. Transverse oblique cross section. Sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 7 - *Chitralina undulata* gen. n. sp. n. Transverse oblique cross section. Sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 8 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 9 - *Chitralina undulata* gen. n. sp. n. Transverse oblique cross section. Sample CK366, Lashkargaz Fm., fourth mb., Lashkargaz, Chitral (Pakistan).
- Fig. 10 - *Chitralina undulata* gen. n. sp. n. Transverse oblique cross section. Sample CK366, Lashkargaz Fm., fourth mb., Lashkargaz, Chitral (Pakistan).
- Fig. 11 - *Chitralina undulata* gen. n. sp. n. Transverse oblique cross section. Sample CK366, Lashkargaz Fm., fourth mb., Lashkargaz, Chitral (Pakistan).
- Fig. 12 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Sample CK366, Lashkargaz Fm., fourth mb., Lashkargaz, Chitral (Pakistan).

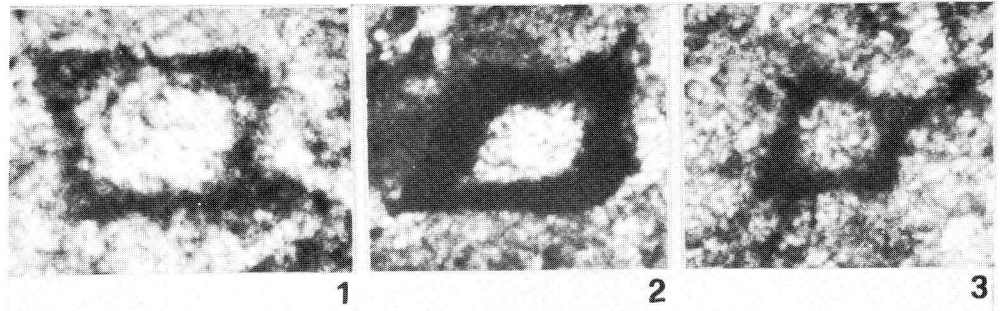
PLATE 3

- Fig. 1 - *Chitralina undulata* gen. n. sp. n. Transverse cross section. Sample CK366, Lashkargaz Fm., fourth mb., Lashkargaz, Chitral (Pakistan).
- Fig. 2 - *Chitralina undulata* gen. n. sp. n. Triangular transverse cross section across the first stage of the test. Sample KK72, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 3 - *Chitralina undulata* gen. n. sp. n. Triangular transverse cross section across the first stage of the test. Sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 4 - *Chitralina undulata* gen. n. sp. n. Triangular transverse cross section across the first stage of the test. Sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 5 - *Chitralina undulata* gen. n. sp. n. Triangular transverse cross section across the first stage of the test. Sample KK72, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 6 - *Chitralina undulata* gen. n. sp. n. Triangular transverse cross section across the first stage of the test. Sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 7 - *Chitralina undulata* gen. n. sp. n. Triangular transverse cross section across the first stage of the test. Sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 8 - *Chitralina undulata* gen. n. sp. n. Triangular transverse cross section across the first stage of the test. Sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 9 - *Chitralina undulata* gen. n. sp. n. Triangular transverse cross section across the first stage of the test. Specimen A) may show the development of the fourth costa. Sample KK72, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).

PLATE 4

- Fig. 1 - *Chitralina undulata* gen. n. sp. n. Longitudinal cross section. Sample KK72, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 2 - *Chitralina undulata* gen. n. sp. n. Longitudinal cross section. Sample KK72, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 3 - *Chitralina undulata* gen. n. sp. n. Longitudinal cross section. Sample KK72, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 4 - *Chitralina undulata* gen. n. sp. n. Longitudinal cross section. Sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 5 - *Chitralina undulata* gen. n. sp. n. Longitudinal cross section. Sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).
- Fig. 6 - *Chitralina undulata* gen. n. sp. n. Longitudinal cross section. Sample KK73, Panjshah Fm., second mb., Panjshah, Chapursan valley, Upper Hunza valley (Pakistan).





0 |-----| 0.250mm

