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Additions to the Eocene (and Oligocene) fauna of Belgium
7. Discovery of *Gymnura* teeth in Ypresian, Paniselian and Rupelian strata

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Abstract: Seven horizons from five Belgian localities have yielded *Gymnura* teeth. This batoid genus was previously unknown from North-western European Palaeogene deposits. Two new species are described.

Résumé: Sept horizons de cinq localités belges ont livré des dents de *Gymnura*. Il s'agit des premiers représentants de ce genre dans les dépôts paléogènes du Nord-Ouest de l'Europe. Deux nouvelles espèces sont décrites.

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INTRODUCTION

Butterfly-rays (*Gymnura*) are occasionally caught along the southern European coasts: in the Algarve (southern Portugal) and in the Mediterranean. It is interesting to record that since the beginning of the Eocene their ancestors periodically inhabited more northerly areas such as the Belgian Basin. Their teeth were discovered at Egem, Flanders (2 distinct horizons in the "Sables de Mons-en-Pévèle"). Zwevegem, Flanders (Argile d'Ypres), Waaienberg, Flanders (upper part of the Argile d'Ypres). Forest, Brabant (2 distinct horizons in the Sables de Forest) and at Vliermaal, Limburg (Sables de Berg, lower Rupelian). The teeth found in the four Eocene localities are referable to a single species; those from Vliermaal, an Oligocene deposit, must be considered as a distinct one.

LOCALITIES

Egem (53W71) and Zwevegem (97E64bis) were described in previous papers of the same series (HERMAN 1979, 1982). At Egem, two levels yielded *Gymnura* teeth: the *Megacardita* (*Venericor*) *planicosta* level (+30 m) and the basal level with *Turritella, Teredo* and pyrite spheroids (+28 m); both levels located in the so-called Sables de Mons-en-Pévèle in the Ampe Claypit.

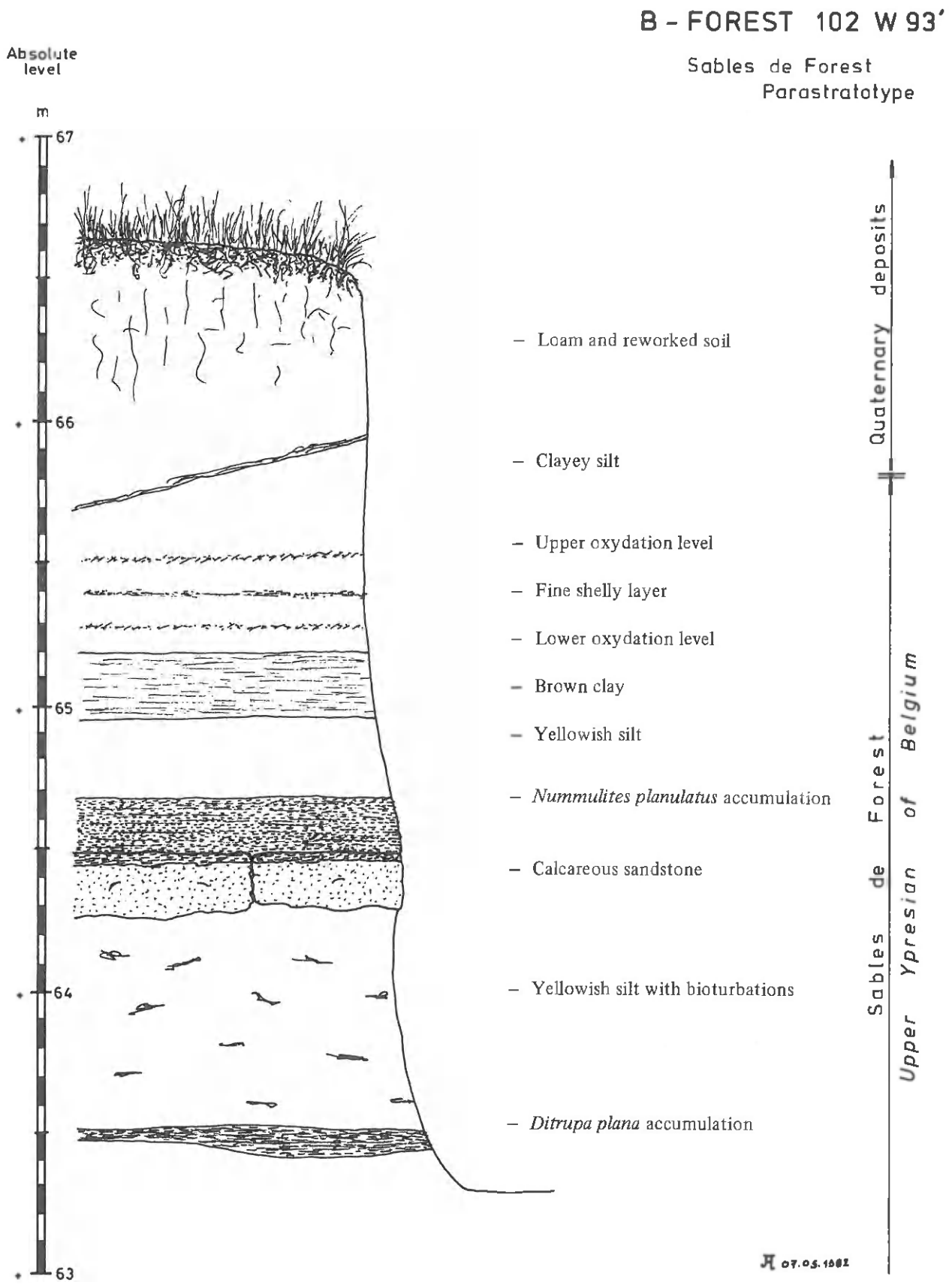
At Zwevegem, *Gymnura* teeth were discovered in the *Pseudamussium* and *Turritella* level (+30 m).

Forest (102W93bis) is a recent excavation we undertook in May 1982. The excavation was within fifty meters of the type-excavation of CASIER (1946, site n° 3), in front of the main entrance of the Football Club Stadium "La Forestoise". Two distinct horizons yielded fish remains. The first one, at +65m50, consisted of a massive concentration of *Nummulites planulatus*, 25 cm of thickness, more or less cemented by carbonates, overlying a hard bank of calcareous sandstone. The second at +63m50 was a lenticle of *Ditrupa plana*, 1 to 10 cm in thickness. Both levels are in the Sables de Forest of upper Ypresian age.

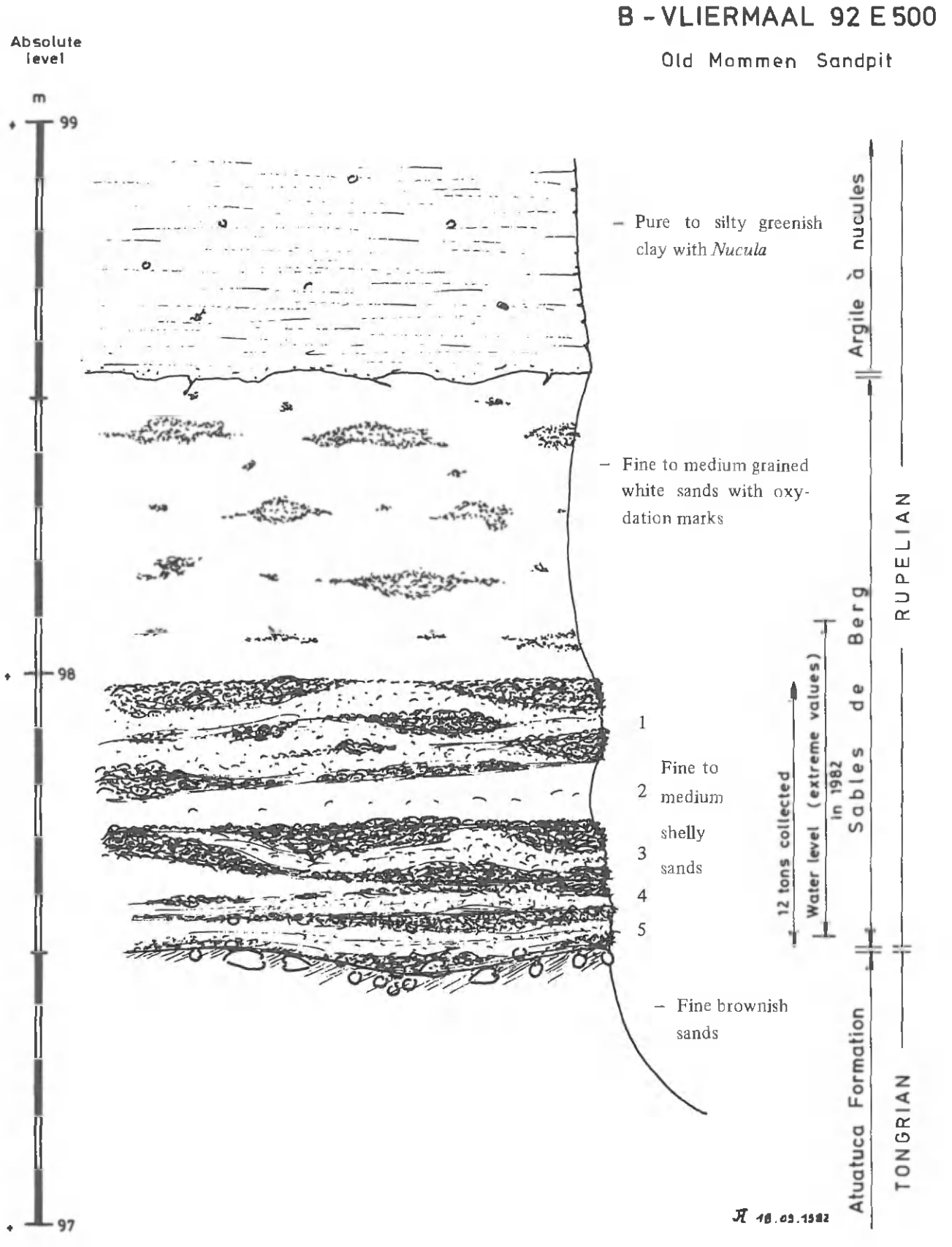
Waaienberg (99W27bis) is an old railway cutting showing at kilometer 16.5 a 9m50 height section in Ypresian and Paniselian strata. The *Gymnura* teeth were founded at ± one meter above the base of this section at +74 m absolute level, in a *Turritella* and *Nummulites planulatus* rich concentration of 40-50 cm thickness. The site was described by DELVAUX (1885).

Vliermaal (92E500) is an old sandpit, called the Mommen Sandpit, 7 km NNW of Tongeren (Limburg); well known by mollusc collectors, where the Sables de Berg and the Argile à nucules both of Rupelian age (Oligocene) are still exposed.

The more or less dense accumulations of molluscs in which *Gymnura* teeth were found are characterised by the abundance of *Limopsis* and "*Glycymeris obovata*" and lie between 0m60 and 1m10 below the base of the *Nucula* clay, in the Sables de Berg (absolute level: between +97m50 and 98 m). (See Text-fig. 2).



Text-fig. 1. Excavation at Forest, cross section.



Text-fig. 2. Vliermaal, Old Mommen Sandpit. Cross section of the sampled section.

Additional explanations for Text-fig. 2 Vliermaal Old Mommen Sandpit

1: Upper subregular shelly accumulation in whitish fine sand with many large scattered *Cyprina* valves; only some of the *Limopsis* were preserved as pairs. The fauna is fragile but diverse and well preserved.
2: More or less sterile whitish sand, locally absent.
3: Second subregular shelly bed in whitish to yellowish sand. Rare *Cyprina* and *Glycymeris*. Same fauna as in 1.
4: Sterile yellowish fine sand.
5: Lower regular shell concentration in a fairly fine yellow to brown sand with numerous derived and rolled cerithids, potamids, mactrids etc. There are flattened, sugar-plum like, rolled flints (0.5 to 5 cm in diameter), also, mainly at the base, paired valves of *Limopsis* and *Glycymeris*, and *Cyprina*. Volutes, nerites, natices, xenophores are present.

In all three shelly levels, *Lymnea*, *Nystia* and *Anisus*-like molluscs are present.

SYSTEMATIC PALAEONTOLOGY

Subclass Elasmobranchii
Order Myliobatiformes
Family Gymnuridae

Genus *Gymnura* van Hasselt 1823

Teeth of three modern species were examined: *Gymnura altavela* (Linné 1758), specimens from the African Atlantic coast, *Gymnura micrura* (Bloch & Schneider 1801), specimens from South Africa and Malaysia, and *Gymnura marmorata* (Cooper 1863), Californian specimens.

Their teeth are very small, hemimillimetric to millimetric sized and relatively homogenous in aspect (strongly homodont) in both jaws.

The root possesses the true typical holaulacorhizid structure (CASIER 1947) with a more or less deep and broad medial groove showing a very large central foramen. There is occasionally a secondary reocclusion of the medial groove in some relatively rare very lateral or commissural teeth.

The crown shows a single medial cusp with two more or less prominent digitiform labial protuberances. The cusp and protuberances give a typical "three-cornered hat" appearance to the crown, reinforced by the production of webs between the cusp and protuberances. Rare bicuspidy and very occasional tricuspidy exists and is supposed to result from trauma (2 to 6% of the teeth). External or internal ornamentation is absent.

A slight sexual dimorphism produces proportionally more massive male teeth with lower but broader cusps, more flattened external sides, of the crown and more massive, but shorter, protuberances.

Teeth are very numerous, a few more on the upper jaw; the number of rows increasing with the size and the age of the animal. The smallest specimen of *Gymnura altavela*, 42 cm broad, has 88 upper teeth rows and 74 lower teeth rows; the biggest specimen of the same species, 160 cm broad, showed 204 upper rows and 172 lower rows. Each row has 7 to 9 functional teeth, plus 2 or 3 still in formation, so that this last specimen carried some three thousand teeth!

Odontological distinction between species is delicate but possible if one considers the shape of the cusp, the importance of the labial protuberances, the development of the webs, the relative compression of the teeth, the relative proportions of the medial groove.

Modern *Gymnura* occur widely in warm (equatorial-tropical) to warm-temperate waters, mainly in shallow waters such as shoal, inland and littoral waters.

Gymnura grootaerti n. sp.

Plate 1

Specific diagnosis: *Gymnura*-like ray of presumed less than a metre in size. The teeth have low roots with deep and broad medial grooves and very poorly developed lateral foramina and high crowns, lightly convex to flat external faces, labial protuberances poorly developed, webs well developed.

Derivatio nominis: In honour of Dr. Patrick GROOTAERT, Institut Royal des Sciences naturelles de Belgique.

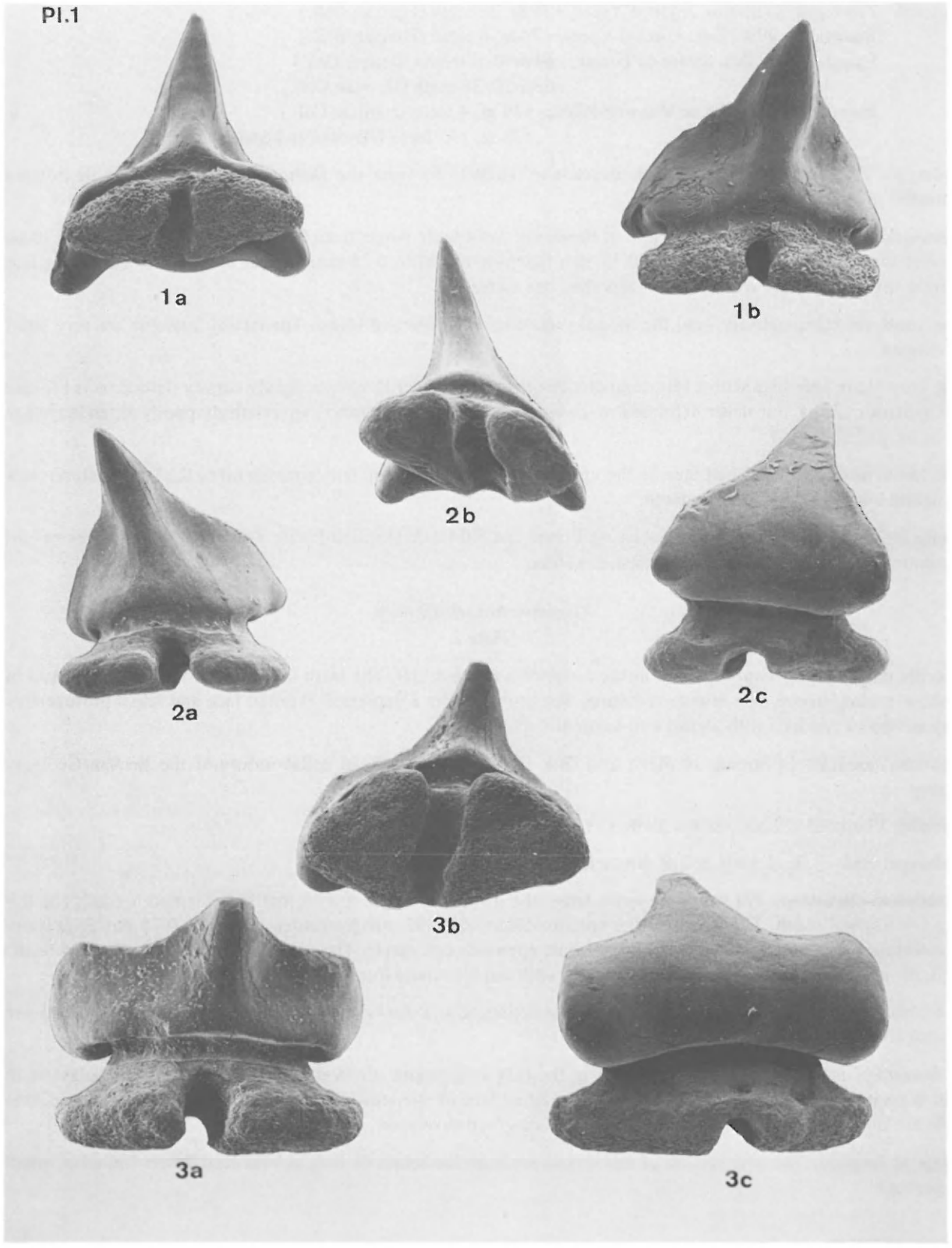


Plate 1. 1-3. *Gymnura grootaerti* n. sp. Forest (102W93bis) *Ditrupa plana* layer in the Sables de Forest. 1. internal oblique and internal views. Coll. S.G.B. 102W93'P4. x 75. 2. internal, internal oblique and external views' Holotype. Coll. S.G.B. 102W93'P3. x 75. 3. internal, internal oblique and external views. Coll. S.G.B. 102W93'P5. x 90.

Material: Zwevegem 97E64bis, Argile d'Ypres, +30 m, 22 teeth (Herman Coll.)
Waaienberg 99W27bis, Argile d'Ypres, +74 m, 6 teeth (Herman Coll.)
Forest 10ZW93bis, Sables de Forest, +64m50, 8 teeth (Herman Coll.)
+63m50, 38 teeth (Herman Coll.)
Egem 53W71, Sables de Mons-en-Pélève, +39 m, 4 teeth (Herman Coll.)
+28 m, 147 teeth (Herman and Smith Colls.)

Holotype: Plate 1, fig. 2. Coll. S.G.B. Brussels n° 102W93'P3 from the *Ditrupa* level in the Sables de Forest at Forest.

Description-discussion: Maximum width of these very small teeth ranges from 0.40 mm (anterior tooth) to 0.70 mm (lateral tooth) and their height from 0.75 mm (anterior tooth) to 0.35 mm (lateral tooth). The size of the teeth suggest that the animal's width must be less than one meter.

The roots are comparatively low, the medial groove is very deep and broad. The lateral foramina are very poorly developed.

The crowns are very high with a very characteristic external face for *Gymnura*, lightly convex (lateral teeth) to quite flat (anterior teeth), but never depressed or convex. The labial protuberances are relatively poorly extended but the webs are well elongated.

The lower margin of the labial face of the crown is regularly arched on the commissural to the latero-anterior teeth or lightly lobated on the anterior teeth.

Range in Belgium: Argile d'Ypres, Sables de Forest and Sables de Mons-en-Pévèle. *Gymnura grootaerti* seems fairly common in silty or muddy-silty sediments of waters.

Gymnura hovestadti n. sp.
Plate 2

Specific diagnosis: *Gymnura*-like ray in the order of a metre in size. The teeth have a high root with very broad but shallow medial groove and minute foramina. The crown shows a depressed external face and labial protuberances very strongly developed with almost non-existent webs.

Derivatio nominis: In honour of Maria and Dirk HOVESTADT, official collaborators of the Belgian Geological Survey.

Material: Vliermaal 92E500, Sables de Berg, +97m50, 3 teeth (Herman Coll.).

Holotype: Plate 2, fig. 1. Coll. S.G.B. Brussels n° 98E500 P1.

Description-discussion: The teeth are quite large: the maximum width is 0.65 mm for an anterior tooth and 0.80 mm for a lateral tooth. The height of the anterior tooth was 0.95 mm (reconstruction) and 0.75 mm for a lateral. The teeth are robust and the animal's width must approach one meter. The root of the only three known teeth is high, the medial groove is very broad but shallow with minute lateral foramina.

The labial or external face of the crown is slightly depressed and shows very long protuberances. The so-called webs are not present.

G. hovestadti is distinct from *G. grootaerti* in the following points: the teeth are more massive, the height of the root is greater, the protuberances are longer, the labial face of the crown is depressed as opposed to flat or convex, webs are inexistent or very reduced as opposed to being well developed.

Range in Belgium: The only records of this species are from the Sables de Berg at Vliermaal (lower Rupelian, middle Oligocene).

CONCLUSIONS

Although the shape, dimensions and general morphology of the teeth of both *G. grootaerti* and *G. hovestadti* teeth are those of modern *Gymnura*, there still exists a significant structural difference. In the 220 teeth of *G. grootaerti*, from six horizons, I am unable to find examples with well developed lateral foramina which are particularly marked on the root of the teeth of the modern species examined, especially on the external side. The three teeth of *G. hovestadti* have minute lateral foramina. Perhaps they are a Recent acquisition of the *Gymnura*, especially of the

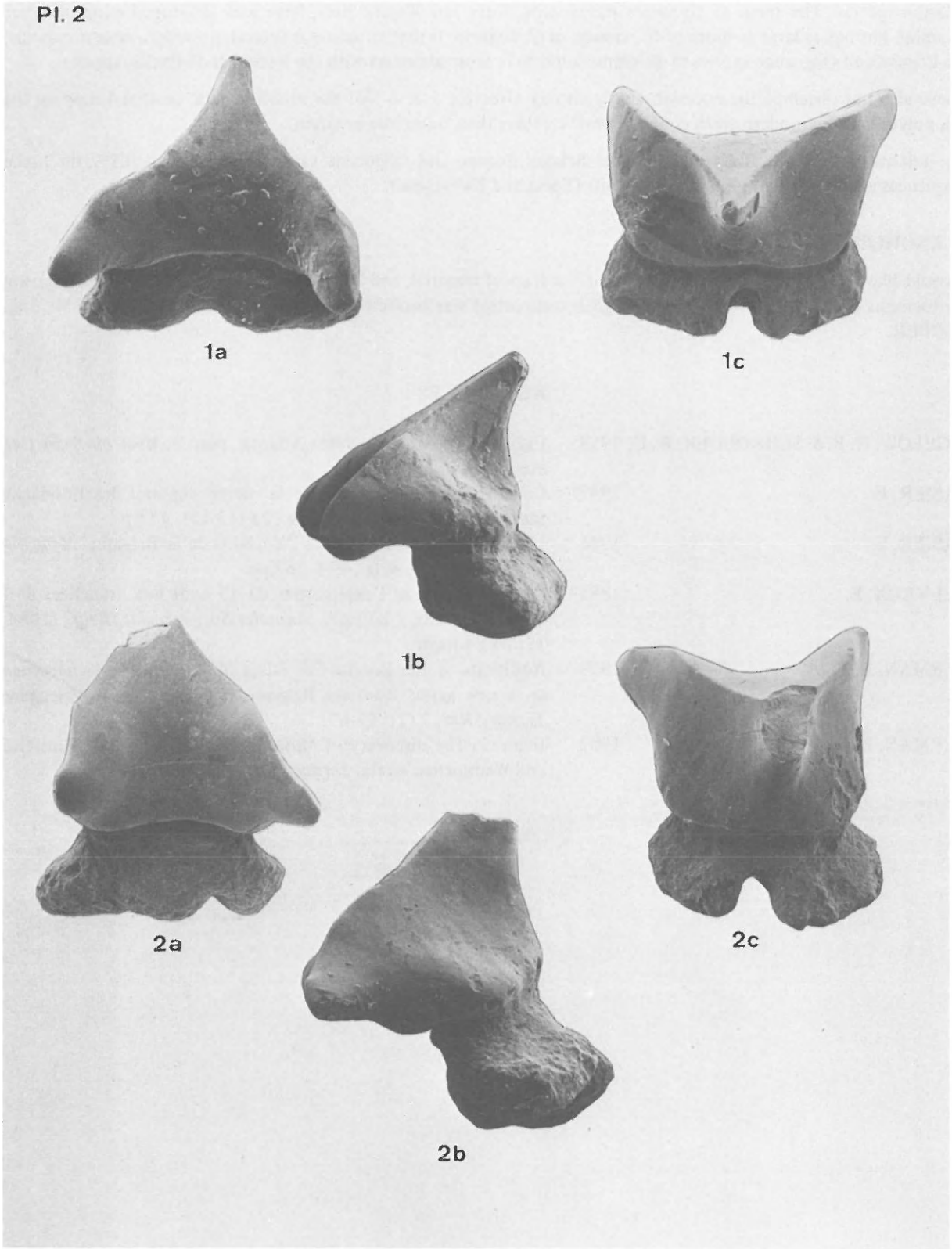


Plate 2. 1-2. *Gymnura hovestadti* n. sp. Vliermaal (92E500) Sables de Berg. 1. occlusal, profile and internal views, Holotype. Coll. S.G.B. 92E500'P1. x 60. 2. external oblique, profile and internal views. Coll. S.G.B. 92E500'P2. x 60.

Atlantic species. The teeth of *Gymnura marmorata*, from Indo-Pacific area, have well developed external lateral foramina but not as large as those of *G. micrura* or *G. altavela*. If that structure is typical of modern Atlantic species, the Eocene and Oligocene species of Belgium would have more affinities with the Recent Indo-Pacific species.

I have also not observed the occasional polycuspidy affecting 5 or 6 %of the modern teeth, so that I suppose that this polycuspidy in modern teeth could be genetic rather than traumatic in origin.

The relative abundance of *Gymnura* in the Belgian Eocene and Oligocene varies from 0.1% to 0.5%; the higher frequences are those of silty-muddy sediments (Egem and Zwevegem).

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