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## Additions to the fauna of Belgium

### 6. The Belgian Eocene Squalidae

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**Abstract:** *Squalus orpiensis* (Winkler 1874) from the Belgian Palaeocene and lower Eocene is proposed as the genotype of *Megasqualus* gen. nov. *Squalus* teeth from the Belgian Ypresian, Panislian and Bruxellian, classically referred to *Squalus minor* (Leriche 1902) are redescribed as *Squalus smithi* sp. nov. Specimens described by the author in 1973 as *S. orpiensis* and *S. minor* are discussed.

**Résumé:** *Squalus orpiensis* (Winkler 1874) des couches paléocènes et infra-éocènes belges est considéré comme génotype de *Megasqualus*, nouveau genre. Les *Squalus* récoltés dans les formations yprésiennes, paniséliennes et bruxelliennes, rapportés classiquement à *S. minor* (Leriche 1902) sont redécrits et considérés comme représentant une nouvelle espèce, *Squalus smithi*. Les exemplaires marocains attribués en 1973 par l'auteur aux espèces *S. orpiensis* et *S. minor* sont réexaminés.

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#### INTRODUCTION

The lower Eocene deposits of Belgium have produced a very small number of Squalinae (sensu stricto). The Argile de Ghlin has yielded two specimens of *Squalus orpiensis*, a common large species from the Sables d'Orp-le-Grand (Heersian, uppermost Paleocene). Improved knowledge of the dentitions of the modern Squalidae allow us to consider this species as a representative of a new genus. Ypresian and Panislian deposits have yielded some teeth of a very small sized *Squalus*. The same population existed in the Sables de Bruxelles, Middle Eocene, and seems very common in a certain area. All these teeth were referred *Squalus minor*. Differences in morphology and proportions are pointed out and these populations are considered as a new species.

#### LOCALITIES

Five sites provided this material: Ghlin, Forest, Egem, Seneffe-Godardville, and Woluwe.

1. **GHILIN:** The claypit Durieux-Guelton (140W102) shows a thin horizon, perhaps a single bedding plane, yielding sharks' teeth, teleost and turtle bones. This fossiliferous horizon lies at about 30-40 cm above the base of the Argile de Ghlin.

The 4-5 metres of Argile de Ghlin are situated above greyish continental sands. This clay unit is classically referred to as the base of the Argile d'Ypres but its true stratigraphical position in the Yper Clay Formation is not clearly defined, so I would prefer to use the term "Argile de Ghlin". The thin bed containing fossil vertebrate remains has also yielded pyrite concretions, rolled and pyritized wood, and a very discrete fraction of coarse elements, in particular rolled quartz grains and rolled weathered flints. Some quite complete turtle shells were found, one of these, carefully extracted, is preserved in the C.G.H. Collection. At some places scattered sharks' vertebrae were found. There is a strange absence of small vertebrate debris. The smallest teeth collected are *Albula* and *Hypolophodon* teeth of 3-4 mm size. A number of typical Ypresian species coexist with palaeocene survivors such as *Heterodontus lerichei*, *Synechodus eoceanus*, *Squalus orpiensis*, *Palaeogaleus vincenti* and *Palaeohypotodus rutoti*.

2. **FOREST:** The Forest Festihall excavation (102W93) enabled (1968-1969) the collection of large samples from the Ypresian beds described by CASIER in 1946. The famous *Ditrupe* horizon was carefully excavated by many searchers (COUPATEZ, CROCHARD, GIRARDOT, HERMAN, SMITH, WOUTERS). This level yielded two *Squalus* teeth.

3. **EGEM:** The *Venericor planicosta* level (+ 39 m) in the Ampe Claypit (53W71) previously described by HERMAN (1979) yielded a few *Squalus* teeth; seven specimens are known. The lowest beds have not yet yielded similar teeth.

4. **SENEFFE-GODARVILLE:** The enlargement works of the Seneffe canal made it possible for the I.R.Sc.n.B. to collect in 1953 a very distinctive fauna at the base of the Sables de Bruxelles (141E250, absolute level + 156

m). The material is quite perfectly preserved and shows many *Heterodontus*, *Squalus* and *Hemiscyllium* teeth. All these genera are extremely rare in other Sables de Bruxelles localities. More than two hundred teeth of *Squalus* were collected in this site.

5. WOLUWE: The van Pachtenbeke Sandpit (88E129) has also given one single *Squalus* tooth from the shelly lenses in the Sables de Bruxelles.

### SYSTEMATIC PALAEOONTOLOGY

Subclass Elasmobranchii

Order Squaliformes

Family Squalidae

BIGELOW and SCHROEDER described in 1957 three subfamilies: Squalinae, Dalatiinae and Echinorhinae. It is now apparent that the Squaliformes story is excessively long. The genus *Squalus* seems to have existed since the lowermost Palaeocene. *Squalus*-related groups such as *Centrosqualus*, *Centrophoroides* and *Protosqualus* existed since the Middle Cretaceous (*Protosqualus* Cappetta is known from Albian and ... Barremian: (THIES 1979, pl. 2, fig. 6)). Authentic or closely related species of *Centroscyminus*, *Elmopterus* and *Scymnodalatias* have been described from the Hemmoor Chalk of Northern Germany, Upper Maastrichtian (HERMAN 1981, in press). If we consider *Pseudodalatias* as a true Dalatiinae, the phylogeny of the Squaliformes dates back before the Retic. Without starting a discussion on the highly controversial status of *Pseudodalatias* Reif 1978 (true Dalatiinae or an extreme example of convergent evolution), it is evident that the Squaliformes were highly diversified before the Upper Cretaceous. It seems also evident that the Squalinae subfamily of BIGELOW & SCHROEDER (1957) should be restricted to the following genera, all showing slight dignathic and gradient monognathic heterodonty: *Squalus* Linné 1758, *Cirrhigaleus* Tanaka 1912 (if valid), *Protosqualus* Cappetta 1977, *Centrophoroides* Davis 1887 and *Centrosqualus* Signeux 1950. I propose to introduce a new genus, *Megasqualus*, based on *Squalus orpiensis* (Winkler 1874).

Genus *Megasqualus* nov. genus.

**Generic diagnosis:** Presumed large sized Squalidae with teeth showing a particularly flattened root base, a very broad infundibulum, numerous lateral root foramina, a broad regular-shaped apron, anterior and posterior crown serration slightly developed.

**Derivatio nominis:** Very large *Squalus*-like sharks

**Type species:** *Megasqualus orpiensis* (Winkler, T. C. 1874)

**Range in Belgium:** Heersian: Sables d'Orp-le-Grand, Landenian: Tuffeau de Lincent and Sables de Dormaal, Ypresian: Argile de Ghlin.

**Other species:** The North African Palaeocene-Eocene specimens considered as *Squalus orpiensis* (HERMAN 1973) seem to belong to a new population of this genus.

*Megasqualus orpiensis* (Winkler, T.C. 1874)

Pl. 1, fig. 6

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|---|--|
| 1874 <i>Notidanus orpiensis</i> nobis   | WINKLER, T. C., Mem: qq. restes Pois. Syst. Heers., p. 12, pl. 1, fig. 13-15   |
| 1902 <i>Acanthias orpiensis</i> Winkler | LERICHE, M., Poiss. Paleoc. Belg., p. 14, pl. 1, fig. 1-8.                     |
| 1931 <i>Squalus orpiensis</i> (Winkler) | WHITE, E. I., Vert. Foss. Engl. Eoc. p. 67, text. fig. 25-26.                  |
| 1977 <i>Squalus orpiensis</i> (Winkler) | HERMAN, J., Sél. terr. néocrét. et pal. Belg. ..., pp. 137-138, pl. 5, fig. 8. |

**Discussion:** *Megasqualus orpiensis* is an authentic squalinid by virtue of its size and also by its tooth morphology. The general aspect of the teeth is of the familiar *Squalus* type, but they have a very regular and subquadrangular root, with a relatively poorly depressed base, quite flat, only slightly axially bent, a function of the position in the jaw. The infundibulum is very large and gaping. The lateral radicular foramina are extremely numerous.

The regular, subquadrangular, shape of the root is a result of the very poor development or absence of the secondary expansions. The cutting edges of the crown are serrated. This serration decreases slightly with age. The base of the internal face of the crown is strongly microlobate. The base of the external face of the crown is lightly lobate. The apron is very broad.

All these features are not those of true *Squalus*. The very large size that these teeth can reach in the Belgian prompts me to propose the name *Megasqualus*.

The Moroccan specimens I have referred to *S. orpiensis* (HERMAN 1973, pp. 274-275, pl. 1, fig. 1-2) show appreciable differences. The symphyseo-commissural elongation is less important, so that the proportions of the teeth of the North-West-European and North African deposits differ. The base of the root of the Moroccan specimens is also less flattened, and so less regular, and they are also smaller. It is quite certain that these teeth belong to a distinct population of *Megasqualus*. I will not propose a specific name for this population as they are at present being studied by my colleague H. CAPPETTA.

**Affinities:** *Megasqualus* seems to be an archaic group surviving in the late upper Palaeocene western European sea and endemic in some parts of the lowest Eocene western European sea.

The broad apron, the poorly developed radicular expansions and the relatively flattened root base suggest possible affinities with *Protosqualus* Cappetta from both Lithuanian and French Albian localities. But this remains purely hypothetical without discoveries of more evolved *Protosqualus* or more primitive *Megasqualus*.

Genus *Squalus* Linné 1758 p.p.  
*Squalus minor* (Leriche M. 1902)  
 Pl., fig. 1-3

#### References:

- 1902 *Acanthias minor* (Daimeries) LERICHE, M., Poiss. Paleoc. Belg., pp. 16-17, pl. 1, fig. 9-16.  
 1977 *Squalus minor* (Leriche) HERMAN, J., Sél. terr. neocrét. et pal. Bel., pp. 134-136, pl. 5, fig. 7.

**Remarks:** The type locality is Maret (Orp-le-Grand, Brabant, Belgium) and the type strata is one shelly layer with *Arctica morrisi* lenses. It seems useful to produce a few more illustrations of this stratigraphically important species. The photographed specimens were collected at the same place (119W374, HERMAN 1973). The Moroccan specimens (HERMAN 1973, pp. 275-276, pl. 1, fig. 3) attributed to this species show also an other range of microvariations in proportions, so that it is possible to consider them as a distinct population.

**Range in Belgium:** Danian: Tuffeau de Ciply, very rare; Heersian: Sables d'Orp-le-Grand, extremely common; Landenian: Tuffeau de Lincent, very common; Sables de Dormaal, not very common.

*Squalus smithi* n. sp.  
 Pl., fig. 4-5

**Specific diagnosis:** *Squalus*-like shark of presumed very small size. The teeth are poorly elongated, a consequence of a relative reduction of their anterior part. The apron is long and broad, its width and height are equal. The root shows a narrow and deep infundibulum.

**Derivatio nominis:** In honour of Mr. Richard SMITH, official collaborator of the Geological Survey of Belgium.

**Material:** FOREST (102W93) Two teeth (S.G.B. Coll.), *Ditrupa* level in Sables de Forest.

EGEM (53W71) Seven teeth (C.G.H., Herman and Smith Colls.), *Venericor planicosta* level ("Paniselian").

WOLUWE (88E129) One tooth (C.G.H. Coll.), shelly lens in the Sables de Brussels.

SENEFFE-GODARVILLE (141E150) More than 200 teeth (I.R.Sc.n.B. Coll.), base of the Sables de Bruxelles.

**Holotype:** Plate 1 fig. 4 S.G.B. Coll. Brussels n° 53W71 P2.

**Description-discussion:** These teeth are very small: 2.15 mm in the Sables de Forest, 3.20 mm in Egem Sands and 5.50 mm in the Brussels Sands at Seneffe-Godarville. Only the largest specimens of Godarville site attain the size of the *Squalus minor* of Maret, Sables d'Orp-le-Grand.

The most characteristic details are the strength of the apron (length and height) and the poor development of the anterior part of the tooth, which is located in front of the apron. Crenulations or serrations are absent. The base of the crown is very slightly lobulate, quite regular in shape. The root itself is a little more regular than that of *Squalus minor*.

**Range in Belgium:** Sables de Forest to the Sables de Bruxelles. This species seems abundant only in the south-eastern area of the Sables de Bruxelles deposits.

In Great Britain, *S. smithi* is common in some horizons of the London Clay where it cohabits with another species (Information and loan material from D. J. WARD). The specimens illustrated by CASIER, E. (1966, pl. 3, fig. 13-16) belong to this other species.

## CONCLUSIONS

In Belgium, the Squalinae sensu stricto (see above) are very common in the upper Palaeocene (Sables Orp-le-Grand) where they are represented by two species: *Megasqualus orpiensis* of very large size and by *Squalus minor* of smaller size but more abundant. The *Megasqualus orpiensis* population remains important during the Landenian both in Belgium (Tuffeau de Lincet and Sables de Dormaal) and France (Sables de Bracheux or beds referable to these Sands).

The *Squalus minor* population has a similar story but seems to remain more northern. During the Eocene period, the Squalinae seem extremely rare in Belgium, with the exception of temporary abundance of *Squalus smithi* in the south-eastern part of the Sables de Bruxelles Sea.

Distribution of *Squalus* and *Megasqualus* in Belgium.

	T. Ciply	S. Orp	T. Lincet	S. Dormaal	C. Ghlin	C. Ypres	S. Forest	S. Egem	S. Brussels W	S. Brussels S
<i>Megasqualus orpiensis</i>		c	c	c	R					
<i>Squalus minor</i>	R	C	C	c						
<i>Squalus smithi</i>						?	R	r	R	C

c: common C: very common r: rare R: very rare ?: not yet found W: West S: South T: Tuffeau S.: Sands  
C.: Clay.

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1-3. *Squalus minor* (I.ÉRICHE, M. 1902) × 14, Maret 119W374, Sables d'Orp-le-Grand, level with *Artica morrisi* lenses. Coll. S.G.B. 119W P1-2-3.

1. Commissural tooth; 2. Lateral tooth; 3. Anterior tooth showing exceptional preservation of the centrosqualiform root structure.

4-5. *Squalus smithi* nov. sp.

4. Holotype, lateral tooth × 28, Egem P3W71, level with *Venericor planicosta* lenses (+ 39 m) in the upper part of Sables de Mons-en-Pévèle. S.G.B. Coll. 53W71 P2.

5. Other lateral tooth × 30, Forest 102W93, *Ditrupe* layer near the top of the Sables de Forest. Coll. S.G.B. 102W93 P1.

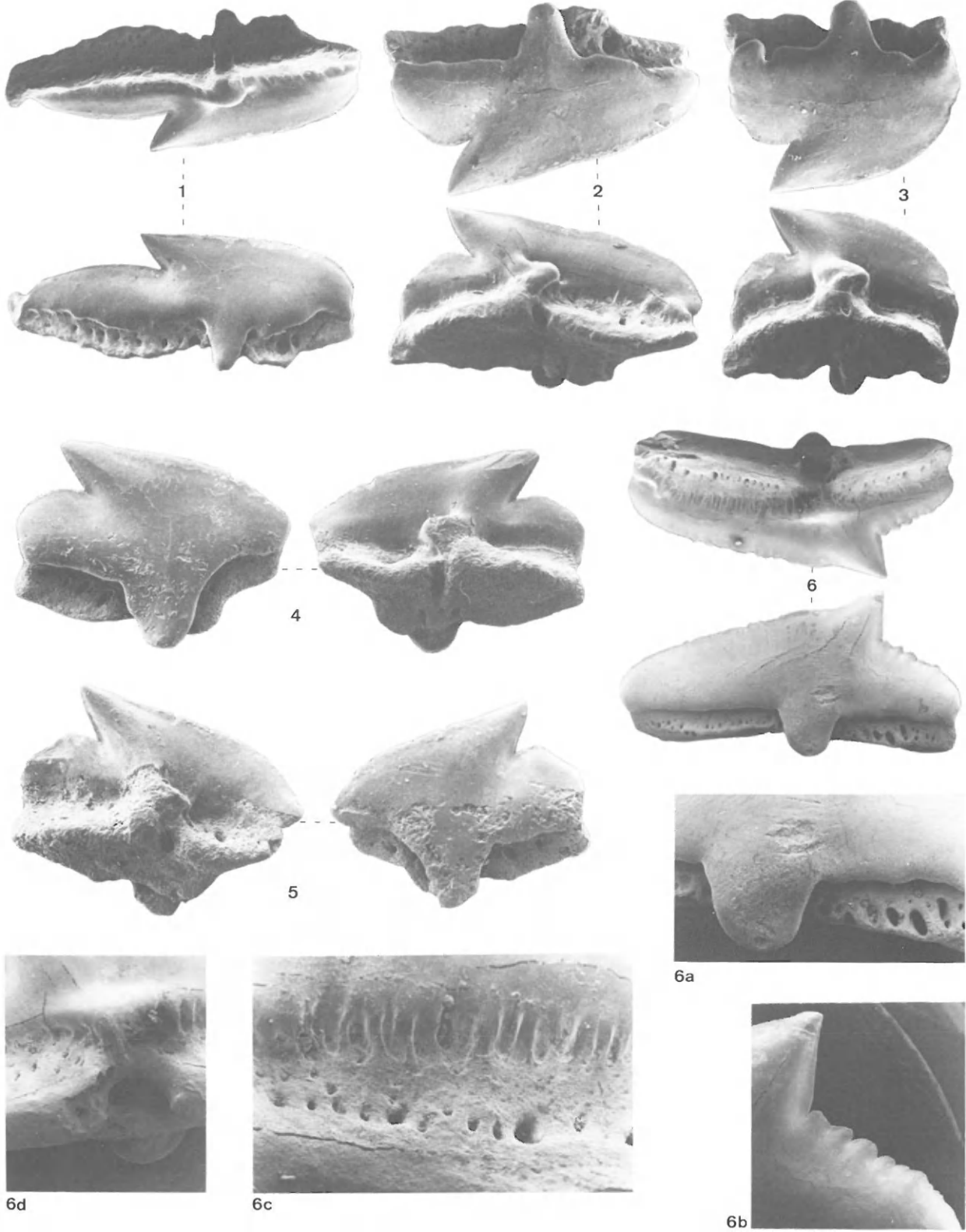
6. *Megasqualus orpiensis* (WINKLER, T. C. 1874) × 5.5, Maret 119W374, Sables d'Orps-le-Grand, level with *Artica morrisi* lenses. Coll. S.G.B. 119W374 P4.

6a. Detail × 11 showing large apron, light external lobulation of the base of the crown, and importance of the secondary root foraminae.

6b. Detail × 11 of the posterior serration of the crown.

6c. Detail × 22 showing the strong microlobulation of the internal lower part of the crown and the numerous root foraminae.

6d. Detail × 11 of the broad infundibulum.



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