

# A new caddisfly larval case (Insecta, Trichoptera) from the Lower Cretaceous Vectis Formation (Wealden Group) of the Isle of Wight, southern England

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HEADS, S. W. 2005. A new caddisfly larval case (Insecta, Trichoptera) from the Lower Cretaceous Vectis Formation (Wealden Group) of the Isle of Wight, southern England. *Proceedings of the Geologists' Association*, **117**, 307–310. A new species of trichopteran larval case is described and named *Piscindusia complexa* isp. nov. The holotype specimen occurs in a well-cemented sandstone gutter cast from the upper Shepherd's Chine Member of the Vectis Formation (Wealden Group) at Atherfield, Isle of Wight. The new species is assigned to *Piscindusia* based on the use of fish bones and scales in the construction of the case walls. *Piscindusia complexa* isp. nov. is distinguished from the type species *Piscindusia sukachevae* Jarzembowski by its smaller size, near-parallel walls along most of the case length and more complex construction. *Piscindusia complexa* isp. nov. displays advanced larval construction behaviour evident in material selectivity, manipulation and organization, supporting hypotheses of evolution in the case-building behaviour of trichopteran larvae during the Late Jurassic and Early Cretaceous.

**Key words:** Insecta, Trichoptera, caddisfly, larval case, *Piscindusia*

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## 1. INTRODUCTION

Fossil insects have been known from the Wealden Group of the Isle of Wight since the mid-nineteenth century (Brodie, 1853; Goss, 1879), but substantial material was not collected until the early 1990s. Twitchett (1994) recorded insect fossils from both the Cowlaze Chine and Shepherd's Chine members of the Vectis Formation (Fig. 1 a, b) at the Atherfield type-section [OL 441 802–448 797] and the Compton Bay and Yaverland sections [OL 369 851–373 847, OL 613 851–621 853, respectively]. In his brief account of the fauna, Twitchett (1994) reported the occurrence of Coleoptera (beetles), Blattodea (cockroaches), Diptera (flies), Hemiptera (true bugs) and Trichoptera (caddisflies), the latter represented by the single larval case described herein. Mecoptera (scorpionflies) are also present, represented by a single specimen of *Mesopanorpa* sp. indet. (pers. obs. of specimen MIWG 7150, Dinosaur Isle Museum, Sandown). A single specimen of Orthoptera (family Elcanidae) is held in the collection of Dr Jörg Ansorge of Ernst-Moritz-Arndt-Universität Greifswald, Germany (E. Jarzembowski, pers. comm.).

Most of the insect material from the Vectis Formation is poorly preserved and difficult to identify beyond

ordinal level. Some specimens can, however, be assigned to familial or lower level groups (e.g. Blattodea and some Hemiptera). However, identification to species level is impossible with the majority of specimens and the fauna remains largely undescribed. Insects are also known as inclusions in amber from the underlying Wessex Formation (Jarzembowski, 1995a), with other potentially 'insect-friendly' lithologies occurring throughout the succession (e.g. crevasse-splay clays, abandoned channel and oxbow lake clays). Future prospecting in these deposits will almost certainly yield insect fossils.

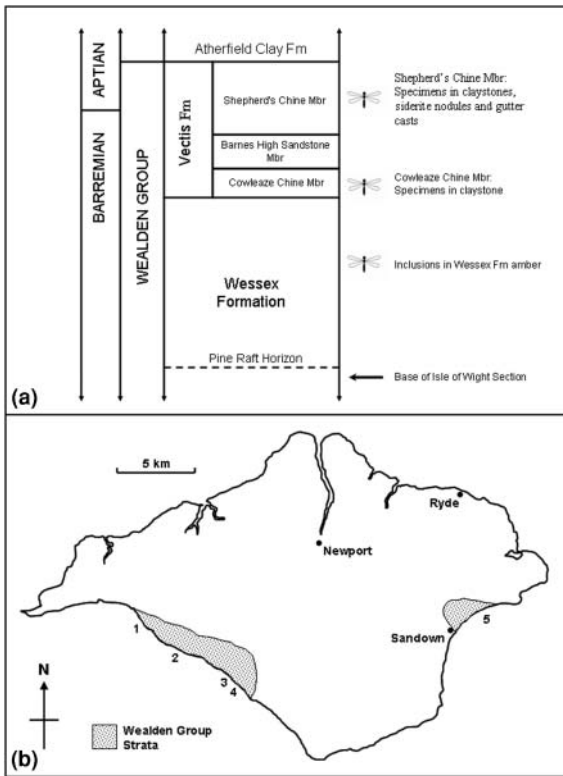
## 2. SYSTEMATIC PALAEOLOGY

As the fossil larval cases of Trichoptera cannot at present be matched with adult forms, the ichnotaxonomy developed for caddis cases by Vyalov & Sukacheva (1976) has been followed. This ichnotaxonomy was adopted by Jarzembowski (1995b) in describing the first cases from the Wealden Group of mainland southern England.

**Insecta** Linné, 1758

**Trichoptera** Kirby, 1813

Ichnogenus *Piscindusia* Jarzembowski, 1995b



**Fig. 1.** Locality and stratigraphy: (a) generalized stratigraphy of the Wealden Group on the Isle of Wight, showing the stratigraphic distribution of insect-yielding units (vertical thicknesses not to scale); (b) map of the Isle of Wight showing the outcrop of Wealden Group strata and principal fossil insect localities. 1, Compton Bay (Vectis Fm); 2, Chilton Chine (Wessex Fm amber); 3, Cowleaze Chine (Vectis Fm); 4, Shepherd's Chine (Vectis Fm); 5, Yaverland (Vectis Fm).

### Type species

*Piscindusia sukachevae* Jarzembowski, 1995b; known from the Wadhurst Clay Formation (Valanginian) and Lower Weald Clay Formation (Hauterivian) of southern England.

### Diagnosis

Tubular caddis cases 9–30 mm long with numerous fish bones and scales in their construction (after Jarzembowski, 1995b).

### Included species

Two ichnospecies: the type species *Piscindusia sukachevae* Jarzembowski, 1995b; and *P. complexa* isp. nov. described herein.

### *Piscindusia complexa* isp. nov. (Fig. 2)

### Etymology

In reference to the complex mode of the case construction.

### Holotype

The holotype (Fig. 2) is held in the Museum of Isle of Wight Geology collection at Dinosaur Isle Museum, Sandown, Isle of Wight, with the accession number MIWG 7072.

### Diagnosis

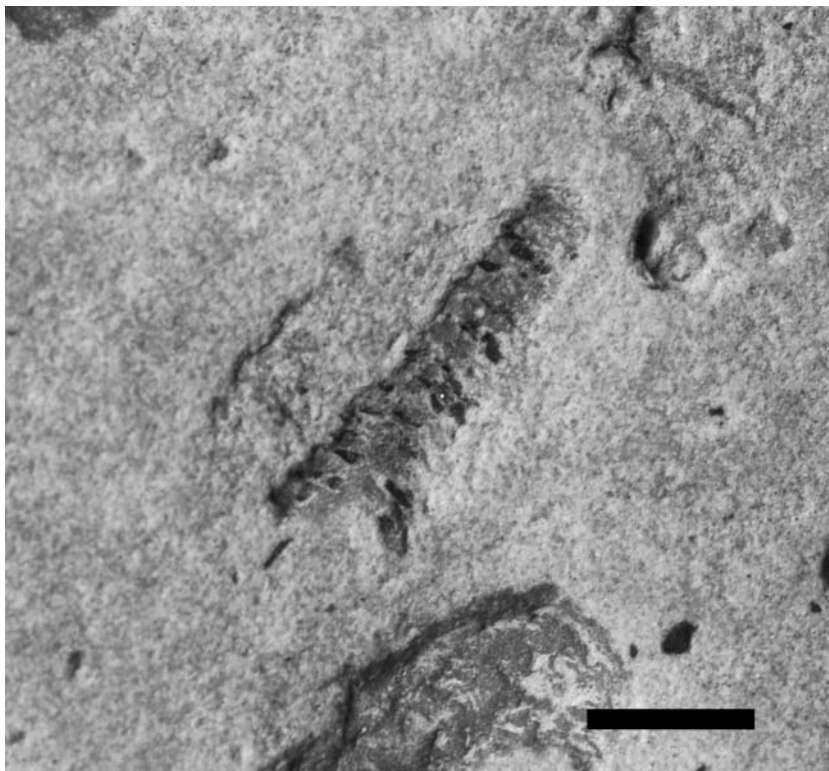
Small (9 mm long) *Piscindusia* with near-parallel case walls along most of the length, tapering only within the posterior 25%; constructed of small, elongate fish bones and scales, arranged transversely to the anterior–posterior axis of the case in semi-spiral rows.

### Description

The holotype (MIWG 7072, Fig. 2) is 9 mm long and has an almost uniform width of 2 mm for the greater part of its length as a result of the near-parallel nature of the case walls for the anterior 6 mm (75%). The case begins to taper 2 mm from the posterior, where it is truncated at a width of less than 1 mm. The case walls are composed of small (0.1–1.5 mm), elongate fish bones and scales which are arranged transverse to the anterior–posterior axis of the case in a semi-spiral fashion. The case is somewhat crushed anteriorly, but the posterior portion retains some relief, a feature suggesting lack of occupation by the larva (Jarzembowski, 1995b). It is preserved in the base of a well-cemented gutter cast of fine-grained sandstone and siltstone, along with associated coleopteran elytra, fish debris and comminuted plant material.

### Discussion

*Piscindusia* is known exclusively from the Wealden Group of the UK and is unique in its construction, being the only known caddis to incorporate vertebrate material into the case walls (Jarzembowski, 1995b). The gross morphology of the case is known to be species-diagnostic in extant trichopterans (Chinery, 1993) and the differences observed between *P. sukachevae* and *P. complexa* certainly reflect significant differences in mode of construction and perhaps larval morphology. Of particular importance are the degree of tapering and the complexity of the case construction. In *P. sukachevae* the case is relatively long (10–30 mm) and tapers continuously from anterior to posterior, whereas in *P. complexa* the case retains a uniform width, with parallel walls along most of its



**Fig. 2.** *Piscindusia complexa* isp. nov. Photograph of holotype (MIWG 7072), from the Shepherd's Chine Member of the Vectis Formation, near Atherfield. Scale bar represents 3 mm.

length, tapering only within the posterior-most 25%. Furthermore, in *P. sukachevae* the case is constructed crudely of small, irregular fragments of bones and scales arranged randomly. Such a mode of construction would have required a considerable amount of silk to bind the case. However, in *P. complexa* the bones and scales used are larger, generally elongate and arranged at right angles to the anterior–posterior case axis in a semi-spiral mosaic (Fig. 2). This more sophisticated form of construction probably resulted in a stronger, more robust overall structure and may have significantly reduced the amount of silk required for binding, thereby minimizing the larva's metabolic expenditure.

Increasing complexity of case-building ability among caddisflies during the Late Jurassic and Early Cretaceous was first noted by Sukacheva (1980). The fossil record of caddis cases during this period shows a gradual increase in the complexity of case construction, reflected in both structure and material selection and manipulation (Ivanov & Sukacheva, 2002). Although phylogenetic relationships cannot be inferred directly from larval cases, it could be speculated that the more advanced construction method seen in *P. complexa* in

contrast to *P. sukachevae* reflects a similar evolution in case-building behaviour within a possible *Piscindusia* clade during the Early Cretaceous. This hypothesis gains some support from the younger age of *P. complexa* (Barremian–Aptian) in contrast with *P. sukachevae* (Valanginian–Hauterivian).

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