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Platysolenites antiquissimus Eichw. (Vermes)

from the Lower Cambrian of northern Norway

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Abstract.

New material of *Platysolenites antiquissimus* Eichw. is described from two new Lower Cambrian localities in Finnmark. A new diagnosis is given for the genus which is tentatively assigned to the family *Serpulidae* Burmeister. Evidence suggests that the original tube was flexible and helical-shaped.

Introduction and acknowledgements.

In 1966 during fieldwork in Finnmark, Northern Norway, Mr. Sven Føyn collected excellently preserved Cambrian material containing numerous specimens of tubes which he recognised as belonging to *Platysolenites antiquissimus* Eichwald. After a preliminary examination, Mr. Føyn generously gave me his material to prepare and photograph and I have described it herein along with other specimens from the Troms area first studied in 1934 by Prof. T. Strand. The latter never published his work but his manuscript and specimens were later deposited in the Paleontological Museum, Oslo (PMO).

I wish to express my thanks to Mr. S. Føyn for helpful discussions during the examination of the material and for kindly writing the accompanying remarks on stratigraphy. Also I extend my thanks to Prof. L. Størmer and Dr. D. L. Bruton for their helpful discussions and to the latter for kindly correcting the English in the text. Miss B. Mauritz kindly prepared the photographs.

Remarks on stratigraphy and occurrence.

Tubes of *Platysolenites antiquissimus* Eichwald were found at two localities in Finnmark in 1966. One locality is a river cut at the southwestern slope of Halkkavarre mountain 25 km SE of the head of the Porsangerfjord. The fossils occur in a reddish-brown shale belonging to the Dividal Group (also called the «Hyolithus zone»). Previously, *Platysolenites antiquissimus* Eichw. has been found at a corresponding stratigraphical level in the Dividal Group at Torneträsk in Norrbotten, northern Sweden, (Moberg, 1908), at four localities in Troms, northern Norway, (Th Vogt, 1918) and on the slopes of the Vuolanjunes and Gaggagaissa mountains south of Porsangerfjord (O. Holtedahl, 1918). At Torneträsk and in Troms the occurrence of *Platysolenites* and its associated fauna indicates that the faunizone belongs to the lower part of the Lower Cambrian (the same associated fauna is

known from the Mjøsa area, southern Norway, in beds assigned to 1 aα_2 or 1 aβ).

The stratigraphy of the Dividal Group and its position in the Eocambrian—Cambrian sequence is described by Mr. Føyn in a separate account appearing in this volume.

The second locality is situated where a brooklet crosses the main road 3.4 km east of Kunes at the head of the Laksefjord. The *Platysolenites* fragments occur in a green shale belonging to the Breivik Formation of the Vestertana Group. This find is especially important stratigraphically because fossils have not previously been found in the Vestertana Group.

Systematic paleontology.

Phylum *Annelida* Lamark, 1809.
Order *Sedentarida* Lamark, 1818.
? Family *Serpulidae* Burmeister, 1837.
Genus *Platysolenites* Pander, 1851.

Type species: P. antiquissimus Eichwald, 1860.

Diagnosis (emended): Small siliceous-calcareous helical-shaped tubes most commonly found broken into pieces which are straight or bent. Outer surface annulated, wall thickness variable.

Platysolenites antiquissimus Eichwald, 1860.
Pl. 1, fig. 1—7 and pl. 2, figs. 1—8.

P. antiquissimus Eichwald, 1860, p. 678, pl. 33, fig. 19; Schmidt, 1881, p. 13, fig. 1; Schmidt, 1888, p. 26, pl. 2, fig. 32—33; Walcott, 1890, p. 722, fig. 8; Moberg, 1908, p. 29, pl. 1, fig. 12; Holtedahl, p. 129, pl. 17, fig. 2; Vogt, 1924, p. 289, fig. 4; Yanishevsky, 1926; Strand, 1934; Howell, 1962, p. W 165, fig. 104, no. 4; Gekker and Yushakov, 1962, p. 444, pl. 3, fig. 9.

? *P. lontowa Öpik,* 1926, p. 46, fig. 2.

Diagnosis and *description:* Diminutive tubes originally circular in cross-section (Pl. 1, fig. 3) but commonly compressed and elliptical (Pl. 2, fig. 3). Outer surface of the tube annulated with annulations either widely and regularly spaced (Pl. 1, figs. 1, 3) or more finely distributed and irregularly spaced (Pl. 1, figs 5, 7; Pl. 2, fig. 4). In the former, the distance between the annula-

tions varies from 0.5 to 0.17 mm, and the average distance measured using 35 specimens was 0.25 mm.

The wall thickness of the tubes varies from 0.2 mm to 0.02 mm. The largest specimens, with thick walls, commonly have more regular annulated outer surface and the tubes are circular or elliptical in cross-section. Units with thinner walls however appear more irregularly compressed and the tubes are bent into a spiral or helical shape (Pl. 1, figs. 4, 6_{14}; Pl. 2, figs. 1—2).

The diameter of the cavity varies from 1.0—0.2 mm but it appears to be constant on the same specimen irrespective of the wall thickness.

Thin sections and x-ray analyses show that the units are composed of microgranular quartz containing inclusions of opaque minerals which increase in density towards the cavity and are irregularly distributed around it (Pl. 2, figs. 7—8). The annulation seen on the outer surface (Pl. 2, fig. 8 — marked by arrows) does not occur on the inside of the tube wall adjacent to the cavity.

The cavity is infilled with the same material as the enclosing sediment and sometimes by a brownish opaque mineral or combination of both. In few cases pyrite has been observed as an infilling of the cavity.

In two specimens (PMO 74645_b; 74647_v) it has been possible to recognise what is probably the end of the tube and the wall edge is regular and smoothly rounded.

Assemblages of tube fragments are common and one piece of rock examined (Pl. 1, fig. 6) contained 17 tubes covering an area of 30 sq.cms, and to a depth of 2 mm. With the exception of two fragments (nos. 5 and 14, Pl. 1, fig. 6) all are of the same type i. e., with approximately same wall thickness and cavity diameter. Ten units (nos. 1—4, 6—9, 12—13) are orientated in the same direction while one (no. 10) lies perpendicular to this orientation. The right end of fragment no. 10 is strongly bent beneath itself but reappears (arrow) in a similar orientation to the adjacent no. 9. Fragment no. 14 is helicol-shaped and has a somewhat thicker wall than similar shaped specimens (Pl. 1, fig. 4; Pl. 2, figs. 1—2). Fragment no. 5 is a very small tube.

None of the tubes studied appear to be bifurcated. However, amongst the material, is one slab showing an interesting bifurcated

impression forming a Y-shaped outline. The stem of the Y is infilled with a brownish sediment beneath which can be recognised a layer of microgranular quartz. It may well be that this microgranular quartz represents the outer wall of a *Platysolenites* tube and the brownish sediment its cavity infilling. On the other hand, this may well be an infilled burrow without any relation to *Platysolenites*.

X-ray photographs of the shale (Pl. 2, figs. 5—6) do not show any contrast between *Platysolenites* tubes and their cavity infillings and the enclosing sediment. The dark lines must be additional burrow marks filled by pyrite and other minerals.

Remarks and *affinities:* The Norwegian specimens, both in form and mode of occurrence, are similar to those found in the blue clay of the Leningrad Region and Estonia. It is difficult to compare the Norwegian material with the specimen figured by Eichwald (1860, Pl. 33, fig. 19) but a more recent photograph of new material from the same locality given by Yanishevsky (1926) shows that it is undoubtedly similar.

Schmidt (1888) though that *Platysolenites* tubes belong to primitive crinoids but in the present material no traces of eocrinoid plates or anything resembling them have been found nor have bifurcated parts of arms.

Walcott (1890) reproduced Schmidt's figure of *Platysolenites* and without comment included it along with other described Lower Cambrian pteropods. However, pteropods differ from *Platysolenites* in having a conical-shaped skeleton.

Both Eichwald and Yanishevsky thought their respective specimens to be worms and the present author favours this view because the specimens show that the sleketon of the original animal was very flexible. In form they resemble rather closely some serpulids and are herein assigned with reservation to the Family Serpulidae Burmeister, 1837.

The examination of *Platysolenites* tubes shows that the recrystallization which has taken place in the wall structure, occurred later than their bending or compression, as evidenced by small tension joints at the point of bending (Pl. 2, fig. 7).

The present study of the Norwegian *Platysolenites* material suggests that the tubes were: 1) simple, 2) relatively flexible, 3) approxi-

mately the same diameter throughout, 4) larger than 2.5 cm and 5) open at both ends.

Occurrence: Lower Cambrian beds. Norway: Breivik Formation: Kunes (Laksefjord, Finnmark); Dividal Group: Halkkavarre, Gaggagaissa, Vuolanjunes (Finnmark); Dividal Group: Ruogooaive, Dorrovarre, Galajavre, Avevagge (Troms); Bråstad Sandstone ($1a\alpha_2$): Steinsviken (Ringsaker). Sweden: Dividal Group: Luopakte, Pessinenjokk (Torneträsk). USSR (Russia): blue clay: Pavlovsk (Leningrad Region); Estonia: Balti and Wendi series: Wokol, Tallinn, Kunda (see: Aaloe et al. 1960, pp. 10—12).

Material: 150 fragments of which 4 are helical-shaped.

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Plate 1

Platysolenites antiquissimus Eichwald, 1860.

Fig. 1. A compressed specimen, Breivik Formation, 3.4 km E. of Kunes, Laksefjord, Finnmark. PMO 74633; X 9.2.

Fig. 2. Problematicum, (Platysolenites?), Dividal Group, Halkkavarre, Porsanger, Finnmark; PMO 74644; X 5.5.

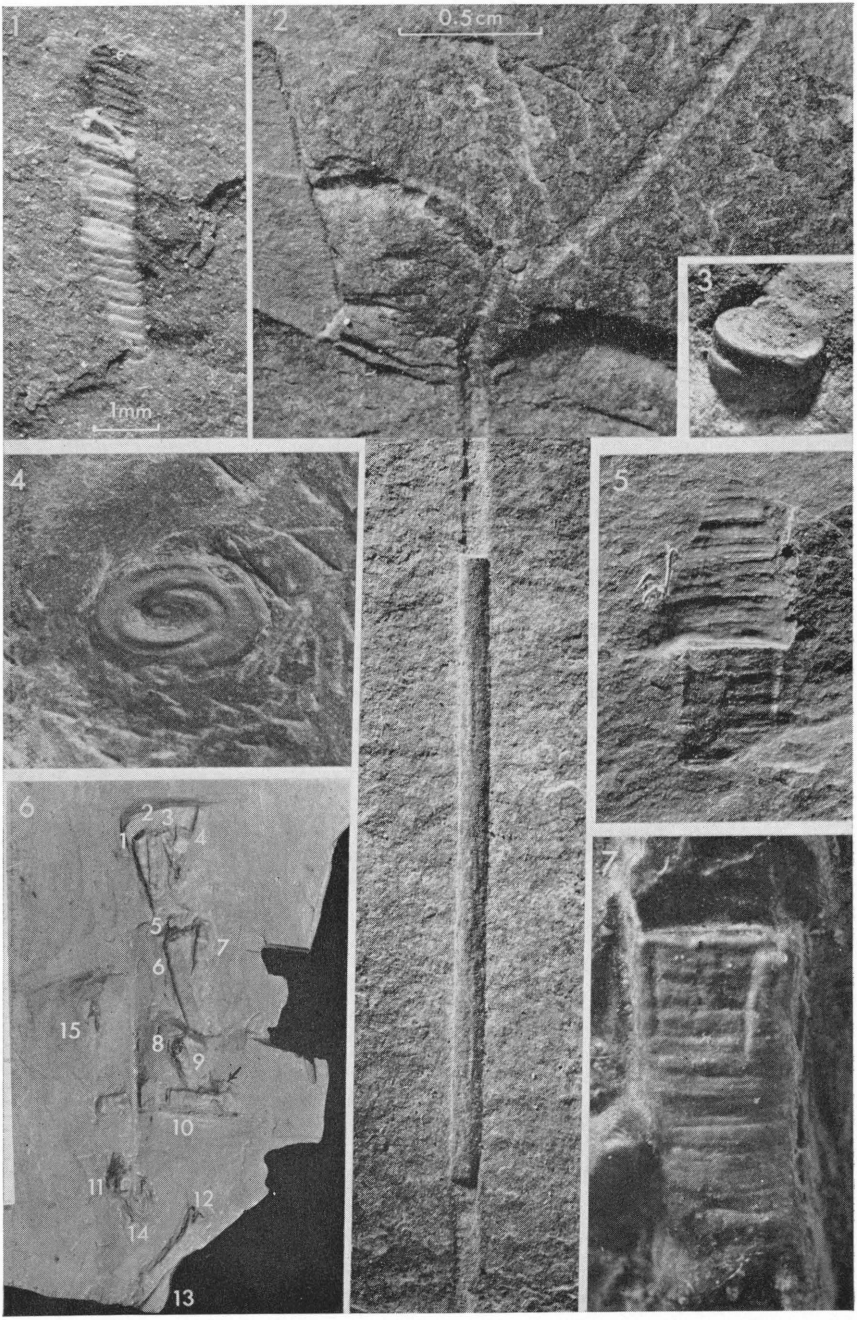
Fig. 3. A nearly circular specimen with thick wall; same locality as fig. 2; 15 m below in the section; PMO 74643a; X 9..

Fig. 4. A helical-shaped specimen; Breivik Formation, 3.4 km E. of Kunes, Laksefjord, Finnmark; PMO 74647; X 11.4.

Fig. 5. An irregular annulated specimen. Bottom half preserved in relief, top half as external mould; same locality as fig. 4; PMO 74645; X 9.2.

Fig. 6. An assemblage of Platysolenites; same locality as fig. 4; PMO 74639; X 2.

Fig. 7. Counterpart of the top half of the specimen figured as fig. 5; PMO 74646; X 11.4.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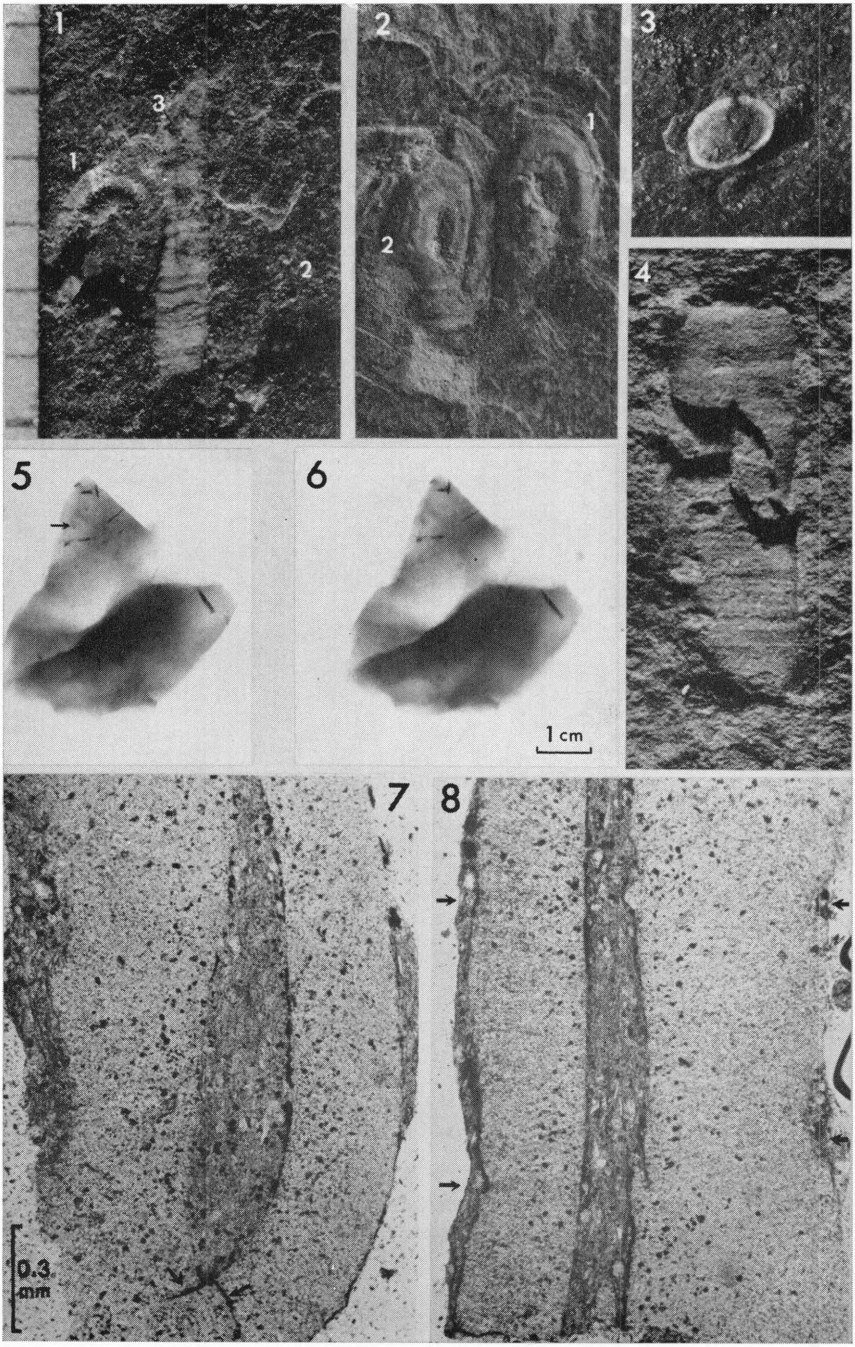
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Plate 2

Platysolenites antiquissimus Eichwald, 1860.

Fig. 1. Rock piece showing two helical-shaped tubes (1 and 2) and one simple compressed tube (3); Breivik Formation, 3.4 km E. of Kunes, Laksefjord, Finnmark; PMO 74636; X 9.2.

Fig. 2. Counterpart of the same rock piece as fig. 1 show two helical-shaped tubes; PMO 74635; X 11.4.

Fig. 3. A cross-section of a tube; same locality as fig. 1; PMO 74647; X 9.2.

Fig. 4. Lateral view of a tube; Dividal Group, Halkkavarre, Porsanger, Finnmark; PMO 74643_b; X 9.2.

Figs. 5—6. Stereoscopic X-ray photographs of a piece of shale, containing four fragments of Platysolenites tubes. The tubes are not visible on the photographs. One foraminifera like structure marked by arrow; Ruogooaive, Troms; PMO 47192; X 0.66; Coll.: Vogt. (4 mA, 50 KV, 4 min., 1 m, Gevaert Structurix D 4 film.)

Figs. 7—8. Fig. 7. Part of a cross-section of a tube. Note compressed ventral cavity with shale infilling and opaque minerals concentrated around it; also small tension jounts in the wall marked by arrows. PMO 47178_a; Fig. 8. Longitudinal section of the same tube. Annulations on the outer side of the tube marked by arrows. PMO 47178^b; Both specimens from Dorrovarre, Troms; X 66; Coll.: Vogt.