

Contribution to the knowledge of *Montacuta dawsoni* Jeffreys, 1864 (Mollusca, Bivalvia: Galeommatoidea)

Contribution à la connaissance de *M. dawsoni* Jeffreys, 1864 (Mollusca, Bivalvia : Galeommatoidea)

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ABSTRACT - *Montacuta dawsoni* Jeffreys, 1864 (Mollusca, Bivalvia) is redescribed using specimens from Norway and Newfoundland. The distribution of the species is discussed and a review of the literature is provided.

Montacuta dawsoni - Mollusca - Bivalvia - systematics - distribution

RÉSUMÉ - *Montacuta dawsoni* Jeffreys, 1864 (Mollusca, Bivalvia) est redécrite à partir d'exemplaires provenant de la Norvège et Newfoundland. La distribution de l'espèce est discutée et une révision de la littérature est présentée.

Montacuta dawsoni - Mollusca - Bivalvia - systématique - distribution

INTRODUCTION

M. dawsoni is a poorly known, minute bivalve species the systematic position of which is still highly controversial. Although the species has been regularly dealt with, there exist no comprehensive review of the relevant literature. Therefore it was felt useful to compile here, as much as possible, the available data and references on this species. In this way we hope to facilitate further discussions on the subject.

BRIEF HISTORY

M. dawsoni was originally described by Jeffreys (1864) (for the date of publication see Warén, 1980) on the basis of a single valve collected by R. Dawson in the neighbourhood of Aberdeen (Scotland). The species was later redescribed in more detail and a small figure was provided (Jeffreys, 1869).

Subsequently, Jeffreys (1876) specified that the first, probably subfossil, valve was collected in the Moray Firth ('in the hole off Cruden' as precised by McKay & Smith (1979) who studied Dawson's unpublished shell collection catalogue). In the same paper Jeffreys (1876) also provided distributional and bathymetrical data, as well as some very superficial notes on the soft parts of the living animal. These data were based on material procured during the 'Valorous Expedition' in 1875 (see Warén, 1980).

During the next 90 years, no substantial new information was published with respect to *M. dawsoni*, except for a series of faunistic records, which often were copied from one author to another, e.g. Jeffreys (1870), Monterosato (1875), Mörch (1877), Sars (1878), Herzenstein (1885), Petersen (1888), Posselt (1898), Friele & Grieg (1901), Marshall (1914), Odhner (1915), Hidalgo (1916), Thiele (1928), Johnson (1934), Madsen (1949) and Filatova (1957). Sowerby (1887) provided a new illustration of the species.

The current systematic confusion about *M. dawsoni* was probably founded by Verkrüzen (1875) and Sars (1878), who remarked that the species is very similar to *M. maltzani* (Verkrüzen, 1875^o). This probably inspired Madsen (1949) to suggest that both species would be identical. Bernard (1979) shared this viewpoint and added that *M. dawsoni* would also be conspecific with *Mysella sovaliki* MacGinitie, 1959 (Bernard, 1983). Indeed, MacGinitie (1959) ascertained explicitly that three specimens of *M. dawsoni* from Greenland in the collection of the USNM (No. 170490), in fact refer to *Mysella sovaliki*. However, if MacGinitie (1959) would have been convinced

^o As correctly pointed out by Fedyakov (1986), Scarlato (1987) and Van Aartsen (1996), this species was described by Verkrüzen in 1875 and not in 1876 as most recent authors mention (e.g. Nord sieck, 1969; Bernard, 1979; Backeljau et al., 1984, 1986; Høisaeter, 1986; etc.). Yet, Fedyakov (1986) and Scarlato (1987) misspelled Verkrüzen's name as 'Verkrützen'.

that both species are the same, there would be no reason to describe *Mysella sovaliki* as a new species.

Bowden & Heppell (1968) supported this latter interpretation for they concluded that Jeffreys (1876) and most subsequent authors had confused two different species under the name *M. dawsoni*. Thus, according to Bowden & Heppell (1968), probably all records of '*M. dawsoni*' from the Arctic (e.g. Greenland) would in reality pertain to *Mysella sovaliki*.

To complicate things even more, *M. dawsoni* was also compared with *M. tumidula* (Jeffreys, 1867) (e.g. Friele, 1873) and Verkrüzen (1875) summarized the situation by stating that *M. maltzani* 'scheint etwa zwischen *tumidula* und *Dawsoni* zu stehen'.

Apparently unaware of all this, Spaink (1972) described a new condylocardiid genus and species., viz. *Altenaeum nortoni*, on the basis of a series of Pleistocene valves collected in bore hole samples from the southern North Sea Basin. This new species was as such included in the checklist of Janssen (1975).

However, when Warén (1980) figured syntypes of Jeffreys' *M. dawsoni*, it became clear that this species is identical to Spaink's (1972) *Altenaeum nortoni*. Therefore both names were synonymised by Backeljau et al. (1984), who also showed that *M. dawsoni* is undoubtedly different from *M. maltzani*. On the other hand, Backeljau et al. (1986) remarked that *M. dawsoni* resembles *Mysella kurilensis* (Scarlato & Ivanova, 1974). Yet, this observation was only based on Scarlato's (1981) figures. So, a more convenient account is needed.

Not only the specific differentiation of *M. dawsoni* has provoked confusion, but also its generic allocation. Some authors followed Jeffreys' original designation and thus assigned the species to *Montacuta* (Chaster et al., 1901; Clarke, 1962; Bernard, 1979; Scarlato, 1981; Bernard, 1983). Nevertheless, Winckworth (1932), Tebble (1966), Bowden & Heppell (1968), Nordsieck (1969), McKay & Smith (1979) and Peuchot & Tassin (1980) placed it, without comments, in the genus *Mysella*, while still other authors followed Spaink (1972) by including the species in the monotypic genus *Altenaeum*, which is supposed to belong to the family Condylocardiidae (e.g. Janssen, 1975; Van Dalsum, 1986).

This latter opinion was in turn questioned by Backeljau et al. (1984), who remarked that both shell form and sculpture of *M. dawsoni* are not typical of Condyllocardiidae. Yet, these authors continued using the generic name *Altenaeum*. Subsequently, the condyllocardiid relationship of *M. dawsoni* was even more strongly contested by Ockelmann (cited by Høisaeter, 1986), who preferred to keep the species provisionally in the family Montacutidae (= Lasaeidae according to Ponder, 1971).

MATERIAL

Eleven valves of the collection made by Backeljau et al. (1984, 1986) were compared by the first two authors: 2 valves from Bleik (Andøya, Versteralen, northern Norway 69°17' N, 15°54' E, 16-VIII-1981), 5 valves from Finnvik (Varangerhalvøya, Finnmark, northern Norway, 70°30' N, 30°39' E, 06-VIII-1981) and 4 valves from Store Ekkerøya (Varangerfjorden northern Norway, 70°05' N, 30°08' E, 07-VIII-1981). Two samples labelled as *M. dawsoni* from Newfoundland (respectively 2 and 3 specimens) in the Dautzenberg collection of the RBINSc were studied by the last author.

CONCHOLOGICAL DESCRIPTION

Shell (Fig. 1) : length 1-3 mm, height 1.0-1.5 mm (Table 1); obliquely triangular to subelliptical, equivalve but inequilateral : beak weakly developed, not prominent, posteriorly situated, more or less orthogyrate : apex reaching the commissure; prodissoconch well-delimited relatively large, occupying about 1/3 of shell length; valves \pm convex, rather solid, covered by a thin brownish to yellowish-green periostracum which peels off easily; external surface of the shiny, whitish and sometimes translucent shell with 15-20 fine concentric lines, which are also visible from the inner side; margins smooth;

Hinge (Fig. 2) : internal ligament located in a small triangular well-marked resilifer, the top of which extends slightly over the superior margin of the cardinal area : lower edge of the resilifer does not reach the lower margin of the cardinal area; cardinal area relatively short, broad, curved, separated from the prodissoconch by a more or less well-delimited, straight furrow; along the anterodorsal margin, the cardinal area bends towards the anterior side and disappears abruptly. Each valve with two cardinal teeth bordering the resilifer. The teeth in the right valve are stronger developed than in the left valve. The left anterior tooth is very small, the left posterior tooth extends over \pm 2/3 of

the height of the cardinal area. The right anterior tooth is more robust than the posterior one. Both right teeth reach the margins of the cardinal area. There are also two weak, long and narrow ridges (antero- and posterodorsally situated), which become slightly stronger in the proximity of the cardinal teeth. In the right valve, both ridges originate just above the cardinal teeth and run along the marginal border. In the left valve, the posterior ridge originates closely to the posterior cardinal tooth, whereas the anterior ridge is separated from the anterior cardinal tooth by a narrow depression. The ridges of both valves fit precisely into each other, so that when the shell is closed, the ridges of the left valve intercalate just below those of the right valve. It is not clear whether these ridges may be considered as lateral teeth. In any case, they resemble similar structures in *Keliella miliaris* (Philippi, 1844) (Bonnin et al., 1987);

Although, *M. dawsoni* would be a dimyarian species (Spaink, 1972), we have not been able to observe its muscle scars, neither as we could see a pallial sinus.

DISTRIBUTION AND BATHYMETRY

All published records known to us are indicated in Fig. 3. In view of the existing confusion with respect to *M. dawsoni*, it is clear that many literature data are doubtful. This is particularly true for the records from the Bay of Biscay, southern Portugal and the Mediterranean (e.g. Monterosato, 1875; Jeffreys, 1876; Hidalgo, 1916; Parenzan, 1974) (Warén, in litt. 05-III-1984). Similarly, many northern and Arctic records need to be revised because of possible confusion with *Montacuta maltzani*, *Montacuta tumidula*, *Mysella sovaliki*, *Mysella kurilensis*, etc.

Friele (1873), for example, reported *M. dawsoni* from Osterfjorden near Bergen (southwestern Norway), but this record was rectified by Norman (1879), who quoted a personal communication of Friele himself, admitting that his identification of *M. dawsoni* was erroneous.

Similarly, Möller (1842) described a bivalve species from Greenland, which was later identified as *M. dawsoni* by Posselt (1898). For convenience, we repeat here Möller's (1842) description: "8. Testa bivalvis minuta, aequivalvis, inaequilatera, transversim ovata, ventricosa alba, zonis concentricis hyalinis quinque ornata; dentibus lateralibus in utraque valva longis, angustis; dentibus card. nullis; ligamento interno minuto, angusto. Animal non vidi. Diam. 1" " In fact this description does not allow a reliable identification, for it could equally well apply to other montacutids.

In this context it is worth mentioning that Ockelmann (1958) retained two *Montacuta* species for Greenland, viz. *M. planulata* (Stimpson, 1857) and *M. dawsoni*, whereas MacGinitie (1959) and Bernard (1979) discussed three other candidates, viz. *Mysella sovaliki*, *M. planata* (Dall in Krause, 1885) and *M. moellerii* (Mörch in Jones, 1875).

Another doubtful record of *M. dawsoni* is that of Limfjorden, Denmark. According to Posselt (1898) the species would have been reported there by Collin. However, Collin (1884) did not mention the species for this region, neither as he found it in Hellebaek, eastern Denmark (Collin, 1880). Later, Friele & Grieg (1901) specified that Collin's supposed record, was in fact communicated by Petersen (1888), who referred to Danish specimens in Collin's collection.

The bathymetrical distribution of *M. dawsoni* also needs further consideration. In Table 2 we give an account of the published data on this subject. Apparently, the species would occur in depths ranging between 5 and 3150 m (Friele & Grieg, 1901; Clarke, 1962)! Yet, considering the unreliability of older records (Bowden & Heppell, 1968), it is obvious that not much can be said about the actual vertical distribution of live *M. dawsoni*.

Similarly, not much can be affirmed with respect to the habitat of the species. Odhner (1915) and Hidalgo (1916) stated that *M. dawsoni* would live in mud, whereas Posselt (1898) mentioned sand and fine sand. Moreover, if the species would be a true montacutid, it may be expected to live commensally or parasitically on certain other marine invertebrates.

PALEONTOLOGICAL RECORD

Reliable records of (live) *M. dawsoni* are not only rare because of the systematic confusion, but also because most authors do not specify whether they found live specimens or empty valves. This is important information, for especially in Arctic regions ice may transport empty shells over long distances (Snæli & Steines, 1975).

Usually, the age of empty shells has been inferred from their external appearance, i.e. their 'freshness', transparency and/or the presence of the periostracum (e.g. Van Dalsum, 1986). Yet, these characters can be misleading since several fossil assemblages may yield fresh-looking material too. A good example of this

phenomenon is provided by the Holocene *Angulus pygmaeus* fauna from the southern North Sea basin (Spaink, 1973; Spaink & Sliggers, 1983; De Bruyne et al., 1987). Obviously, this is an additional factor which can severely bias the interpretation of the present-day distribution of *M. dawsoni*.

Empty fossil (?) valves of this species are not so rare. Material from probably Holocene origin has, for example, been reported from the Belgian coastal plain (Spaink & Sliggers, 1983). Pleistocene valves from Tiglian and/or Eemian origin, have been found in bore hole samples from East Anglia, the southern North Sea basin and some scattered localities in the Netherlands (Spaink, 1972; Raven, 1979; Meijer, 1988). Dead material is also regularly found along the Dutch, Belgian, British and Irish coasts (Marshall, 1914; McMillan, 1973; Seaward, 1982, 1990; De Bruyne, 1983, 1986; De Bruyne & Wesselingh, 1984; Backeljau, 1986; Van Dalsum, 1986; Van Nieulande, 1986; De Bruyne et al., 1987; Dumoulin, 1989; De Boer & De Bruyne, 1991). This material is probably of Pleistocene (i.e. Eemian) and/or Holocene origin, which corresponds to the geological range Janssen et al. (1984) attribute to *M. dawsoni*.

DISCUSSION

Systematic relationships

Three main points remain to be solved : 1) in how far is *M. dawsoni* specifically different from *Mysella sovaliki* and *Mysella kurilensis*, 2) to which family should the species be assigned and 3) to which genus does it belong. These questions can only be resolved after a comparative analysis of the taxa involved. This is not only true for *M. dawsoni*, but also for many related 'Montacutidae', of which the systematics are still very confused. *M. maltzani*, for example, has recently been presumed to be neither a *Montacuta*, nor a *Mysella* (Ockelmann cited by Høisaeter, 1986).

In await of such revision, Ockelmann (cited by Høisaeter, 1986) suggested to keep *M. dawsoni* provisionally in the Montacutidae rather than to assign it to the Condylardiidae. In the same sense he suggested to retain the generic name *Montacuta*. For the time being we follow this opinion.

Distribution and paleontology

Most authors regard *M. dawsoni* as a cold water species (e.g. Van Nieulande, 1986; De Bruyne et al., 1987) with a panarctic to boreal distribution (Bernard, 1979, 1983;

Scarlato, 1981). This premise is based on the distributional data outlined above (Fig. 3). However, we already stressed that most of these data are unreliable with respect to the age and the origin of the material involved. Hence, they do not unambiguously warrant the cold water status of *M. dawsoni*.

In fact, the fossil record of the species might indicate the contrary, for hitherto it mainly yielded material from Tiglian and/or Eemian deposits in the southern North Sea basin. These deposits date from interglacial periods (Bilal & Van Heysinga, 1987) and thus may indicate that the species is not a typical cold water inhabitant. This suggestion is further supported by the presence of *M. dawsoni* in the *Angulus pygmaeus* fauna which has a marked Lusitanian character (Spaink & Sliggers, 1983).

A more temperate water status for *M. dawsoni* conforms with the records of this species in northern Norway (Backeljau et al., 1984), for the upwarming effect of the Gulf Stream is even noticeable beyond the North Cape (North Cape Current), at least as far as the Varangerfjord (Filatova, 1962; Backeljau et al., 1986).

Similarly, Ockelmann (1958) pointed out that the fauna of southwestern Greenland contains significantly more southern elements than the fauna of East Greenland. Thus the former fauna is less Arctic than the latter. This may account for the presumed presence of *M. dawsoni* in West Greenland and the species' absence in East Greenland. Finally, the fact that *M. dawsoni* apparently lacks in the high Arctic conditions of Arctic Canada (Lubinsky, 1980), the White Sea (Fedyakov, 1986; Scarlato, 1987) and the Kara Sea (Herzenstein, 1885; Filatova, 1957) would be explained if it is not a typical cold water species.

On the other hand, the records of *M. dawsoni* from Spitsbergen (Odhner, 1915), the eastern Arctic seas in the USSR (Laptev Sea, East Siberian Sea and Chukchi Sea) (Gorbunov, 1946; Filatova, 1957; Scarlato, 1981; Naumov & Fedyakov, 1990) and the Beaufort Sea (Bernard, 1979) contradict this hypothesis. Yet, as stressed before, these records may refer to another species or to material of which the origin is unclear. Moreover, if *M. dawsoni* would be a true panarctic species one might wonder why it is apparently absent in Iceland (Odhner, 1910; Madsen, 1949; Ockelmann, 1958), Jan Mayen (Ockelmann, 1958; Sneli & Steines, 1975), Arctic Canada, the White Sea and the Kara Sea (see above).

In conclusion, it is clear that because of the unreliability of the present-day distribution and status of *M. dawsoni*, it is very difficult, if not impossible, to allocate the species to one or another faunal province or distributional type. Therefore, it is speculative to hypothesize about its water temperature characteristics and thus also about the way in which the species would have invaded the North Sea.

Two opinions with respect to this topic currently oppose each other. De Bruyne et al. (1987) assume that *M. dawsoni* entered the North Sea from the north during colder periods when the North Sea basin was only partly filled with water (e.g. in the Boreal, the early Eemian and/or the late Eemian).

Van Dalsum (1986) on the contrary, suggests that the species invaded the North Sea around Scotland, in or shortly before the Tiglian, when the Street of Dover was still closed. Under influence of the colder climate at the end of the Tiglian, the species disappeared in the North Sea, while it recolonised this region from the south when the Street of Dover was finally opened in the Holocene. Such migration from the south was also postulated by Spaink (1973). At present it is not possible to exclude either of these hypotheses.

We would like to thank Mr. H. Van Paesschen (RBINSc, Brussel) for helping to prepare the figures.

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TABLES

Tabel 1. Dimensions of *M. dawsoni* according to literature data (in mm).

Reference	Length	Height
Jeffreys (1864)	1.5	<1.5
Posselt (1898)	1.5	-
Odhner (1915)	2.7	-
	1.9	-
Nordsieck (1969)	2	1.5
Spaink (1972)	1.44	1.14
Parenzan (1974)	2	-
Bernard (1979)	3	-
Scarlato (1981)	1.8	1.3
Van Niculande (1986)	2	-
De Boer & De Bruyne (1991)	2	-

Tabel 2. Bathymetrical data on *M. dawsoni* from the literature. Old data in 'fathoms' were converted according to 1 fathom = 1.85 m (Warén, 1980).

Reference	Locality	depth (m)
Jeffreys (1870)	Dröbak, Oslofjorden (Norway)	74-111
Monterosato (1875)	Palermo (Italy)	190
Friele (1873)	Osterfjorden (Norway)	37-55
Jeffreys (1876)	St. 4 : 67°50' N - 55°27' W	37
	St. 5 : 66°59' N - 55°27' W	105
	Holstensborg (Greenland)	5.5-65
	St. 9 : 59°10' N - 50°25' W	3238
	Florö (Norway)	555
Posselt (1898)	68°00' N - 54°30' W	37
	Godthaab (Greenland)	18
	Godhavn (Greenland)	9-46
Friele & Grieg (1901)	Advent Bay (Spitsbergen)	37-74
Odhner (1915)	Sassen Bay (Spitsbergen)	45
	Advent Bay (Spitsbergen)	54
Clarke (1962)	not specified	5.5-3220
Bernard 51979)	Beaufort Sea	23-29
Naumov & Fedyakov (1990)	Laptev Sea	40

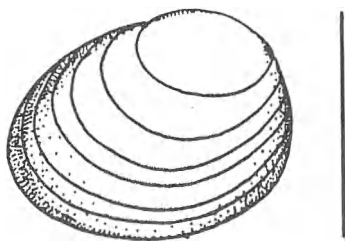


Fig. 1. External appearance of the left valve of *M. dawsoni*. Scale : 1 mm

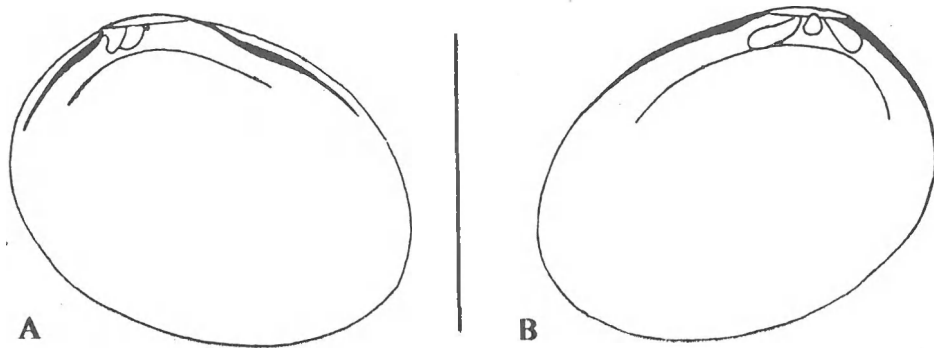


Fig. 2. Hinge structures in the left (A) and right (B) valve of *M. dawsoni*. Scale : 1 mm

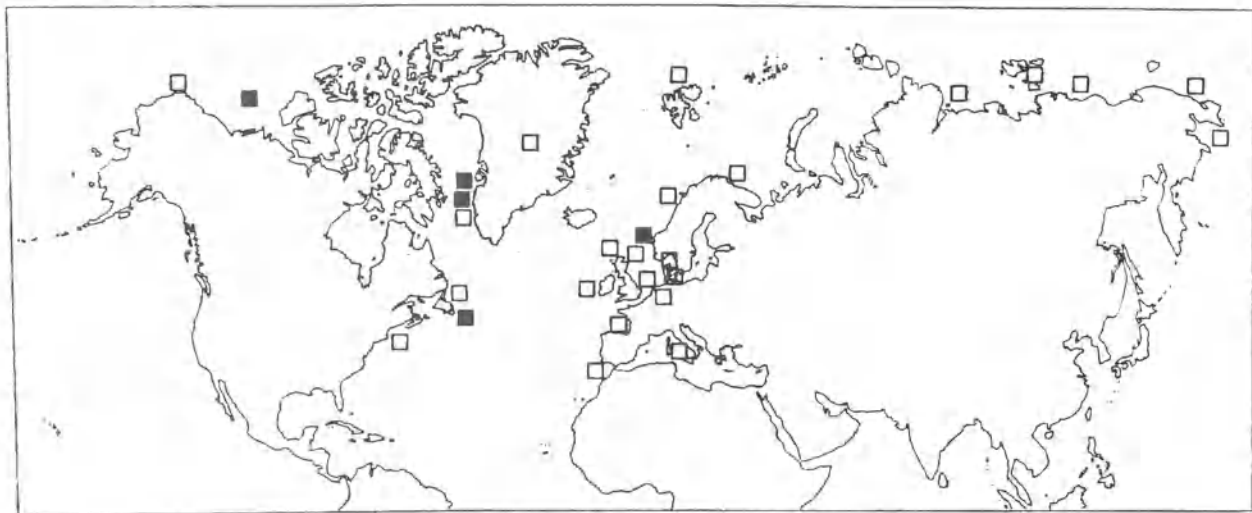


Fig. 3. Distribution of *M. dawsoni* according to literature data (see references). Black squares : presumably live specimens : open squares : empty valves, fossils and records whose status is unclear.