

# The occurrence of *Proserpina* in the British Tertiary, with the description of a new species

(Prosobranchia: Helicinidae).

By

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With 3 figures.

*Proserpina* and its allies constitute a unique group of prosobranch land snails in that they have lost the characteristic operculum, have developed apertural lamellae and have a mantle which may extend and envelop the shell. Today proserpine helicinids are geographically restricted to the New World Tropics. This paper describes a new species of *Proserpina* from the Lower Tertiary limestones of the Hampshire Basin in Southern England.

Archaeogastropoda

Neritacea.

Helicinidae

***Proserpina*** G. B. SOWERBY<sup>II</sup> 1839.

***Proserpina woodwardi*** n. sp.

- 1891 *Despoena woodwardi* EDWARDS (ms) NEWTON, Syst. list EDWARDS coll.: 255 [nomen nudum].  
1900 *Despoena woodwardi* EDWARDS (ms) TAYLOR, Monograph, 1: 413 [nomen nudum].  
1976 *Despoena woodwardi* EDWARDS (ms) PREECE, Tertiary Res., 1 (1): 18 [nomen nudum].  
1980 *Proserpina* sp., — PREECE, Tertiary Res., 2 (4): 170.

**Material examined** Holotype: BM (NH) GG 13359 ex R. C. PREECE coll.; Paratypes: BM (NH) 71107/6, F. E. EDWARDS coll.; BM (NH) GG 13362/1, A. G. WRIGLEY coll.; BM (NH) GG 13360-361/2; SMF 253682/1 ex PREECE; I. J. KILLEEN coll. (Newport, Isle of Wight): 12 specimens; R. C. PREECE coll. (London): 12 specimens.

**Preservation** The majority of specimens are preserved merely as internal casts. This fact renders them more satisfactory for study than well preserved shells, since the impressions of the various lamellae are readily seen on

the cast, whereas in an actual shell the lamellae can only be revealed by breaking the specimen. Fragments of shell do survive on several specimens but this is now largely composed of re-crystallized calcite and details of shell microsculpture are lost. However on a few well-preserved specimens portions of the original shell still survive as a whitish powder. Detailed examination reveals that traces of the shell microsculpture remain (Fig. 2) suggesting that this powder is composed of original aragonite.

**Description** Shell up to 6.5 mm. in diameter, 2.5 mm. in height, depressed, subenticular with a narrowly rounded periphery. Whorls 5-6 gradually expanding. The suture is shallow and in many specimens the septa between the inner whorls are resorbed. There is no umbilicus; the umbilical area is weakly sunken and covered with smooth callous material. The shell is covered with a series of very fine, regular transverse lines (ca. 50 per mm.). These are not present on the protoconch which is smooth (however this may result from poor preservation). There is a pronounced constriction behind the peristome which is otherwise simple and sharp. This constriction however is only present on the casts suggesting that there is some internal irregularity of the shell behind the peristome which extends for a short distance into the aperture. The aperture is crescentic and possesses the following lamella teeth (see Fig. 1 for terminology used). Parietal two, projecting nearly one third of the distance across the aperture. The lowermost is slightly larger although the upper parietal extends frac-

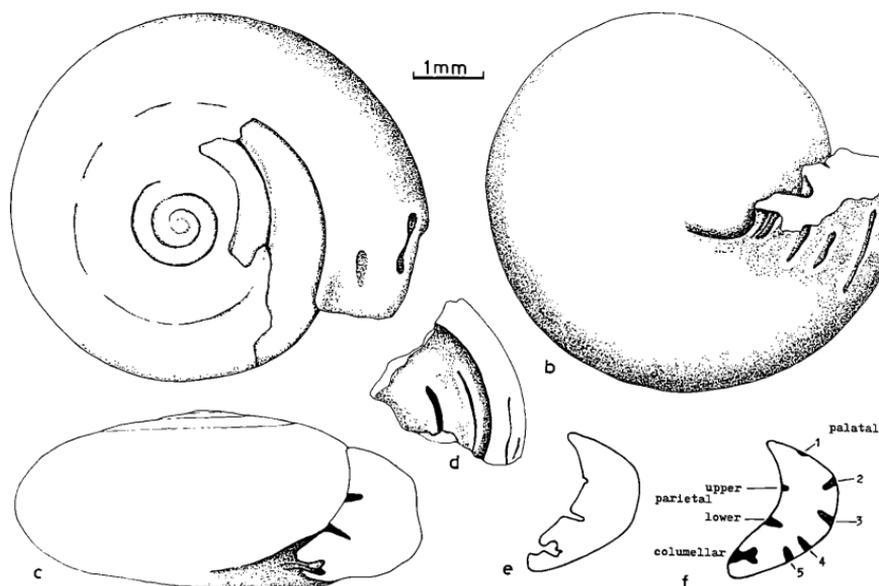


Fig. 1. *Proserpina woodwardi* n. sp., Bembridge Limestone, Headon Hill, Isle of Wight. — a-c) Holotype (GG 13359), d-e) Paratype (GG 13360), apertural fragment showing the development of the parietal teeth, f) ideal cross-section of whorl, showing position of teeth, and terminology used.

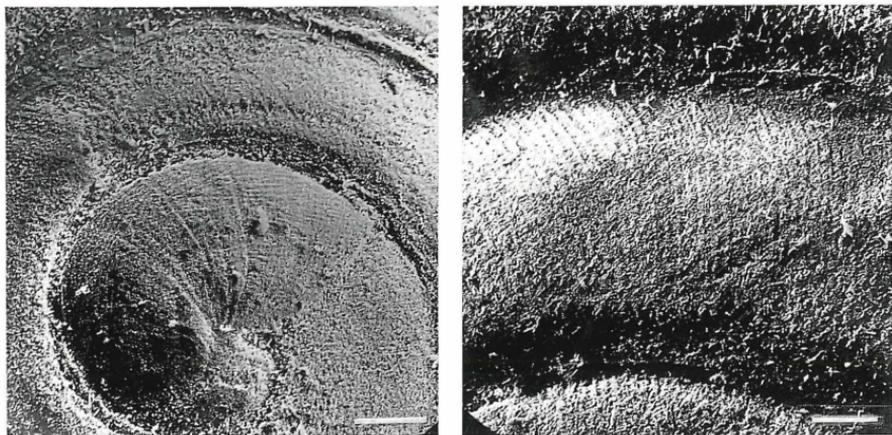


Fig. 2. *Proserpina woodwardi* n. sp. — Bembridge Limestone, Sconce Point, Isle of Wight (Paratype GG 13361). S. E. M. photomicrographs of the shell microsculpture. — Scale bar = 100  $\mu$ .

tionally further into the aperture. There are five palatal teeth that do not extend as far as the peristome. The uppermost (1), which is not always visible, is poorly developed, appearing in the casts as a shallow elliptical furrow, narrowing and becoming shallower towards the aperture. This is situated in the roof of the mouth. The second palatal is considerably more pronounced and slightly posterior to palatal (1) and is situated either on or just above the periphery. This tooth is not uniform in thickness and is expanded at either end. The third palatal is generally the longest and projects furthest into the aperture and can be seen immediately below the periphery. The fourth and fifth palatals are shorter, set close together and are of approximately equal lengths. There are two columellar lamellae set very close together so that only a narrow ridge (corresponding to a notch in life) separates them.

**Dimensions:** Holotype (GG 13359, Bembridge Limestone, Headon Hill, Isle of Wight): 5.7 × 2.3 mm. Measurements of all known specimens are plotted on Fig. 3.

**Derivatio nominis:** It is not clear which WOODWARD FREDERICK EDWARDS wished to honour in the specific name but from the date, S. P. WOODWARD would seem the most likely.

#### Localities and stratigraphical horizons.

The type locality of *Proserpina woodwardi* is Headon Hill, Isle of Wight (National Grid reference SZ 317861), stratum typicum is the Bembridge Limestone. Further specimens have been obtained from the same horizon near Sconce Point (SZ 340898) but the species has not been found at other outcrops of the Bembridge Limestone in the east of the Isle of Wight (PREECE 1976). Various views have been expressed regarding the placing of the Eocene/Oligocene boundary within the formations of the Hampshire Basin. Until recently the Bembridge Limestone was considered Oligocene in age but in the most recent

revision (CURRY et al. 1978) the Eocene/Oligocene boundary is placed at the base of the Bembridge Marls thereby making the underlying Bembridge Limestone Upper Eocene.

A further specimen of *Proserpina* was obtained from the Creechbarrow Limestone of Creechbarrow Hill, Dorset (SY 922824). This specimen which has been described and illustrated elsewhere (PREECE 1980) resembles *woodwardi* in general morphology but the poor preservation renders confident assignment impossible. Recent work on the vertebrate fauna of the Creechbarrow Limestone suggests a Middle Eocene (late Auversian or early Marinesian) age for this formation (HOOKER 1977).

### Discussion

The six specimens included in the F. E. EDWARDS collection were listed by NEWTON (1891) as *Despoena woodwardi* EDWARDS MS. but this is a nomen nudum. BOSS & JACOBSON (1975a) review the complicated nomenclatural history of the genus *Proserpina*. They rightly point out that NEWTON was incorrect in supposing that *Proserpina* SOWERBY 1839 was preoccupied by *Proserpinus* HÜBNER 1816 and that NEWTON's substitute name *Despoena* is superfluous and becomes a junior synonym of *Proserpina*. In a later paper (BOSS & JACOBSON 1975b) they state that *Despoena woodwardi* does not even belong to the Proserpininae. However I recently sent camera lucida drawings of it to Professor BOSS who now agrees that it does resemble species of proserpine helicinids "almost as if it might have been found in Hispaniola" (K. J. BOSS, pers. comm.).

BOSS & JACOBSON (1975a) discuss the phylogenetic history of the Proserpininae. They assume that the loss of the operculum was a "specialization diverging from the fundamental prosobranchiate structure of the Helicinidae, specifically, and the Neritacea, in general" They go on to suggest that the development of apertural lamellae is a further specialization and that those genera or species with 5 or 6 teeth are the apex of a lineage developed from those with only a single tooth. There exists however the possibility that secondary loss of teeth could also occur. Such conjectures must await the discovery of further fos-

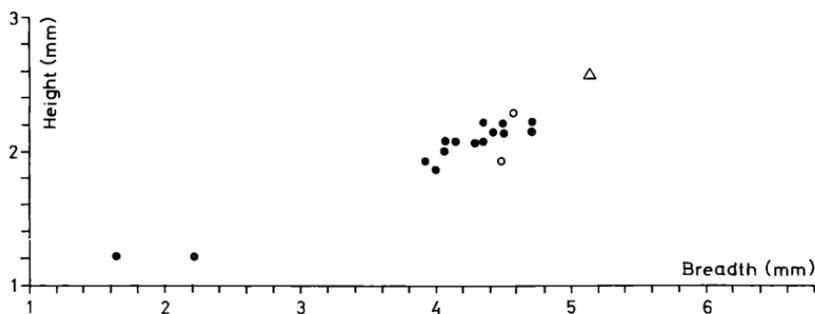


Fig. 3. Graph plotting the dimensions of *Proserpina woodwardi* n. sp. ● Headon Hill, ○ Sconce Point, △ Creechbarrow Hill.

sil species. It is therefore noteworthy that *Proserpina woodwardi*, the earliest known species of the genus, possesses nine apertural lamellae, more than any known living species of proserpine helicimid.

There are other helicimid prosobranchs known from the Lower Tertiary of Europe. Perhaps the best known is *Dimorphoptychia arnouldii* (MICHAUD 1837) from the Calcaire de Rilly (Thanetian) of Rilly-la-Montagne near Reims, France. There has been much discussion as to the taxonomic position of this species. SANDBERGER (1871) who proposed *Dimorphoptychia* placed it in the Endodontidae but all subsequent authors have recognized it as belonging to the Helicinidae. One author (BERTHELIN 1887) even placed it in the Proserpininae since there was complete resorption of the septa of the internal partitions. This assignation however seems unlikely. A recent discussion of the nomenclatural history of this fossil is given by BISHOP (1980).

Today the Proserpininae are solely New World in distribution being commonest in Mexico, South America and Cuba, Jamaica and Hispaniola in the West Indies (BOSS & JACOBSON 1975a). The occurrence of *Proserpina* in Lower Tertiary deposits of the Hampshire Basin is therefore of considerable biogeographical interest. Ecologically their presence suggests a well-shaded and a somewhat humid forest-floor environment. This conclusion is supported by the nature of the other forty or so species of land snails known from the Bembridge Limestone of the Isle of Wight (PREECE 1976). It is noteworthy that several other genera are present, particularly *Strobilops* and members of the Oleacnidae, which also have New World affinities (PILSBRY 1927). The reasons for these dramatic changes in distribution are unknown but probably have a climatic basis related to the progressive cooling during the late Tertiary.

**A c k n o w l e d g e m e n t s** I thank Mr. I. J. KILLEEN of Newport, Isle of Wight for the loan of specimens and Dr. P. B. MORDAN and Mr. J. COOPER of the British Museum (Natural History) for helpful discussion. I would also like to thank Professor K. J. BOSS of Harvard University for his comments.

### S u m m a r y

A new species of helicimid prosobranch, *Proserpina woodwardi* is described from the Bembridge Limestone (Upper Eocene) of Headon Hill and Sconce Point in the Isle of Wight, England. The description validates a manuscript name *woodwardi* F. E. EDWARDS (NEWTON 1891). The species possesses several proserpine features including the characteristic shell microsculpture, apertural lamellae, absence of an umbilicus and the ability to resorb the septa between the inner whorls. There are nine apertural lamellae (two parietal, two columellar and five palatal) apparently more than any living species of *Proserpina*. A further specimen was discovered in the Creechbarrow Limestone (Middle Eocene) of Creechbarrow Hill, Dorset. This closely approaches *woodwardi* in general morphology but the poor preservation prevents detailed examination of the dentition and renders confident assignation impossible. Proserpine helicimids are now geographically restricted to the New World Tropics and their occurrence in the Lower Tertiary limestones of the Hampshire Basin therefore has considerable biogeographical interest.

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