

Some micromorphic gastropods from the *Corbula* beds, Cranmore Member (Solent Group, Early Oligocene) of the Isle of Wight, southern England.

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Abstract: The micromorphic gastropod fauna of the *Corbula* beds, Cranmore Member (Solent Group, Early Oligocene) is recorded. Fossil concentrates recovered from 500 and 125 micron meshes comprised large numbers of gastropods, bivalves, foraminifera and arthropod debris. A new species of gastropod, *Sandbergeria vectiana* (Cerithioidea : Obtortionidae) is described. The associated macrofauna is discussed. Palaeoenvironmental inferences are drawn, concluding that the *Corbula* beds were deposited at a time when the Solent Basin comprised a shallow marine embayment which was open to the sea.

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INTRODUCTION

The Cranmore Member of the Bouldnor Formation (Solent Group) was defined by Insole and Daley (1985) and is equivalent to the Upper Hamstead Beds of Bristow *et al.* (1889). Forbes (1856) named the uppermost horizons of the Upper Hamstead Beds - the *Corbula* beds, based upon the abundance of the bivalve *Varicorbula subpisum* (d'Orbigny). They comprise *circa* 3.5 metres of blue-grey-green shaly muds. The *Corbula* beds are the youngest unit of the Hampshire Basin Palaeogene and constitute Britain's only onshore Oligocene marine sediments. Murray (1992) considered the Solent Basin to have almost completely silted up by Cranmore Member times. The Member is terminated by an erosion surface and overlain by Pleistocene gravels. The precise age of the Member is uncertain but probably dates from Chron 12, NP23 (Aubry, 1986) i.e. early Rupelian. This stratigraphically important sequence has received surprisingly little attention, the two most recent papers being those of Cavalier (1964) correlating the Hamstead beds with the French Oligocene, and Stinton (1964) on the stratigraphy of the Hamstead section.

LOCATION OF SECTION

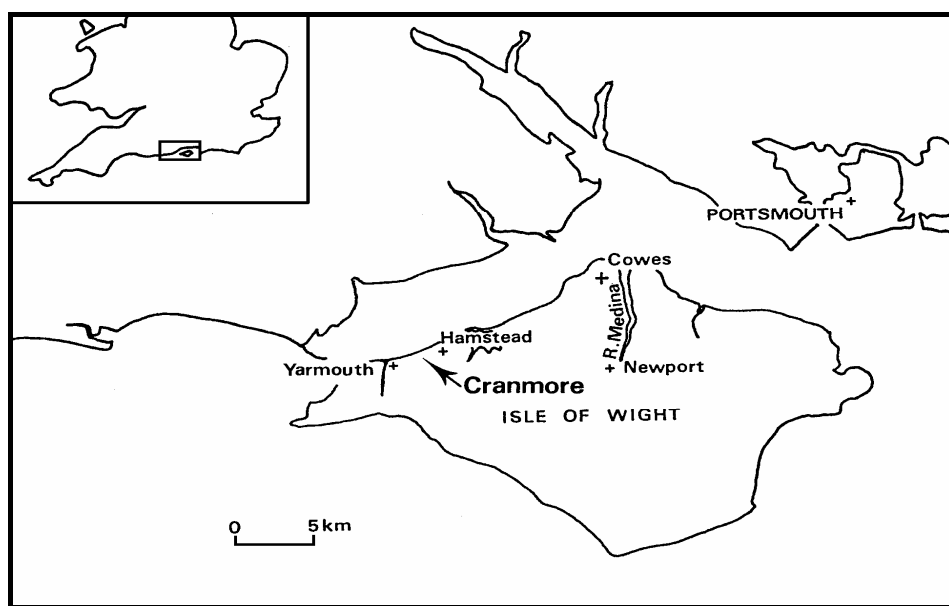
Cranmore (SZ 387 908) is located on the north-west coast of the Isle of Wight between Cowes and Yarmouth (Text-fig. 1). Exposures of the *Corbula* beds are to be found at the top of the cliffs adjacent to the coastal footpath. At present, these exposures are not in good condition, being at best partially overgrown and slumped.

THE FAUNA

The fauna is characterised by the widespread species *Varicorbula subpisum* (d'Orbigny) and *Granulolabium plicatum* (Bruguière) (= *Pirenella monilifera* (Defrance)) but sample preparation revealed a substantial microfauna dominated by gastropods, some of which are described and figured herein.

THE MICROMORPHIC GASTROPODS

Samples were processed using a modified Ward washer (Ward, 1981). The microfauna was retained by 500 and 125 micrometre meshes, the bulk being held by the 500 micrometre mesh. Arthropods, foraminifera and vast



Text-fig. 1. Location of section: Cranmore (SZ 387 908), Isle of Wight.

numbers of *Strebloceras cornuoides* were recovered at 125 microns. Specimens were examined and photographed using a JEOL 35C Scanning Electron Microscope.

SYSTEMATICS

PROSOBRANCHIA

Superfamily CERITHIOIDEA Férussac, 1819

Family OBTORTIONIDAE Thiele, 1925

Genus *Sandbergeria* Bosquet, 1861

Sandbergeria vectiana sp. nov.

Pl. 1, figs 1, 2

Synonymy: *Sandbergeria* sp. Newton, 1891: p.189.

Diagnosis: Small, up to 2.6mm, turreted-conical, whorls moderately convex, ornament of 4 to 5 spiral bands of regularly sized granules, the first (adapical) of which is separated from the succeeding three which are grouped. The fifth (abapical) spiral element when present, is set just above the suture. Sutures are strong giving the shell a banded appearance. The last whorl comprises three-fifths of the total shell height in juvenile shells, and one-half in adult individuals.

Holotype: IWCMS: 1995.254.2 - 2.6 x 1.4mm. Bouldnor Formation, Cranmore Member, Corbula beds, Cranmore cliff, Isle of Wight. Specimen on SEM stub deposited in the Museum of Isle of Wight Geology, Sandown.

Paratypes: IWCMS: 1995.254.1, 3-5: four specimens from the type locality and horizon, (stored on the same stub as the holotype); BMGD 72008a-c F. E. Edwards collection, Natural History Museum, London (as "*Sandbergeria* sp.") three specimens from "Hempstead" (now Hamstead), Isle of Wight.

Stratigraphic distribution: Corbula beds, Cranmore Member, Bouldnor Formation, Solent Group, Early Oligocene.

Location: Cranmore (SZ 387 908), Isle of Wight, England.

Etymology: *vectiana* derived from Vectis, the Roman name for the Isle of Wight.

Description: Small in size when compared to other species of the genus. Up to 2.6 mm in height; width at the last whorl up to 1.4 mm. Shape turreted-conical. Protoconch homeostrophic and paucispiral (1½ whorls). It is thin-shelled, slightly bulbous and lacks ornament. There is no visible break between protoconch and teleoconch. Teleoconch eight moderately convex whorls with incised/grooved sutures. The pronounced nature of the sutures give the shell a distinctive banded appearance. The last whorl comprises three-fifths to one-half of the total height.

The aperture is relatively large and square-ovate with a narrow inductura which broadens abapically and extends beyond the basal margins of the aperture producing a noticeably reflected lip. The inner face of the outer lip is smooth and the shell is relatively thick. A broad shallow siphonal notch is delineated by a slight plication in the otherwise smooth inductura.

Growth lines are opisthocyr, varying from faint to strong. The ornament consists of four (occasionally five - depending upon degree of whorl overlap) granulated spiral threads. This gives rise to a superficially cancellate ornament but varices are not developed. The spiral threads are separated by smooth sulci, the first (i.e. that nearest the adapical suture) being distinctly broader. When present, the fifth spiral thread is located just above the abapical suture and is continuous (not granulated). The early whorls are unornamented but by the fifth whorl, three spiral threads (first, second and fourth are present and by the seventh whorl, thread three has been intercalated between the second and fourth (abapical) threads. The base of the final whorl shows six or seven smooth spiral threads.

Remarks: The cerithioid genus *Sandbergeria* (an obtortionid - following Thiele, 1925) was established by Bosquet (1861) - (see also Cossmann & Pissarro 1904-13; gastropod genus 139). The type species is *Sandbergeria cancellata* (Nyst, 1836) from the Oligocene of Belgium and northern Germany. Three British Palaeogene species (1 unnamed and 2 manuscript names) were listed by Newton (1891), the unnamed species being recorded from the Hempstead Beds (= the Hamstead and Cranmore Members of Insole & Daley, 1985).

Species of *Sandbergeria* are distinguished on the basis of size, whorl shape/convexity, ornament and suture. In this context, Eocene species of *Sandbergeria* from the Paris Basin (Gougerot & Le Renard, 1984) are generally more turreted and elongate than Oligocene species.

Amongst the Oligocene species, *S. vectiana* is distinguished from the type species *S. cancellata* by its much larger last whorl. In *S. vectiana* this is three-fifths of the shell height in juveniles, to one-half in adults, compared with two-fifths in adult *S. cancellata*. There are also two other species of *Sandbergeria* from the Stampian of Etampes (Oligocene, Paris Basin), namely *S. abscondita* Deshayes, 1865 and *S. trimargarita* Cossmann, 1893. *S. abscondita* has less convex whorls producing a more turreted profile, and bears a greater number of spiral threads of ornament. *S. trimargarita* has only three lines of spiral ornament; both are also one third taller.

Superfamily RISSOIDEA Gray, 1847

Family CAECIDAE Gray, 1850

Genus *Strebloceras* Carpenter, 1858

Strebloceras cornuoides Carpenter, 1858

Pl. 1, fig. 3

Description: A very distinctive thin-shelled hooked tube (lituiticone) up to 2mm in length. The first two whorls are planispiral whereas the final whorl is a broad downward-curved tube exhibiting a rapid rate of whorl expansion together with a low rate of whorl translation. The aperture, which is relatively large and round, is orientated away from the axis of coiling. The last whorl is marked by frequent growth lines some of which produce very pronounced constrictions. The shell is unornamented.

Family RISSOIDAE Gray, 1847**Genus *Pusillina* Monterosato, 1884*****Pusillina turbinata* (Lamarck, 1804)**

Pl. 1, fig. 4

Description: A small species up to 2.5mm in height with a turbinated shell of five whorls. The shell is strongly ornamented comprising both axial and spiral elements. The axial ornament consists of pronounced, slightly prosoclyt, rounded ribs which extend the full height of the whorl. The spiral ornamentation comprises seven strong ribs which are intercalated with, but do not cross, the axial elements. The whorl sides are strongly convex with pronounced impressed sutures. The base of the final whorl has five spiral cords as well as the somewhat reduced axial elements. The holostomous aperture is ovoid and large (two-thirds of the last whorl height). The outer lip is smooth and noticeably thick-shelled. There is a smooth narrow inductura.

Remarks: This species is also found in the lower part of the Bembridge Marls Member of the Bouldnor Formation, Solent Group (pers. obs.).

Family HYDROBIIDAE Troschel, 1857**Genus *Hydrobia* Hartmann, 1821*****Hydrobia* sp. indet.**

Plate 1, fig. 5

Description: Small, up to 2mm high, a turreted-fusiform shell of five whorls, which are smooth except for regular closely-spaced weakly prosocline growth lines. The whorls are moderately convex and are shouldered below the suture, which is deeply impressed. The umbilicus is open and the aperture is ellipsoidal in outline. The inductura is thin and raised forming an edge whereas the inside of the outer lip is smooth. There is no siphonal canal although the base of the aperture is flattened.

Family ADEORBIDAE Monterosato, 1884**Genus *Teinostoma* H. & A. Adams, 1857*****Teinostoma* cf. *decussatum* (Sandberger, 1875)**

Pl. 1, figs 6, 7

Description: A thick-shelled, button-shaped gastropod, up to 3mm in diameter, which expands rapidly but with a low translation rate. Ornamentation of the five whorls comprises solid spiral cords, with narrow groove-like interspaces which are evenly spaced. These are more pronounced in the early whorls becoming more diffuse in later whorls. The growth lines are fine and closely spaced. The whorls are flattened on top with a marked angular carina, below which they are convex. The sutures are quite prominent and whorl overlap is approximately one-third. The aperture is large and ovate, with the outer lip tapering to a fine edge. The inductura is broad and flattened and the umbilicus is incompletely filled. Some specimens exhibit a brown line bordering the inside of the outer lip.

HETEROBRANCHIA**Superfamily PYRAMIDELLOIDEA Gray, 1847****Family PYRAMIDELLIDAE GRAY, 1847****Genus *Syrnola* A. Adams, 1862*****Syrnola* sp. indet.**

Pl. 1, fig. 8

Description: Small, thick-walled needle-like shell of at least seven whorls. Maximum height 3mm. The whorl sides are flat to shallowly convex and smooth except for faint opisthoclyt growth lines. The suture is adpressed. The overall shape of the aperture is unknown, however it does appear to be long and narrow. The columella bears a strong plication

ASSOCIATED FAUNA**Mollusca: Gastropoda**

The most abundant of the larger gastropods are juvenile specimens of *Granulolabium plicatum* (Bruguère). The specimens are complete, largely unabraded and range up to 10mm in height. Mature individuals of this species from the underlying Cerithium beds (also Cranmore Member) attain a maximum height of 28mm.

The volute *Neoathleta rathieri* (Hébert), a small species up to 20mm in height, is common. The small species *Euspira vectensis* Wrigley is very common with juveniles being most frequent, the few adults found being up to 10mm high. Colour pattern preservation is frequent in this species and consists of either a central broad white spiral band between a brown background pigment or discrete brown bands of pigment paralleling the growth lines.

Mollusca: Bivalvia

Varicorbula subpisum d'Orbigny is the commonest fossil (the informal title of the beds reflect this). Articulated valves are infrequent, nine paired valves were taken from a sample which contained 521 separated valves. Of all the valves recovered 13% showed predation perforations, small round holes presumably resulting from attack by naticid gastropods and attributable to *Oichnus paraboloides* Bromley.

A single specimen of oyster spat was observed but due to its delicate state it was not possible to collect it. Although *Pycnodonte callifera* (Lamarck) has been recorded from these beds, the horizon bearing these large oysters was not seen. Small (? juvenile) valves of a corbiculid were also found to be common together with fragments of large *Polymesoda convexa* (Brongniart). The small lucinid *Claibornites thierensi* (Hébert) was present but rare.

Arthropoda

Large numbers of ostracod tests were retained by the 125 micrometre mesh. The smooth-valved form of *Hemicyprideis montosa* (Jones & Sherborn) was abundant. Keen (1972) considered this dimorphic species to be euryhaline, being most common in mesohaline conditions. However, Keen found that the smooth valved form was characteristic of sediments deposited under marine salinities. Therefore, the presence of the smooth valved forms here may be indicative of fully marine conditions.

The valves of barnacles ?*Balanus* sp. were found, these having previously been recorded as occurring with the oysters (Bristow *et al.* 1899; White, 1921). Abundant fragments of crab were also observed (some gastropod shells showed signs of possible peeling).

Foraminifera

An indeterminate species of *Quinqueloculina* was found to be abundant in states of preservation which varied from fresh to abraded.

PALAEOENVIRONMENT OF THE CORBULA BEDS

The micropalaeontological evidence suggests marine salinities predominated; *Quinqueloculina* being typical of open marine to hypersaline conditions and smooth valved *Hemicypriideis montosa* indicating marine conditions. Moreover, corbulid bivalves show a preference for shallow and marginal marine conditions (Anderson, 1994) and extant volutes are wholly marine. The faunal evidence indicates that the Corbula beds were deposited in a shallow marine embayment open to the sea. Murray (1992) suggests that the Solent Basin had almost silted up by this time (the Early Oligocene).

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Plate 1.

Fig. 1. *Sandbergeria vectiana* sp. nov., paratype IWCMS:1995.254.1 apertural view x75.

Fig. 2. *Sandbergeria vectiana* sp. nov., holotype IWCMS:1995.254.2 lateral view x47.

Fig. 3. *Strebloceras cornuoides* Carpenter, 1858 IWCMS:1995.254.6 lateral view x60.

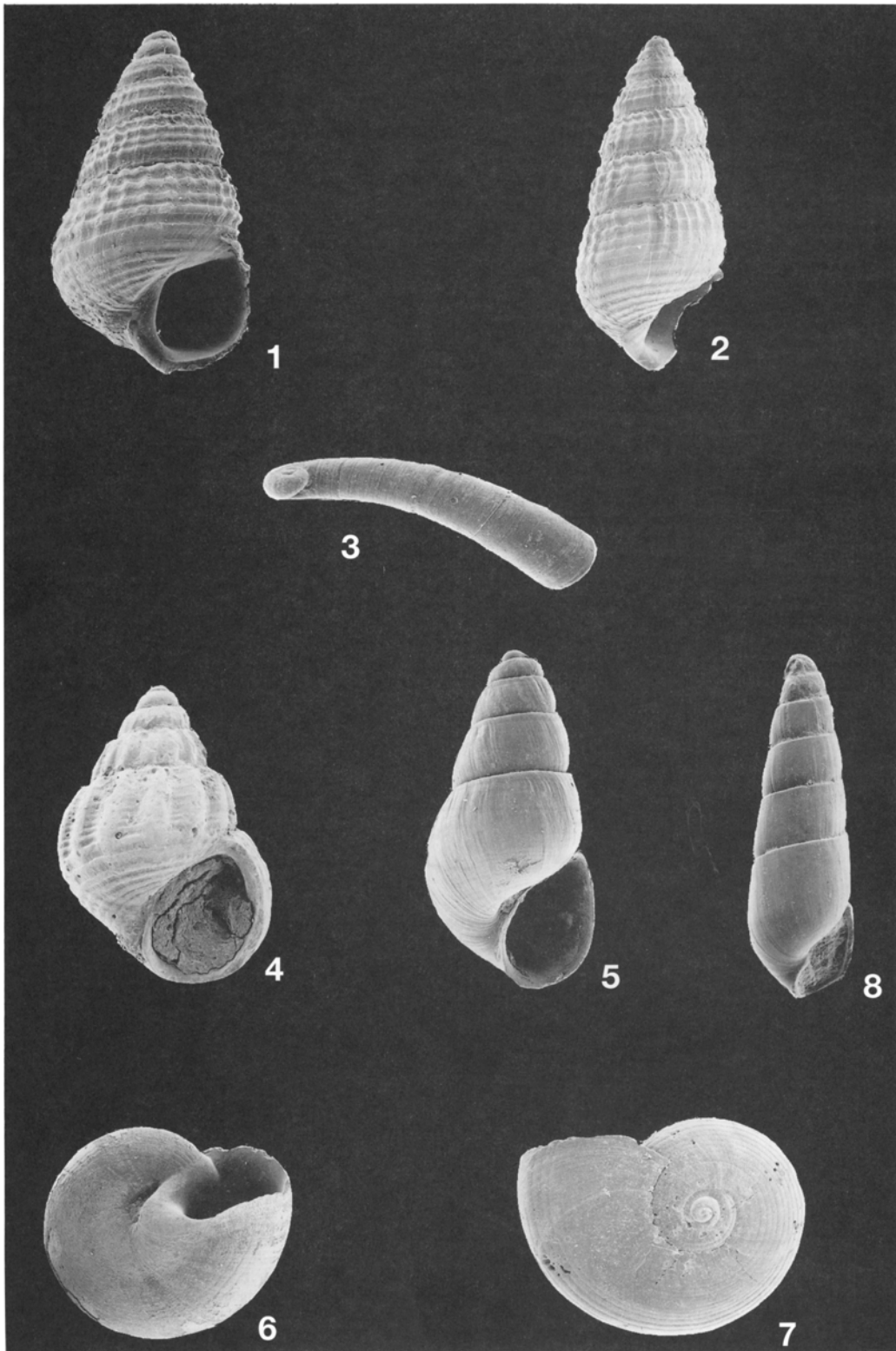
Fig. 4. *Pusillina turbinata* (Lamarck, 1804) IWCMS:1995.255.1 apertural view x43.

Fig. 5. *Hydrobia* sp. indet. IWCMS:1995.255.2 apertural view x55.

Fig. 6. *Teinostoma* cf. *decussatum* (Sandberger, 1875) IWCMS:1995.255.6 abapical view x39.

Fig. 7. *Teinostoma* cf. *decussatum* (Sandberger, 1875) IWCMS:1995.255.7 apical view x43.

Fig. 8. *Syrnola* sp. indet. IWCMS:1995.255.4. x55 apertural view.



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