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**On the taxonomy of the species *Cypridea setina* Anderson, 1939
and *Cypridea laevigata* Dunker, 1846 (Crustacea: Ostracoda) from the
Early Cretaceous of Europe - a special note on systematical inconsistencies**

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Abstract: The ostracod species *Cypridea laevigata* (Dunker, 1846) and *Cypridea setina* (Anderson, 1939) are quite abundant in sediments of Early Cretaceous times in Europe. Until now they are considered separate species, though they have never been compared in detail. Identical diagnostic features, however, indicate that both species have to be combined to one species: *Cypridea laevigata*. The numerous subspecies originally belonging to both taxa are regarded to be only varieties of *Cypridea laevigata*, as well as some ostracods taken from sections in the Iberian Ranges of Spain and which gave reason to this systematical study.

Zusammenfassung: Die Ostracodenarten *Cypridea laevigata* (Dunker, 1846) und *Cypridea setina* (Anderson, 1939) kommen in Unterkreide-Sedimenten Europas recht häufig vor. Bisher wurden sie immer als getrennte Arten behandelt, obwohl sie noch nie in allen Details verglichen worden sind. Identische diagnostische Merkmale zeigen jedoch klar, dass beide zu einer einzigen Art zusammengefasst werden müssen: *Cypridea laevigata*. Die zahlreichen Unterarten, die ursprünglich beiden Arten zugeordnet wurden, werden hier nur noch als Varietäten von *Cypridea laevigata* angesehen, ebenso einige Ostracoden aus Profilen in den Iberischen Ketten in Spanien, welche den Anlass zu dieser systematischen Studie gegeben haben.

Keywords: Ostracoda, *Cypridea laevigata* (Dunker, 1846), *Cypridea setina* (Anderson, 1939), non-marine, systematics, Early Cretaceous

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Introduction

The genus *Cypridea* Bosquet, 1852 is widely distributed in non-marine sediments of latest Jurassic and Early Cretaceous age. At the beginning of the Early Cretaceous, it nearly achieved a worldwide radiation associated with an enormous diversity of species, consisting of both globally distributed and endemic forms.

The immense number of taxa belonging to the wider *Cypridea* group resulted in a splitting into different categories at the levels of species and subspecies, genera and subgenera, as discussed controversially by the different authors in literature. For instance, Anderson (1939) introduced the genera *Uwellingia*, *Morinina*, *Langtonia* and *Cyamocypris* on a par with *Cypridea*, whereas Sylvester-Bradley (1949) and Anderson (1962) displaced them to the subgenus level. Some decades later, authors such as Wolburg (1959) and Anderson (1967, 1985) reassigned all these taxa to *Cypridea*, separating various subspecies. Other taxonomists, such as Sohn (1979) differentiated two genera: *Cypridea* Bosquet, 1852 and *Pseudocypridina* Roth, 1939.

The classification of *Cypridea* s.l. within the Family Cyprideidae has been discussed in detail by Horne & Colin (2004) who listed the multitude of taxa known from literature and discussed their various attributions. They commented on the difficulties of their systematical categorization, as it is not possible to draw direct conclusions at the taxonomic level of this extinct genus by analogy with recent taxa.

At a species level, many poor diagnoses and missing differential diagnoses make it difficult to define and classify the taxa. In many cases, only minor characteristic differences, possibly representing the normal variability of a species, were used to distinguish species or subspecies by previous authors, resulting in further splittings without definition of comprehensible reasons.

Typical examples of this approach become evident in the concepts of *Cypridea laevigata* (Dunker, 1846) and *Cypridea setina* (Anderson, 1939), species, which are not sufficiently differentiated and which to all appearances are synonymous. The purpose of this paper is to advert to this problem and to point out, that further comprehensive investigation on the original (and much more additional) material is recommended.

Moreover, this is just one example for a systematic revision of two ostracod species, in a mode which is obviously necessary to be treated to many more revisions within many ostracod groups, prior to a more refined usability of these microfossils.

Taxonomical Facts

The taxonomical data, the genesis and history concerning both species are summarized as follows:

Cypridea laevigata (Dunker, 1846)

Dunker (1846) assigned various ostracod species to the genus *Cypris*, some of which were later referred to *Cypridea* by other authors. Amongst them "*Cypris laevigata*" was listed with the following diagnosis (Dunker 1846: 59): "*Cypris* valvulis oblongis, subreniformibus, inflatis, dorso curvatis, basi subrectis, antice subrostratis, laevibus". In other words: a *Cypris* with oblong valves, subreniform (kidney-shaped), inflated, with a convex dorsal margin, straight basis [ventral margin], anterior end weakly beak-like. The associated tab. XII, fig. 25 shows the right valve of a smooth ostracod with a small antero-ventral beak. The ventral margin, however, is noticeably curved concavely, an attribute never specified by the authors after Dunker.

Wolburg (1959) rearranged *Cypridea laevigata* (Dunker, 1846) as "species dubia, incertae sedis" due to the fact that a detailed description of the carapace and the stratigraphical level is missing.

Anderson (in Anderson et al. 1967: 215) gave the following diagnosis for *Cypridea laevigata*: „Carapace oval in outline in lateral and dorsal view, rostrum small or very small, reflexed, alveolus very small and curved forwards, cyathus lunate. Surface smooth and glossy. Left valve the larger." He disclaimed the holotype as being badly chosen by Dunker (op. cit.). However, he stated that it is almost impossible to mistake *C. laevigata* with other species. At the same time, he annotated that - because of its size and the peculiar form of its beak - *Cypridea setina* can be considered the only closely related form. Anderson distinguished six new subspecies (*C. laevigata leonardi*, *C. l. fairlightensis*, *C. l. wadhurstensis*, *C. l. subquadrata*, *C. l. hawkhurstensis*, *C. l. philpottsii*) in addition to the nominate-subspecies *laevigata laevigata*, though the differences between these are very minute and consequently very difficult to differentiate from each other. However, their stratigraphical significances are clearly visible (Fig. 1). A general trend is: "an increase in length/height-ratio with at intervals the brief emergence of an unusually high variety" (Anderson in Anderson et al. 1967: 215).

Cypridea setina (Anderson, 1939)

Anderson (1939) introduced four new genera: *Langtonia*, *Morinina*, *Cyamocypris*, and *Ullwellia*, all sister genera, due to certain morphological significances. He presented the new species *Langtonia setina*, with the following diagnostic features: "Valves ovate. Surface smooth and glossy. Beak and notch small. Hinge-line curved, knurled posteriorly. Overlap slight except ventrally." An differential-diagnosis is insufficient, he only mentioned that "*L. setina* is very like Dunker's description of *Cypris laevigata*, and the two forms may be identical." (p. 305) and "Evidently the shell figured by Dunker was partly embedded in the matrix, which has somewhat obscured the dorsal margin. His description, however, ... is applicable to *Langtonia setina*..." (p. 305).

Sylvester-Bradley (1949) assigned *Cypridea setina* to the subgenus *Pseudocypridina* (Roth, 1933) and introduced another subspecies, *Cypridea (Pseudocypridina) setina rectidorsata*, the latter corresponding to the valve figured by Anderson (1939: p. 305, pl. 12, fig. 7b).

Wolburg (1959: 295) provided a new diagnosis, stating *setina* to be a "smooth *Cypridea*, generally oval in lateral view, without dorsal angles or with very distinct dorsal angles, the dorsal line inclined or slightly convex between them". The rostrum is crescent-shaped, in some cases very acute and pointed and does not overlap the ventral margin. The cyathus is absent in most cases.

Wolburg (1959) mentioned different varieties, which Anderson (1962) referred to, assigning them as new subspecies within his "*setina-group*": *Cypridea setina acerata* Anderson, 1962 (subovate form *sensu* Wolburg), *C. setina dotica* (arcuate form), *C. setina erumna* (angulate form), *C. setina setina* (ovate form) and *C. setina rectidorsata* (*Cypridea rectidorsata sensu* Wolburg). The subspecies *C. setina camelodes* Anderson, 1962 as well as *C. setina bellatula*, *C. setina deburghi* and *C. setina florida* Anderson, 1971 followed later. Anderson (1985) added another subspecies: *Cypridea setina pelota*.

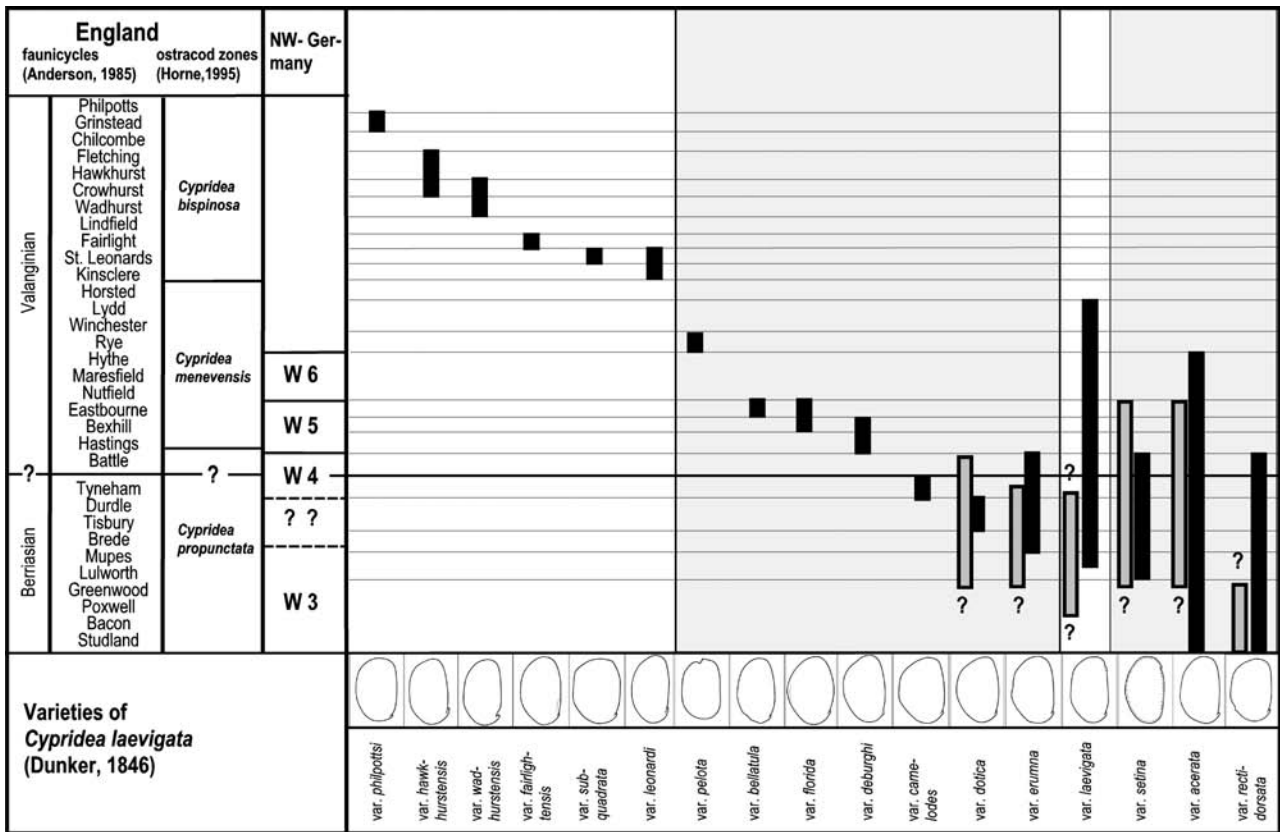


Fig. 1: List of the subspecies as formerly subordinated to *C. setina* or *C. laevigata*, now considered as varieties of *Cypridea laevigata* (Dunker, 1846), and their stratigraphical context in NW Germany (grey bars) and England (black bars). The subspecies, which originally belonged to *Cypridea setina* (Anderson, 1939), are highlighted in grey. The line drawings originate from published illustrations (Anderson, 1985). The stratigraphical correlations are based upon Hoedemaker & Hergreen (2003), who presented a detailed correlation chart, contrasting the tethyan Berriasian to Barremian succession of Spain and France to the boreal strata of England, Germany and the Netherlands.

It is very obvious that the diagnoses for *Cypridea setina* (see Wolburg 1959: 295) and Anderson, in Anderson & Bazley (1971: 81, not noting that it is an “emended diagnosis”): “Carapace evenly ovate in outline, rostrum very small, retroverted, alveolus small almost obsolete, cyathus narrow, lunate, surface smooth, left valve the larger.”

and *Cypridea laevigata* (Anderson, in Anderson et al. 1967: 215): “Carapace oval in outline in lateral and dorsal view, rostrum small or very small, reflexed, alveolus very small and curved forwards, cyathus lunate. Surface smooth and glossy. Left valve the larger.”

are almost identical. Their significant diagnostic features are: (i) outline of the carapace, (ii) smooth surface, (iii) small rostrum, (iv) small alveolus, and (v) lunate cyathus. These criteria are fulfilled both in *setina* and in *laevigata*, with their particular subspecies. They are, apart from minor variabilities, mainly concerning the dorsal margin and the length/height-ratio, which finally effect the subdivision into the subspecies. Internal structures, which could give an advice for particular differences, have not been described so far.

In conclusion, there is apparently no reason to differentiate the two species *C. laevigata* and *C. setina* (including all subspecies), and these are combined to one species here. Following the principles of priority, the species-name must be “*laevigata*“. However, except for a short diagnosis, there is no explanatory description in the original text and the figures, corresponding to the time they originate from, are not informative enough. Moreover, according to the conventions of that time, Dunker did not deposit any type-material and added no detailed information about the locality from which the material was collected. Nevertheless, according to the ICZN, article 11 and 12.2, *Cypridea laevigata* is a valid name inspite of these apparent irregularities, because it is published before 1931. Thus I recommend *Cypridea laevigata* (Dunker, 1846) as the valid species name and regard *Cypridea setina* (Anderson, 1939) as a younger synonym.

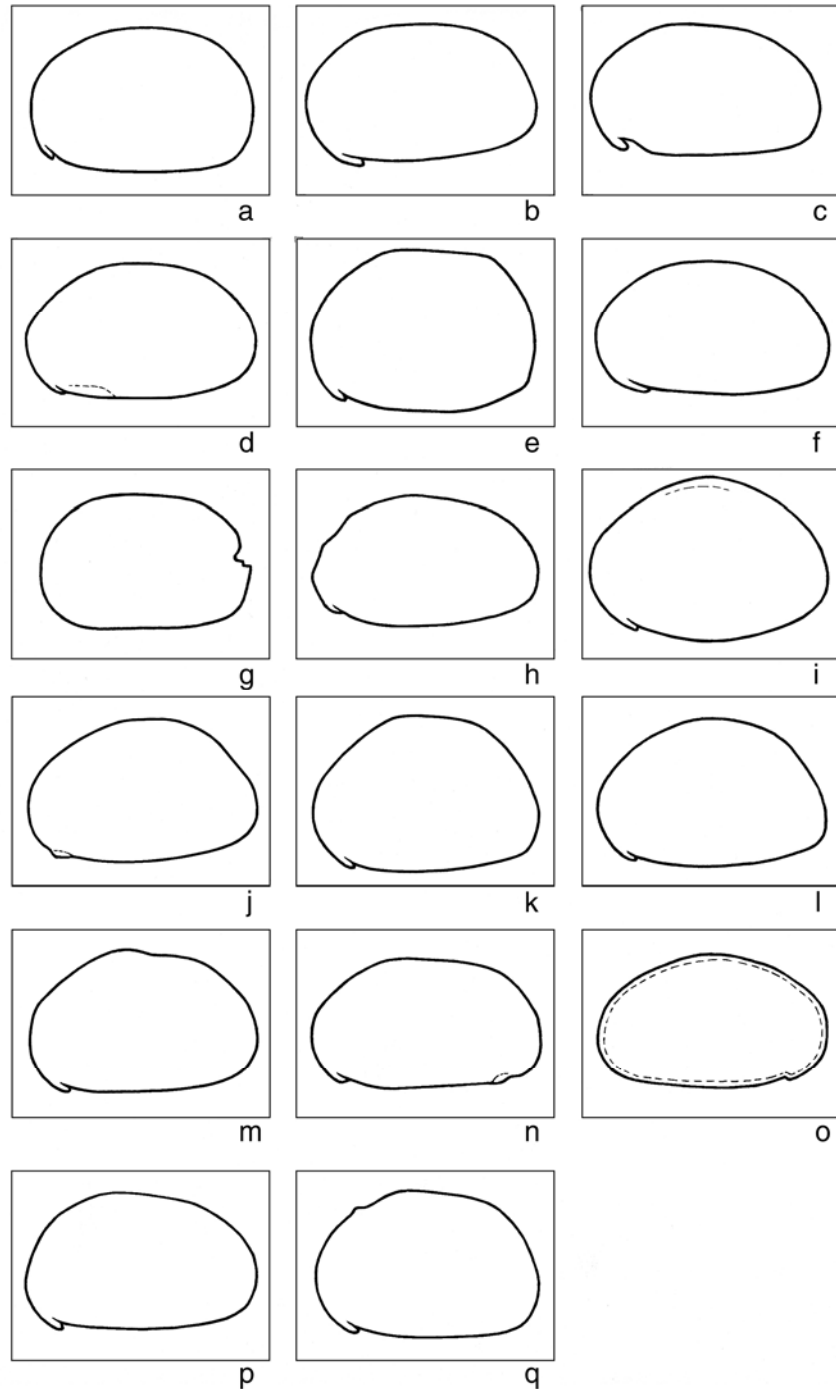


Fig. 2: Varieties of *Cypridea laevigata* (Dunker, 1846): line drawings of the valve outlines (lateral view) of the various taxa being considered. All figures traced from Anderson (1985).

a. *Cypridea laevigata* var. *philpottsi* Anderson, 1967, Holotype, Mik(M) 2959, illustrated by Anderson (1985: pl. 7, fig. 5), left valve, 1,23 mm.

b. *Cypridea laevigata* var. *hawkhurstensis* Anderson, 1967, Holotype, Mik(M) 2148, illustrated by Anderson (1985: pl. 7, fig. 12), left valve, 1,07 mm.

c. *Cypridea laevigata* var. *wadhurstensis* Anderson, 1967, Holotype, Mik(M) 2147, illustrated by Anderson (1985: pl. 7, fig. 6), left valve, 1,05 mm.

d. *Cypridea laevigata* var. *fairlightensis* Anderson, 1967, Holotype, Mik(M) 2151, illustrated by Anderson (1985: pl. 7, fig. 9), left valve, 1,16 mm.

- e. *Cypridea laevigata* var. *subquadrata* Anderson, 1967, Holotype, Mik(M) 2150, illustrated by Anderson (1985: pl. 7, fig. 16), left valve, 1,09 mm.
- f. *Cypridea laevigata* var. *leonardi* (Anderson, 1967), Holotype, Mik(M) 2149, illustrated by Anderson (1985: pl. 7, fig. 8), left valve, 1,17 mm.
- g. *Cypridea laevigata* var. *pelota* (Anderson, 1985), Holotype, Mik(M) 2154, illustrated by Anderson (1985: pl. 11, fig. 10), left valve, 0,89 mm.
- h. *Cypridea laevigata* var. *bellatula* (Anderson, 1971), Holotype, Mik(M) 2156, illustrated by Anderson (1985: pl. 5, fig. 6), left valve, 1,00 mm.
- i. *Cypridea laevigata* var. *florida* (Anderson, 1971), Holotype, Mik(M) 3200, illustrated by Anderson (1985: pl. 6, fig. 17), left valve, 1,09 mm.
- j. *Cypridea laevigata* var. *deburghi* (Anderson, 1971), Holotype, Mik(M) 2152, illustrated by Anderson (1985: pl. 6, fig. 7), left valve, 1,01 mm.
- k. *Cypridea laevigata* var. *camelodes* (Anderson, 1962), Holotype, Mik(M) 3202, illustrated by Anderson (1985: pl. 6, fig. 18), left valve, 0,98 mm.
- l. *Cypridea laevigata* var. *dotica* (Anderson, 1962), Holotype, Mik(M) 3311, illustrated by Anderson (1985: pl. 6, fig. 12), left valve, 1,02 mm.
- m. *Cypridea* var. *erumna* (Anderson, 1962), Holotype, Mik(M) 3313, illustrated by Anderson, 1985: pl. 6, fig. 6), left valve, 0,98 mm.
- n. *Cypridea laevigata* var. *laevigata* (Dunker, 1846), Mik(M) 2146, illustrated by Anderson (1985: pl. 7, fig. 3), left valve, 1,13 mm.
- o. *Cypridea laevigata* var. *setina* (Anderson, 1939), Lecotype, Mik(M) 535, illustrated by Anderson (1985: pl. 5, fig. 9), right valve, 0,95 mm.
- p. *Cypridea laevigata* var. *acerata* (Anderson, 1962), Holotype, Mik(M) 3204, illustrated by Anderson (1985: pl. 5, fig. 12), left valve, 1,01 mm.
- q. *Cypridea laevigata* var. *rectidorsata* (Sylvester-Bradley, 1949), Holotype, Mik(M) 3314, illustrated by Anderson (1985: pl. 6, fig. 14), left valve, 0,97 mm.

Concerning the taxonomical position of the various subspecies, it has to be comprehended why they were distinguished from each other. In the sense of Anderson (Anderson in Anderson et al. 1967: 215), they may be used as “varieties with stratigraphical importance”, whereas in his opinion the variability for at least *C. laevigata* consists of an increasing length/height-ratio. Having a closer look on these varieties, however, it becomes evident, that the ratios are quite similar (see the contour drawings of Figs. 1 and 2, this paper) - beginning with *C. leonardi* (1.66) to *C. subquadrata* (1.32), *C. fairlightensis* (1.55), *C. wadhurstensis* (1.75), *C. hawkhurstensis* (1.69), and at last *C. philpottsi* (1.63).

Above all, the concept of these varieties seems different in the view of individual authors. Wolburg (1959), for instance, related to his varieties in a sense quite different from that of Anderson (1962). The arcuate form of Wolburg (1959: 295) corresponds to the valve, figured by Anderson (1939: pl. 12, fig. 7a), whereas fig. 7b of the same paper is assigned to the angulate form sensu Wolburg. Anderson (1939, 1962), however, regarded his fig. 7 a as *C. setina setina*, as it is proofed by the same catalogue-numbers (GSM 60682), which he marked as “syntype“ and 1962 as “lectotype“, respectively.

Anderson (1962) designated his new subspecies *C. setina dotica* to the arcuate and *C. setina erumna* to the angulate type of Wolburg (which is *C. setina setina* sensu Wolburg). Sylvester-Bradley (1949) named the variety figured by Anderson (1939: plate 12/7b) a new subspecies, *C. setina rectidorsata*, due to its more angulate dorsal angles (accepted by Anderson 1962). This leads to the conclusion that *C. setina rectidorsata* sensu Wolburg is the angulate form, also implying that *C. setina erumna* and *C. setina rectidorsata* are synonymous. In fact and apart from the slightly more prominent anterior dorsal angle of *C. setina erumna*, both forms are almost identical.

Anderson (in Anderson & Bazley 1971: 85) considered his *C. setina setina* as the ovate variety sensu Wolburg, who, on his part, has compared his arcuate variety with *C. setina setina* sensu Anderson. It becomes evident that the differentiation of these subspecies often seems to be irreproducible, because their classification is difficult due to many transitions within them.

An approach to itemize how the varieties relate to each other fails at the incomplete listing of the occurrences (not only the boreholes, but also the sampling-depth), as they are in most cases only noted for the holotypes. So it is nearly impossible to estimate, if varieties might occur even in the same samples.

A stratigraphical value has to be proved in other sections and regions. Generally speaking, a careful revision of the entire material, concerning *Cypridea laevigata* s.l., supported by morphometrical methods is imperatively

demanding, especially giving attention to sexual dimorphism (which could be one of the reasons for a different l/h-ratio) or the juvenile forms morphology, investigations which recommend a multitude of samples.

Presumably, all of these subspecies, as created by the authors cited above, are simply varieties of a complex morphogroup, which finally corresponds to just one, or only a few basic forms (perhaps simply males and females) that can be distinguished satisfactorily. This would correspond to the ideas of Wolburg (1959), who stated that the “extreme forms” of *C. setina* (arcuate, ovate and angulate) with all their varieties cannot be separated. Unfortunately, Wolburg did not figure his ovate and subovate forms, so it is not possible to assign them to the forms of Anderson.

As a consequence of the above-mentioned facts, the subspecies of the former species *laevigata* and of *setina* should all be considered just varieties – with the so-far defined varieties presumably end-forms or distinctive intermediates of typical trends. Fig. 1 shows all these varieties in their stratigraphical context with regard to their main areas of occurrence (England and NW Germany). Fig. 2 presents these varieties in detail.

Systematic Description

Class **Ostracoda** Latreille, 1802
 Order **Podocopida** Müller, 1894
 Suborder **Podocopina** Sars, 1866
 Superfamily **Cypridoidea** Baird, 1845
 Family **Cyprideidae** Martin, 1940

Genus *Cypridea* Bosquet, 1852

Cypridea laevigata (Dunker, 1846)

- 1846 *Cypris laevigata*, Dkr. Dunker: 59, tab. XIII, fig. 25.
 1939 *Langtonia setina* sp. n. Anderson: 305, pl. 12, figs. 7a,b; pl. 13, figs. 12a, b.
 1940 *Cypridea* (629) *valdensis* Wicher: 268, pl. 2, fig. 3.
 1941 *Cypridea inornata* Peck, n. sp.: 301, pl. 44, figs. 33-36.
 1949 *Cypridea* (*Pseudocypridina*) *setina setina* (Anderson); Sylvester-Bradley: 146 - 147.
 1949 *Cypridea* (*Pseudocypridina*) *setina rectidorsata* subsp. nov. Sylvester-Bradley: 147 – 149, fig. 24, figs. 25 a-b.
 1949 *Cypridea* Wi 3. Wolburg: 351-352, figs 2, 5.
 1959 *Cypridea setina* (Anderson, 1939); Wolburg: 294-296, pl. 5, pl. 2, figs. 15-17.
 1959 *Cypridea laevigata* (Dunker, 1846); Wolburg: 307.
 1962 *C. (P.) setina rectidorsata* (Sylvester-Bradley, 1949); Anderson: 23, pl. 1, fig. 1.
 1962 *C. (P.) setina setina* (Anderson, 1939); Anderson: 24, pl. 1, fig. 2.
 1962 *C. (P.) setina erumna* subsp. nov. Anderson: 24, pl. 1, fig. 5.
 1962 *C. (P.) setina dotica* subsp. nov. Anderson: 25, pl. 1, fig. 3, 4.
 1962 *C. (P.) setina camelodes* subsp. nov. Anderson: 25, pl. 1, fig. 6.
 1962 *C. (P.) setina acerata* subsp. nov. Anderson: 25-26, pl. 1, figs. 7-8.
 1966 *Cypridea (Ps.) setina fiteriensis* n. subsp. Kneuper-Haack: 187-188, pl. 45, fig. 19.
 1967 *Cypridea laevigata laevigata* (Dunker); Anderson, Bazley & Shepard-Thorn: 215-216, pl. 13, fig. 57.
 1967 *Cypridea laevigata leonardi* subsp. nov. Anderson, Bazley & Shepard-Thorn: 216, pl. 13, fig. 58.
 1967 *Cypridea laevigata fairlightensis* subsp. nov. Anderson, Bazley & Shepard-Thorn: 216, pl. 13, fig. 59.
 1967 *Cypridea laevigata wadhurstensis* subsp. nov. Anderson, Bazley & Shepard-Thorn: 216, pl. 13, fig. 61.
 1967 *Cypridea laevigata subquadrata* subsp. nov. Anderson, Bazley & Shepard-Thorn: 216, pl. 13, fig. 60.
 1967 *Cypridea laevigata hawkhurstensis* subsp. nov. Anderson, Bazley & Shepard-Thorn: 217, pl. 13, fig. 62.
 1967 *Cypridea laevigata philpottsii* subsp. nov. Anderson, Bazley & Shepard-Thorn: 217, pl. 12, fig. 55.
 1968 *Cypridea* sp. ex gr. *setina* Anderson; Christensen: 22-23, fig. 6.
 1971 *C. setina acerata* Anderson; Anderson & Bazley: 81-82, pl. 17, fig. 1.
 1971 *C. setina bellatula* Anderson; Anderson & Bazley: 81-82, pl. 17, figs. 2-3.
 1971 *C. setina camelodes* Anderson; Anderson & Bazley: 81-82, pl. 17, fig. 4.
 1971 *C. setina deburghi* subsp. nov. Anderson & Bazley: 83, pl. 18, fig. 1.
 1971 *C. setina dotica* Anderson; Anderson & Bazley: 83, pl. 17, figs. 5-6.
 1971 *C. setina erumna* Anderson; Anderson & Bazley: 83, pl. 17, fig. 7.
 1971 *C. setina florida* subsp. nov. Anderson & Bazley: 83, pl. 17, fig. 8.

- 1971 *C. setina rectidorsata* Anderson; Anderson & Bazley: 83, pl. 17, fig. 9.
 1971 *C. setina setina* Anderson; Anderson & Bazley: 83, pl. 17, fig. 10.
 1978 *Cypridea setina setina* (Anderson, 1939); Bate & Robinson: 306, pl. 2, fig. 6, tab. 1.
 1978 *Cypridea setina rectidorsata* Sylvester-Bradley, 1949; Bate & Robinson: 306, pl. 2, figs. 7, 8, tab. 1.
 1981 *Cypridea setina dotica* Anderson, 1962; Colin, Lehmann, & Morgan: 142, pl. 11.5, fig. 7.
 1983 *Cypridea setina florida* Anderson; Li Yuwen: fig. 2.
 1983 *Cypridea setina acerata* Anderson; Li Yuwen: fig. 2.
 1983 *Cypridea setina bellatula* Anderson; Li Yuwen: fig. 2.
 1985 *Cypridea laevigata* (Dunker, 1846); Anderson: 29.
 1985 *Cypridea laevigata* (Dunker, 1846) subspecies *fairlightensis* Anderson, 1967; Anderson: 29, pl. 7, fig. 9.
 1985 *Cypridea laevigata* (Dunker, 1846) subspecies *hawkhurstensis* Anderson, 1967; Anderson: 29, pl. 7, fig. 12.
 1985 *Cypridea laevigata* (Dunker, 1846) subspecies *laevigata* (Dunker, 1846); Anderson: 29, pl. 7, fig. 3.
 1985 *Cypridea laevigata* (Dunker, 1846) subspecies *leonardi* Anderson, 1967; Anderson: 29, pl. 7, fig. 8.
 1985 *Cypridea laevigata* (Dunker, 1846) subspecies *philpottsi* Anderson, 1967; Anderson: 29, pl. 7, fig. 5.
 1985 *Cypridea laevigata* (Dunker, 1846) subspecies *subquadrata* Anderson, 1967; Anderson: 29, pl. 7, fig. 16.
 1985 *Cypridea laevigata* (Dunker, 1846) subspecies *wadhurstensis* Anderson, 1967; Anderson: 29, pl. 7, fig. 6.
 1985 *Cypridea setina* (Anderson, 1939) subspecies *acerata* Anderson, 1962; Anderson: 31, pl. 5, fig. 12.
 1985 *Cypridea setina* (Anderson, 1939) subspecies *bellatula* Anderson, 1971; Anderson: 31, pl. 5, fig. 6.
 1985 *Cypridea setina* (Anderson, 1939) subspecies *camelodes* Anderson, 1962; Anderson: 31, pl. 6, fig. 18.
 1985 *Cypridea setina* (Anderson, 1939) subspecies *deburghi* Anderson, 1971; Anderson: 31, pl. 6, fig. 7.
 1985 *Cypridea setina* (Anderson, 1939) subspecies *dotica* Anderson, 1962; Anderson: 31, pl. 6, fig. 12.
 1985 *Cypridea setina* (Anderson, 1939) subspecies *erumna* Anderson, 1962; Anderson: 31, pl. 6, fig. 6.
 1985 *Cypridea setina* (Anderson, 1939) subspecies *florida* Anderson, 1971; Anderson: 31, pl. 6, fig. 17.
 1985 *Cypridea setina* (Anderson, 1939) subspecies *rectidorsata* Sylvester-Bradley, 1949; Anderson: 31, pl. 6, fig. 14.
 1985 *Cypridea setina* (Anderson, 1939) subspecies *setina* (Anderson, 1939); Anderson: 31, pl. 6, fig. 7.
 1985 *Cypridea setina* (Anderson, 1939) subspecies *pelota*; Anderson: 31, pl. 11, fig. 10.
 1998 *Cypridea (Pseudocypridina)* cf. *laevigata* (Dunker, 1846) *leonardi* Anderson, 1967; Cabral, p. 302, pl. 3, fig. 10.
 1999 *Langtonia setina setina* Anderson, 1939; Nikolaeva & Neustrueva: pl. IX, fig. 3-4.
 1999 *Langtonia setina rectidorsata* Sylvester-Bradley, 1949; Nikolaeva & Neustrueva: pl. IX, fig. 8.
 2005 *Langtonia setina setina* Anderson, 1939; Neustrueva, Sinita, Khand & Melnikowa: pl. 13, fig. 6.
 2005 *Langtonia setina rectidorsata* Sylvester-Bradley, 1949.- Neustrueva, Sinita, Khand & Melnikowa: pl. 13, fig. 8.
 2007 *Cypridea setina* (Anderson, 1939); Stoica: 111-112.
 2007 *Cypridea setina* ssp.1; Stoika: 112-113, pl. 11, figs. 1-3; pl. 12, figs. 1-3, text-figs. 72 a,b.
 2007 *Cypridea setina* ssp.2; Stoica: 113-114, pl. 11, figs. 4-7; pl. 12, figs. 4-6, text-figs. 73 a,b.
 2009 *Cypridea setina acerata*; Horne: 302, pl. 2, fig. 7.

Type species: *Cypridea laevigata* var. *laevigata* Dunker, 1846.

Diagnosis: Carapace ovate (varieties with higher l/h-ratio) or semirectangular (varieties with lower l/h-ratio) in outline, rostrum very small, retroverted, alveolus small, almost obsolete, cyathus narrow, lunate, surface smooth, left valve the larger.

Differential-diagnosis (emend.): *Cypridea laevigata* differs from all other species of the genus in its smooth surface and the absence of any ornamentation (spines, nodes), the very small retroverted rostrum, which appears even smaller due to the very narrow alveolus and the small, or even obsolete lunate cyathus. *Cypridea piedmonti* (Roth, 1933), another form without spines and knobs, also has a small rostrum, but its alveolus is stronger, making the rostrum appear more prominent. Both forms must be regarded as a closely related species.

Holotype: No holotype was deposited by Dunker, so a neotype has to be defined in the context of a comprehensive revision of the group, implicating all varieties available.

Stratigraphical distribution: Berriasian to Valanginian

Geographical distribution: NW-Germany, England, Spain, Poland, Denmark, Scania, Romania, China, Mongolia, North America.

Dimensions: Length of the holotype 0.95 mm, height: 0.54 mm, l/h-ratio: 1.74 (according to Anderson the holotype is slightly depressed, the "normal l/h-ratio is 1.6. This appears to be unhandily, a new lectotype should be chosen from the series of the holotype)

Description: The smooth valves are low to highly-ovoid in outline with a tendency to a somewhat sub-quadrangular outline. The rostrum is small, retroverted and does not overlap the ventral silhouette. It is sub-ordinated to some variability in shape, but all varieties can be attributed to a small, inconspicuous form. The

alveolus is narrow, accentuating the small rostrum. A cyathus is either absent or very small, lunate, adapting the outline of the carapace.

Seventeen varieties are described up to now, partially connected by intermediates. These forms are shown in Figure 1. They differ by their l/h-indices, associated with a distinct development of their dorsal angles as follows:

C. setina var. *setina* (only with very distinct or mostly without dorsal cardinal angles), *C. setina* var. *erumna* (dorsal cardinal angles are present, hinge margin inclined backwards), *C. setina* var. *rectidorsata* (dorsal cardinal angles are present, hinge margin parallel to the ventral margin), *C. setina* var. *acerata* (low form, dorsal margin slightly flattened), *C. setina* var. *bellatula* (low, ovoid form), *C. setina* var. *camelodes* (high form, elevated, anterior cardinal angle higher), *C. setina* var. *deburghi* (lower form, almost semicircular, extremely small rostrum), *C. setina* var. *dotica* (elevated form, smoothly curved dorsal margin, higher in the posterior half), *C. setina* var. *florida* (elevated form, marginal area swollen to a projecting hump), *C. setina* var. *pelota* (elevated form, subquadrangular, rostrum very small), *C. setina* var. *laevigata* (ovoid form, posterior cardinal angle present), *C. setina* var. *fairlightensis* (slightly elevated form, posterior cardinal angle present), *C. setina* var. *hawkhurstensis* (ovoid form, cyathus and rostrum slightly larger than in the other forms), *C. setina* var. *leonardi* (ovoid form, cyathus and rostrum slightly larger than in the other forms, dorsal angles present, dorsal margin parallel to ventral margin), *C. setina* var. *philpottsi* (ovoid form, cyathus and rostrum very small, carapace slightly higher in the posterior half), *C. setina* var. *subquadrata* (subquadrangular form, almost semicircular rounded in their posterior portion) and *C. setina* var. *wadhurstensis* (very low and compact form, dorsal margin shallow rounded).

Occurrences:

NW-Germany: Wealden 3 to Wealden 5, Berriasian to Valanginian (Wolburg 1959, Wicher 1949)

England: Upper Purbeck to Weald Clay (Wadhurst Formation): Studland to Rye Faunicycles (Anderson 1939, 1962, 1985, Anderson et al. 1967, 1971, Sylvester-Bradley 1949, Bate & Robinson 1978)

North Celtic Sea and Fastnet Basins: Early Valanginian (Colin et al. 1981)

Spain: Late Berriasian to Early Valanginian, NW- Iberian Ranges (Kneuper-Haack 1966)

Poland: Purbeckian Beds (Christensen 1968)

Denmark (Bornholm): Rabekke Fm, Purbeckian Beds (Christensen 1968)

Sweden (Scania): Purbeckian Beds (Christensen 1968)

Romania: Purbecko-Wealden (Stoica 2007)

China: Sichuan Basin, Early Cretaceous (Li Yuwen 1983)

Central and Southern Mongolia: Early Cretaceous (Nikolaeva & Neustrueva 1999, Neustrueva et al. 1999)

North America: Early Cretaceous (Peck 1941, Sames (in prep.))

Conclusion

The two formerly independent species *Cypridea laevigata* (Dunker, 1846) and *Cypridea setina* (Anderson, 1939) have never been related or compared to each other in detail until now and have to be synonymized because of their identical diagnostic features. *Cypridea laevigata* (Dunker, 1846) is regarded to be the valid species-name, because of principles of priority and as a consequence *Cypridea setina* (Anderson, 1939) needs to be retracted. The former subspecies *C. setina setina*, *C. setina erumna*, *C. setina rectidorsata*, *C. setina acerata*, *C. setina bellatula*, *C. setina camelodes*, *C. setina deburghi*, *C. setina dotica*, *C. setina florida*, *C. setina pelota*, *C. laevigata laevigata*, *C. laevigata fairlightensis*, *C. laevigata laevigata C. laevigata hawkhurstensis*, *C. laevigata leonardi*, *C. laevigata philpottsi*, *C. laevigata subquadrata* and *C. laevigata wadhurstensis* are now considered varieties.

They are characterized by insignificantly diverse l/h-indices caused by moderate differences in outlines, which may in some cases merely be attributed to sexual dimorphs. In this context, the stratigraphical ranges of the varieties turn out to be inapplicable, because intermediate forms allow no definite assignments to one or another variety. So, seen as a whole, the record will be extended to longer-ranging intervals.

Spanish Material

Two sections in the NW-Iberian Ranges (Spain), Fitero and Leza Valley, with Berriasian to Valanginian strata, generated some ostracods which have to be included into the morphological range of *Cypridea laevigata* (Dunker, 1846). They were originally regarded as a new subspecies, *Cypridea setina fiteriensis*, by Kneuper-Haack (1965). However, due to their low height and angulate dorsal margins, both belong to the variety *Cypridea laevigata* var. *laevigata* (Dunker, 1846) (Fig. 3).

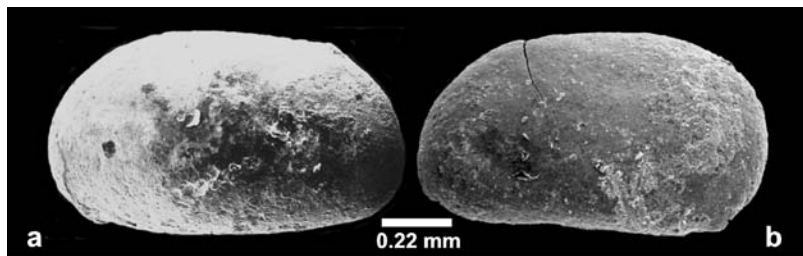


Fig. 3: *Cypridea laevigata* var. *laevigata* (Dunker, 1846).

a: *Cypridea laevigata* var. *laevigata* (Dunker, 1846), sample 87/178, Berriasian to Valanginian, Leza Valley, left valve, length: 1165 μ m.

b: *Cypridea laevigata* var. *laevigata* (Dunker, 1846), sample 281/W, Berriasian to Valanginian, Baños de Fitero, right valve, length: 980 μ m.

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