

# New thoracican cirripedes (Crustacea) from the Portland and Purbeck Groups (Tithonian–Berriasian) of Dorset, United Kingdom

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**Abstract.** The first cirripedes from the Portland and Purbeck groups of southern England are described, and referred to two new species, *Loriolepas whytei* sp. nov and *Etcheslepas portlandensis* sp. nov. They constitute the first records of cirripedes from the upper Tithonian (uppermost Jurassic) and Berriasian (lowermost Cretaceous) of western Europe. A new family, the Archaeolepadidae, is introduced for the extinct genera *Archaeolepas* and *Loriolepas*.

**Key words.** Jurassic, Cretaceous, stalked barnacles, southern England

## Introduction

In 1928, Thomas Withers described the meagre cirripede material from the British Upper Jurassic, consisting of a small number of mostly broken valves washed from the Kimmeridge Clay of Buckinghamshire. In the Lower Cretaceous, the marine pre-Aptian strata had yielded only a single species from the Speeton Clay (Hauterivian) of Speeton, Yorkshire. Recent discoveries by Steve Etches (Etches Collection, Kimmeridge) of magnificently preserved, and locally abundant, cirripedes from the Kimmeridge Clay in Dorset have considerably improved our understanding of the taxonomy, phylogeny and palaeoecology of Late Jurassic forms (Gale 2014, 2018), but they remained unknown from the overlying Portland Group. In 2015, during a field excursion for students of the University of Portsmouth to Freshwater, on the Isle of Portland (Fig. 1) I collected a number of cirripede valves from the Cherty Member of the Portland Stone Formation, and further specimens on a subsequent visit. At this time, Paul Ensom told me that he had

found a single cirripede valve in the Cinder Bed at Warbarrow Tout, Purbeck, Dorset (Ensom 1985b). I visited that section in 2016 and collected an additional 15 specimens. Subsequently, the Portland and Purbeck specimens proved to belong to two new species; these are the only late Tithonian and Berriasian records of the group from western Europe. These new records, together with material from the Kimmeridgian of Germany (Gale et al. 2019) and the Hauterivian of northern Germany (Gale 2019) partly infill a stratigraphical gap in the fossil record of the group.

## 2. Stratigraphy and localities

*Cliffs and an old quarry at Freshwater, Isle of Portland.* Exposures along the side of the steep path which passes through the Cherty Member of the Portland Stone Formation have yielded common cirripedes at a level 7–8 metres above the base of the member (Fig. 2B). The age is late Tithonian, *Kerberites kerberus ammonite* Zone (Coe 1996).

*Worbarrow Tout, Dorset.* The west side of Worbarrow Tout provides good exposures of the Cinder Bed at the base of the Durlston Formation, a brackish intercalation which is full of the oyster *Praeexogyra distorta* (see Ensom 1985). Here, the Cinder Bed attains a thickness of 1.85 m (Fig. 2C). Barnacle valves occur only in a single, 10-cm-level, 1 m above the base. The Cinder Bed is middle Berriasian in age, falling within magnetochron M17 (W. Wimbledon, pers. comm., 2018).

## 3. Abbreviations.

DCM, Dorset County Museum, Dorchester, UK.

MIJML Etches Collection, Kimmeridge, Dorset, UK.

NHMUK Natural History Museum, London, UK.

## 4. Systematic palaeontology

Family Archaeolepadidae, new family

**Diagnosis.** Calcareous pedunculate cirripedes in which the tall capitulum is made up of six robust plates, including two scuta, two terga, a carina and a rostrum. Lateral plates absent.

**Included genera.** *Archaeolepas* von Zittel, 1885 and *Loriolepas* Gale, 2015.

**Remarks.** *Archaeolepas* was included in the family Eolepadidae Buckeridge, 1983, in the original description of the family, on account of the similar plating configuration to that of *Eolepas* Withers, 1928. However, it has lately been shown that *Eolepas* has phosphatic plates (Gale and Schweigert 2015) which means that *Archaeolepas* and *Loriolepas* require a new family.

Genus *Loriolepas* Gale, 2015

**Type species.** *Pollicipes suprajurensis* de Loriol, (in de Loriol and Pellat, 1867), by original designation.

**Referred species.** *Archaeolepas decora* Harbort, 1905; *Pollicipes planulatus* Morris, 1845 and *L. whytei* sp. nov.

**Diagnosis.** *Archaeolepadids* which possess a capitulum which is less than half the height of the peduncle. Peduncular plates small, polygonal, set in about 20 columns. Carina two-thirds the height of tergum, strongly incurved towards tergum. Tergum possesses a sharply demarcated, flat-topped apicobasal ridge which forms a basal margin.

*Loriolepas whytei* sp. nov.

**Diagnosis.** *Loriolepas* in which the tergum possesses a broad, flat-topped apicobasal ridge which is straight, and terminates proximally in a basal margin. Scutum broad and low, lacking apicobasal ridge.

**Material.** Fifteen valves from the Cinder Bed (middle Berriasian) of Worbarrow Bay, Dorset. NHMUK and Dorset County Museum.

**Types.** The tergum illustrated in Figure 3K is the holotype (NHMUK IC 1332). The other three illustrated valves are paratypes and are from the same horizon and locality (Fig. 3H,I, NHMUK IC 1333, IC 1334; Fig. 3J, DCM G.7260).

**Derivation of name.** In honour of the work on barnacles by the late Dr Martin Whyte (formerly of Sheffield University).

**Description.** Terga twice as tall as broad, five sided, occludent margin short and straight (Fig. 3J, K). Upper carinal margin **slightly** longer than lower, with an obtuse angle between carinal margins. Tergal margin concave, scutal-occludent surface weakly depressed. Occludent ridge for scutal contact absent. A triangular apicobasal ridge **extends** from the apex to the base of the valve, where it forms a short, straight basal margin. Scuta (Fig. 3H, I) are triangular, and the height approximately equals the breadth. The occludent margin is convex, the tergal margin straight. Although the contact between the basal and rostral margins is not exposed, the growth lines (Fig. 3I) suggest that it is gently curved.

**Remarks.** *Loriolepas whytei* sp. nov. is closest to *L. suprajurensis* (Fig. 3A, D, E), from which it differs in the straight, rather than curved, apicobasal ridge and the absence of a ridge for scutal articulation. The occludent margin is straight in *L. whytei* sp. nov., but concave in *L. suprajurensis*. The scutum of *L. whytei* sp. nov. is shorter and broader than that of *L. suprajurensis*, and lacks an apicobasal ridge.

**Occurrence.** Cinder Bed, Purbeck Group, of Worbarrow Bay, Dorset. Middle Berriasian.

Family ?Zeugmatolepadidae Newman, 1996

Genus *Etcheslepas* Gale, 2014

**Diagnosis.** Capitulum broad, with tall upper latus and rostralatus, and numerous (50+) **smaller, imbricating** lateral plates. Rostrum strongly convex, with four discrete surfaces.

*Etcheslepas portlandensis* sp. nov.

Fig. 4A–D

**Diagnosis.** *Etcheslepas* characterised by relatively few, **well-separated** and evenly spaced raised ridges on the valves which run parallel to the margins.

**Material.** **Eighteen** valves in NHMUK Coll. from the **Cherty Member** (Portland Stone Formation) at Freshwater, Portland, Dorset; **upper** Tithonian, *Kerberites kerberus ammonite* Zone.

**Types.** The tergum figured in Fig. 4D is **the** holotype (NHMUK IC 1336). The other **illustrated** valves are paratypes (Fig.4A, tergum, NHMUK IC 1337; Fig. 4B, scutum, IC 1338; Fig. 4C, carina, IC 1339).

**Derivation of name.** After the Isle of Portland, Dorset, which yielded the material described here.

**Description.** Terga (Fig. 4A, B, D) nearly symmetrically rhombic in outline, slightly taller than broad. Upper and lower carinal margins gently convex, of equal length. Apicobasal ridge weak, curved towards the carinal margin. Occludent margin slightly concave, and a ridge for scutal articulation is present adjacent to the occludent margin. A weakly depressed region adjacent to this ridge bears shallow grooves beneath the prominent ridges. Sculpture consists **of** widely separated fine ridges, parallel with valve margins, approximately 50 microns apart. The triangular scutum (Fig. 4B) is as broad as tall with an elongated basal margin and a sharp apicobasal ridge, which separates a well-demarcated tergal surface. The growth lines are slightly less regular than on the terga. The carina (Fig. 4C) is rounded in cross section and tapers strongly towards the apex. It bears widely separated, low ridges like those on the terga, which **are shaped like the letter 'V'** towards the basal margin. The ridges become more closely spaced basally, probably indicating decreased growth towards maximum size, as for the terga.

**Remarks.** *Etcheslepas portlandensis* sp. nov. differs from *E. durotrigensis* (Fig. 4E, I) in the proportionately lower, more symmetrically rhombic terga and the more acutely angled (about 100°) growth lines on the carina. The sculpture is also very different; in *E. durotrigensis*, the growth ridges are very fine, **numerous and** closely spaced, whereas those in *E. portlandensis* sp. nov. are fewer and more widely spaced.

## 5. Conclusions

The first thoracican cirripedes from the **upper** Tithonian Portland Limestone Formation and the **middle** Berriasian Durlston Formation of Dorset are described. They are identified as belonging **the archaeolepadid** genus *Loriolepas* (*L. whytei* sp. nov.) and the **zeugmatolepadid** *Etcheslepas*

(*E. portlandensis* sp. nov.). A new family, *Archaeolepadidae*, is erected for accommodation of the extinct genera *Archaeolepas* and *Loriolepas*. This is only the second record of a cirripede from the Berriasian Stage, worldwide.

## Acknowledgements

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# Captions

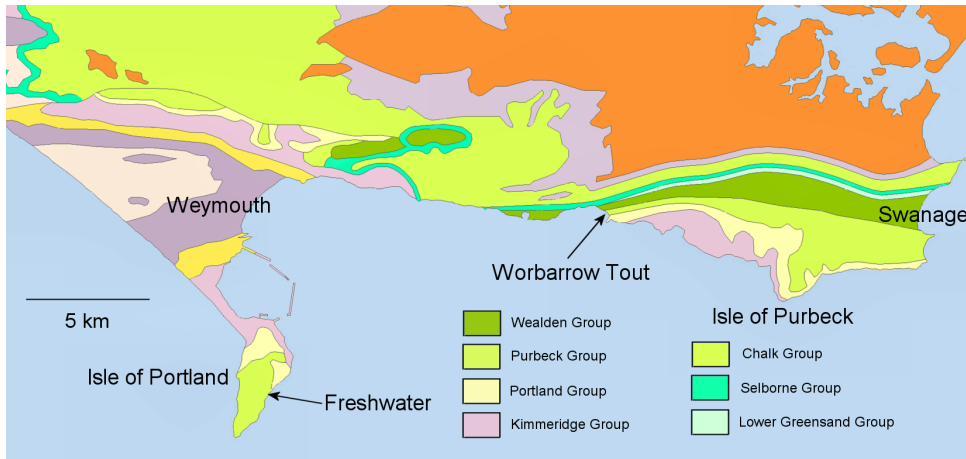


Fig. 1. Map of south-central Dorset, to show localities which have yielded the fossil cirripede material described herein. Modified after BGS digimap viewer.

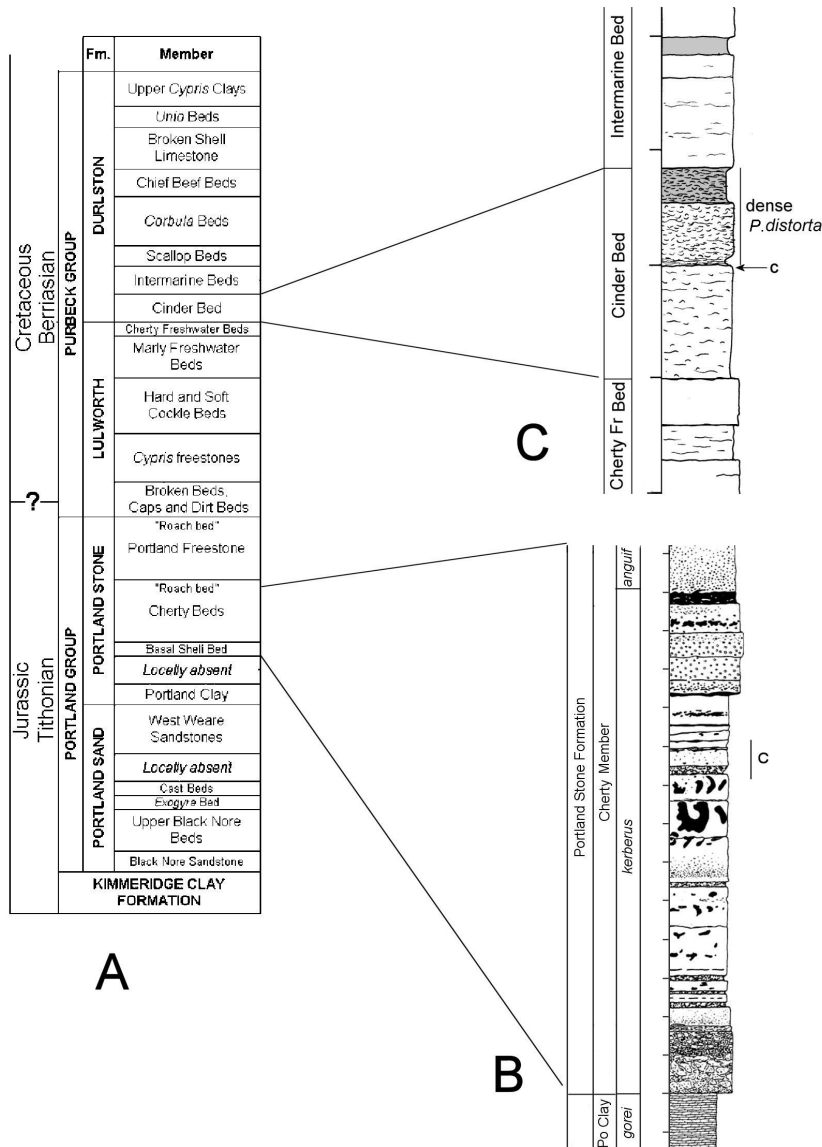




Fig. 2. A, stratigraphical column of the **Portland and Purbeck groups**, based on Woods (2011). B, log of **the Cherty Member (Portland Stone Formation)** as exposed at Freshwater, Isle of Portland, with **the horizon which has yielded cirripedes** marked (**small letter 'c'**). C, log of Cinder Bed at Worbarrow Tout, Purbeck, to show level which **has yielded cirripede** fossils. The Cinder Bed in Worbarrow Bay contains abundant *Praexogyra distorta*. Nomenclature after Ensom (1985a).

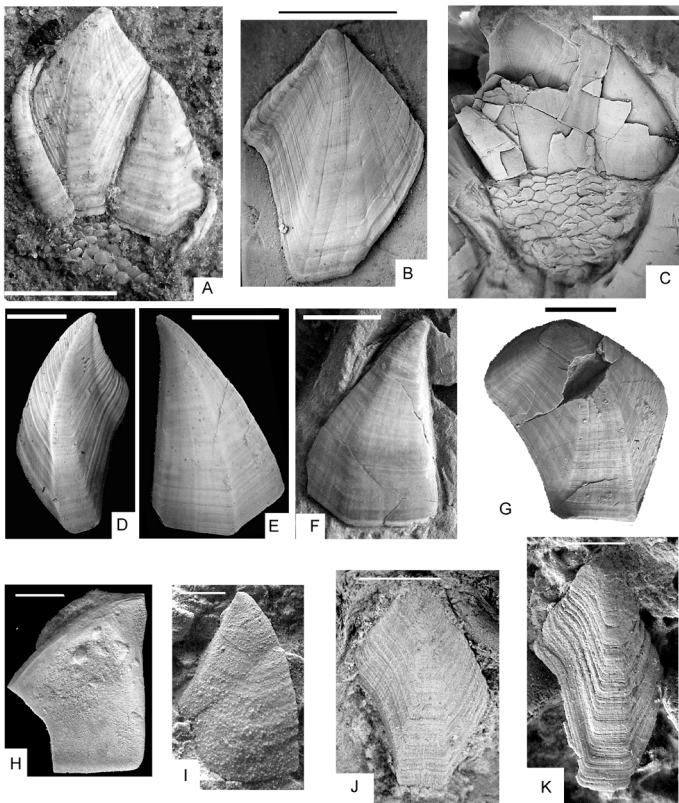


Fig. 3. A, D, E, *Loriolepas suprajurensis* (de **Loriol**, *in* de Loriol and Pellat, 1867); A, complete capitulum, Tithonian, Tour de Croi, near Boulogne-sur-Mer, **northwest** France (private collection, Paris; see [fossilesboulonnais@free.fr](mailto:fossilesboulonnais@free.fr)), **the original of Gale (2015, fig. 4A)**; D, tergum, **external** view (**the original of Withers 1928, pl. 5, fig. 10**; Gale 2015, **fig. 4D**), NHMUK In. 27430, Tithonian, near Boulogne-sur-Mer, France; E, scutum, external view (**the original of Withers 1928, pl. 5, figs 8, 9**; Gale 2015, **fig. 4E**), NHMUK In. 24729, Tithonian, near Boulogne-sur-Mer, France. B, *Loriolepas planulata* (Morris, 1845), tergum (**the original of Darwin 1851, pl. 4, fig. 11**; Withers 1928, pl. 5, fig. 3), NHMUK In. 24247, Oxford Clay, Callovian, *Peltoceras athleta* Zone, Christian Malford, Wiltshire, UK. C, F, G, *Loriolepas decora* (Harbort, 1905); C, lateral views of individual (**the original of Gale 2015, fig. 4C**); F, external view of scutum (**the original of Withers 1935, pl. 1, fig. 5**; Gale 2015, **fig. 4F**); G, external view of tergum (**the original of Withers 1935, pl. 1, fig. 6**; Gale 2015, **fig. F**), **lower** Valanginian, *Platylenticeras heteropleurum* Zone, Musingen, near Bückeberg,

Schaumberger Lippe, **northwest** Germany, Geological Institute of Göttingen University. H–K, *Loriolepas whytei* sp. nov.; H, I, scuta, in internal (H) and (I) external views, paratypes, NHMUK IC 1333, IC 1334. J, K, terga, external surfaces. **J**, paratype, Dorset County Museum, Dorchester, DCM no. G 7260. K, holotype, NHMUK IC 1332, **1 m above** base of Cinder Bed, Warbarrow Tout, Dorset; **middle** Berriasian. Scale bars **equal 5 mm**.

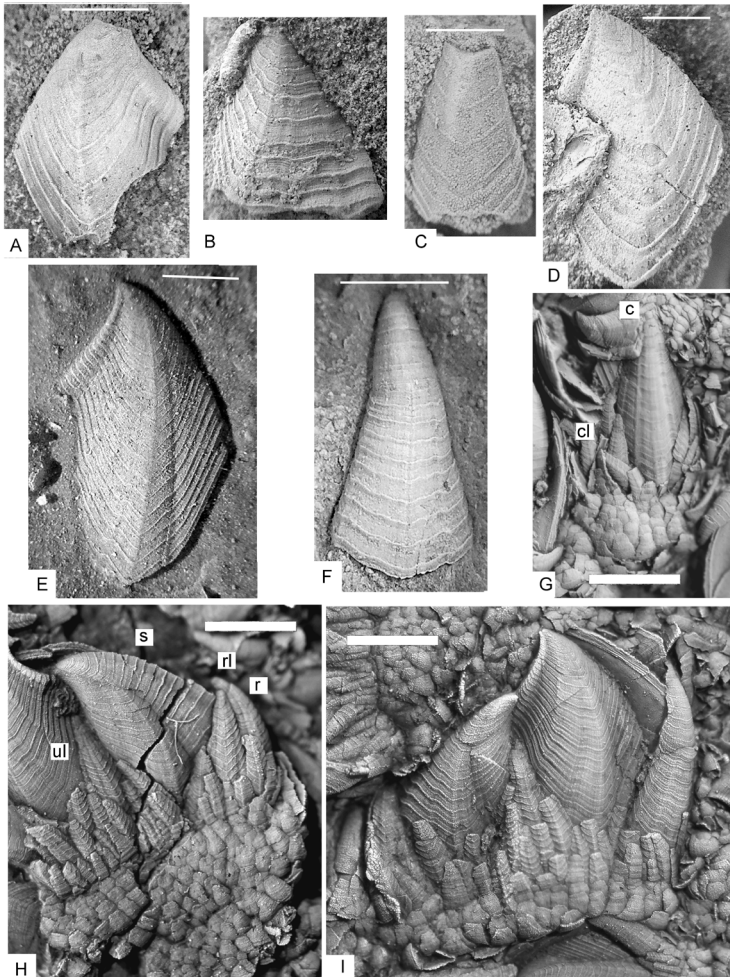


Fig. 4. A–D, *Etcheslepas portlandensis* sp. nov. A, D, terga; B, scutum, C, carina. A–C are paratypes (NHMUK IC 1337, IC 1338, IC 1339 ), D is **the** holotype (NHMUK IC 1336). Cherty **Member**, Freshwater, Portland, Dorset; **upper** Tithonian, *Kerberites kusensis ammonite* Zone. E–I, *Etcheslepas durotrigensis* Gale, 2014. E, isolated tergum (**the** original of Gale 2014, **fig.** 2D). F, carina (**the** original of Gale 2014, **fig.** 2B). G, capitulum in dorsal view (**the** original of Gale 2018, **fig.** 2B). H, I, capitula in lateral view (**the originals** of Gale 2018, **fig.** 2C, D). Level of Freshwater Steps Stone Band, *Pectinatites pectinatus* Zone, Tithonian, Kimmeridge Clay, Kimmeridge, Dorset. All specimens in **the** MIJML collection, Kimmeridge. **Scale bar equals 5 mm**.