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On characters, variability, and distribution of the European marine gastropods Bittium latreillii (Payraudeau) and Bittium lacteum (Philippi)

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Probably because they had difficulties in finding a sharp morphological border-line between both species, a number of authors considered *Bittium*[1] *latreillii*[2] (Payraudeau, 1826) a variety (Bucquoy, Dautzenberg & Dollfus, 1884: 214; Priolo, 1956: 291) or a subspecies (Nordsieck, 1968: 68; Parenzan 1970: 105) of *B. reticulatum* (Da Costa, 1778). Richter & Thorson (1975: 128), however, demonstrated that the sculpture of the larval shell is different in both species, and very constant in each of them. This induced me to closely examine adult material of *B. latreillii, B. lacteum* (Philippi, 1836) and *B. reticulatum* with its allied forms[3] *jadertinum* (Brusina, 1865), *scabrum*

[1] According to Monterosato (1884: 121) the name *Bittium* is preoccupied because Leach had used it before for a crustacean genus. No support, however, can be found for this thesis in Neave (Nomenclator Zoologicus), Sherborn (Index Animalium) or Schulze, Kükenthal & Heiden (Nomenclator Animalium Generum et Subgenerum).

[2] Payraudeau evidently latinized Latreille's name as Latreillius.

[3] It is very difficult to verify Richter & Thorson's (1975: 128) opinion that *B. reticulatum* and *B. jadertinum* are separate species, because the discriminating character, i.e., the fine sculpture on the first whorl of *B. jadertinum*, by its vulnerability disappears soon as the shell grows. As yet I could not find any other character clearly separating both forms. I therefore prefer to treat them collectively here.

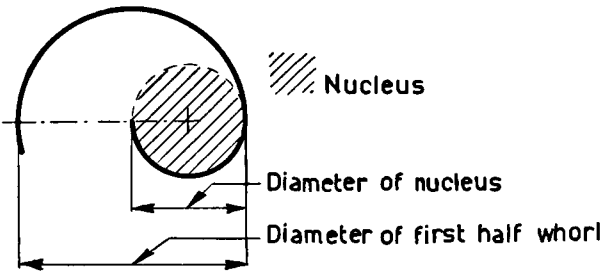

Fig. 1. Nucleus and first half whorl.

(Olivi, 1792), and *paludosum* Bucquoy, Dautzenberg & Dollfus, 1884. In none of these the spiral ridges do develop simultaneously on the juvenile shell. The lower two ridges, those on the base not counted, always appear first, and develop about simultaneously. Before long a third ridge appears above these two. In *B. latreillii* and in *B. lacteum* this third spiral ridge soon becomes equally strong as the older two, so that juvenile specimens of these species soon show three very regular and similar spiral rows of tubercles. Now it is a character of *B. latreillii* that a fourth spiral row of tubercles appears between the uppermost and the lower two of these three rows, and that from the beginning this fourth row is fully separated from the neighbouring ones. It often appears on about the eighth whorl, but may occasionally even appear only on one of the last whorls of the adult shell. Within little more than one whorl, this fourth row of tubercles develops from non-existent to as strong as the other three rows, see fig. 2. In *B. reticulatum* and its allied forms the fourth spiral ridge (as before counted according to age, and not to position!) develops either about simultaneously with the third ridge, or above that ridge, see fig. 3. This, of course, only applies to those specimens of *B. reticulatum* s.l. on which a fourth spiral row of tubercles appears at all. The apical dimensions of both *B. latreillii* and *B. reticulatum* s.l. are about 0.08/0.12 mm; the first one of these measurements is the diameter of the nucleus of the shell, the second one that of the first half whorl (fig. 1).

B. latreillii is a very common species, widely distributed in the Mediterranean, where the shells may have either four or five spiral ridges or rows of tubercles on the last whorl, those on the base not counted. The fifth spiral row of tubercles, if present, appears just below the uppermost one in exactly the same way as does the fourth row, (still counted according to age, and not to position), but that the fifth row appears a few whorls after that row.

The species also occurs outside the Mediterranean. At Santander and Zarauz, at respectively 145 and 15 km W. of San Sebastian, N. Spain, it seems to have always five spiral ridges or rows of tubercles on the last whorl (my private collection). So has the sole adult specimen I saw from the Islas Canarias[4] (Gran Canaria, Puerto de La Luz, Bahia Confital; RMNH[5]). Judging from a large sample of juvenile and broken specimens (Hierro; RGM No. 221.289[5]), the species is not rare in those regions. Four out of five specimens from the Azores (collected near the harbour of Corvo; RMNH) have six spiral ridges or rows of tubercles on the last whorl. The fifth specimen even has seven of these rows, and also has seven instead of six spiral ridges on the base.

White specimens of *B. latreillii* do occur. There are several in my collection, from all over the Mediterranean. Some may simply have been bleached by the sun, but certainly not all of them. I also found one in the Dautzenberg collection[6], in a tube containing three specimens marked: "Bittium lacteum Ph./Bucq. Roussillon/var. à 4 ranges de tubercules". Otherwise, the colour is only subject to slight variations.

The main characters by which shells of *B. lacteum* are distinguished from those of *B. latreillii* are the apical dimensions (about 0.16/0.27 mm) and the absence of varices. In addition, adult Mediterranean specimens of *B. lacteum* always differ from adult specimens of *B. latreillii* and of *B. reticulatum* s.l. as regards the spiral ridges on the base of the shell. There are six, moderately to well developed, ridges on the base of adult shells of the latter two species, and only three, very strong ones, on that of *B. lacteum*, with often a fourth, very weak one, close to the columella. On juvenile shells of *B. latreillii* as well as of *B. reticulatum* s.l., however, the third and the sixth spiral ridge on the base, counted from the top downwards, usually are weak or absent. In juvenile *B. lacteum* the upper three spiral ridges on the base are less strong than in adult ones, so that as regards these spiral ridges, all three species are very similar indeed in the juvenile stage.

The original description of *B. lacteum* is based on shells from Sicilia, and mentions only three spiral rows of tubercles on each whorl. Yet, a close examination of large numbers of shells reveals that occasionally a

[4] The spelling of geographical names is as recommended by the Times Atlas of the World.

[5] Rijksmuseum van Natuurlijke Historie, Leiden: RMNH; Rijksmuseum van Geologie en Mineralogie, Leiden: RGM.

[6] Now in the Institut Royal des Sciences Naturelles de Belgique, Bruxelles.

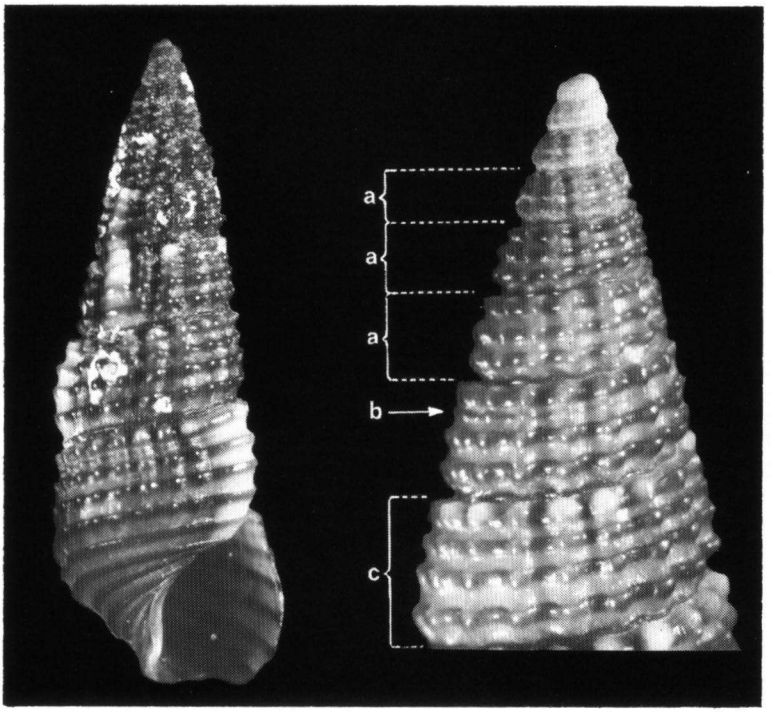

Fig. 2. *Bittium latreillii* (Payraudeau). Magnification 10x and 20x respectively. Specimens from Punta Mika, near Zadar, Jugoslavia, and Capte, few km S. of Hyères, France, respectively. a. Three similar spiral rows of tubercles per whorl, of which the lower two appear first. b. Appearance of the fourth spiral row of tubercles. c. Four similar spiral rows of tubercles per whorl.

weak fourth row of tubercles appears in about the same way as in *B. latreillii*, but this only appears on the last whorl (2 specimens, from Sciacca and Trapani, Sicilia, in my collection; 2 specimens from Palermo, ex Monterosato, in the Dautzenberg collection).

In addition to samples from Bastia, Corse, and from Cagliari, Sardegna, the Dautzenberg collection contains many samples from Tunisia and Algeria. From these it appears that *B. lacteum* is conchologically a very constant species in those regions except that:

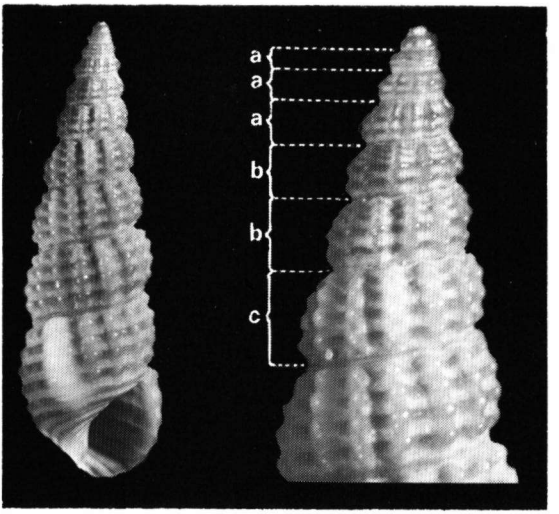

Fig. 3. *Bittium reticulatum* (Da Costa). Magnification 10x and 20x respectively. Specimen from Sezimbra, 30 km S. of Lisboa. a. The lower two spiral ridges on the whorls appear first, and develop about simultaneously. b. The upper two spiral ridges appear after the lower two, and develop about simultaneously (on other specimens the upper spiral ridge often appears later or not at all). c. Four similar spiral rows of tubercles per whorl.

– specimens from outside Sicilia may reach a length of about 10 mm, while in Sicilia they do not seem to surpass 8 mm;
– a weak fourth spiral row of tubercles seems to appear somewhat more early, and on a considerably higher percentage of the shells, as the locality is situated more westward on the North African coast;
– many specimens from North African localities are not as pure white as are those from Sicilia. Usually the specimens are uniformly coloured, but occasionally the lower part of the base is of a darker colour.

There can be little doubt that *Cerithium algerianum* Sowerby (1855:878) is identical with the North African Mediterranean form of *B. lacteum*. Thus, *B. lacteum algerianum* (Sowerby) is characterized by the uniform colour of the spire of the individual shells, and by the fact

that specimens with a weak fourth spiral row of tubercles on the last whorl are nor rare.

B. lacteum tessellatum Bucquoy, Dautzenberg & Dollfus, 1884, differs from the Sicilian form in the larger dimensions (length up to about 10 mm), and the colour. The background is usually of a whitish colour; the interstices between the tubercles are of a darker colour. A weak fourth spiral row of tubercles on the last whorl is not rare. The subspecies occurs on the Mediterranean coast of France and in the Islas Baleares (3 shells from S. Antonio, Ibiza; RMNH).

A sample of 21 shells from a locality at about 40 km W. of Málaga, S. Spain (RMNH), represents the link between the subspecies *tessellatum* and *hanleyanum* Monterosato, 1889. These shells are very similar to *B. lacteum tessellatum*, except that the fourth spiral row of tubercles is much more developed on most of them. On one specimen it even appears already on the fifth whorl, counted from the base upwards. On two other shells it does not appear at all. All kinds of intermediates between these extremes are represented in the sample. Moreover, some of the shells are of a more uniform brownish colour.

Specimens from Torremolinos (15 km SW. of Málaga), Algeciras, Getarès (a few km SW. of Algeciras) (all in my collection), and from Tangier (2 specimens in the Dautzenberg collection, marked: "Bittium Hanleyi Monts./Tanger 12 m/Pallary 18.4.02") all have a well developed fourth spiral row of tubercles. They also differ somewhat from the Mediterranean forms mentioned above, in that they have five instead of four spiral ridges on the base, which, moreover, are somewhat less strong. Two of these are weak ones, situated close to the columella. The largest specimen measures about 11.5 mm. Yet a number of these shells still show the darker blotches between the tubercles, which are a character of *B. lacteum tessellatum*. Nordsieck (1968), Hidalgo (1917), nor Pasteur-Humbert (1962) mention the form. Pallary (1902: 15; 1920: 45) mentions it as *Bittium reticulatum* da Costa, var. *Hanleyi* Monterosato, though the latter (1889: 39) described it as *Bittium hanleyanum*. As usual, Monterosato's description is very short: "C'est un *Bittium* à facies de *Cerithiopsis*, presque noir, à réticulation bien accusée." He mentions the species from Tangier and Mogador. This description, the localities mentioned, Pallary's figure, Pallary's shells in the Dautzenberg collection, and the good contact Pallary had with Monterosato (Pallary, 1902: 4), leave little or no doubt that Monterosato's description does really refer to the form under discussion, notwithstanding the fact that the specimens I have seen are not by far as dark as mentioned by Monterosato. In addition to the localities recorded by Monterosato, Pallary also mentions Mazagan.

Yet, shells from Mazagan (6 specimens in the Dautzenberg collec-

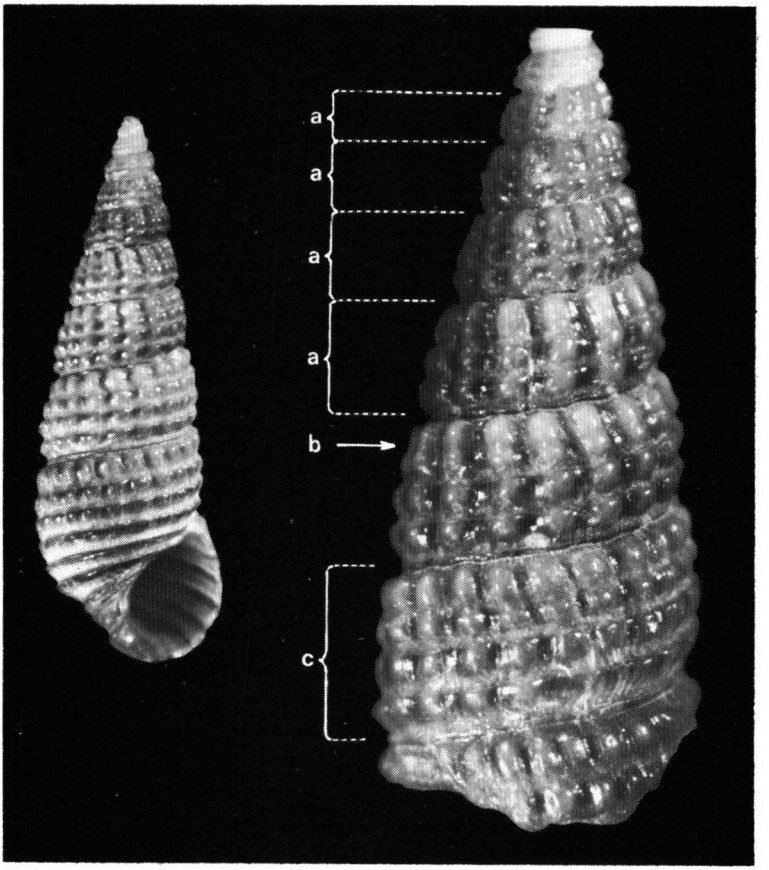

Fig. 4. *Bittium lacteum banleyanum* Monterosato. Magnification 10x and 20x respectively. Specimens from Sezimbra. a. Three spiral rows of tubercles per whorl, of which the lower two appear first; the upper row becomes widest. b. Gradually a spiral furrow starts to divide the upper row into two rows of tubercles. c. Four similar rows of tubercles per whorl.

tion, marked: "Bittium lacteum Ph./entre Sidi Bou Zid et Mouley Abdallah/G. Lecointre 1916")[7] and from Safi, between Mazagan and Mogador (many specimens in my collection), are not entirely identical to those from Tangier and surroundings. The largest specimen in the sample from Safi measures about 10 mm; the shells from Mazagan are even smaller. Many specimens in both samples have six, moderately developed, spiral ridges on the base. The shells from Mazagan are of a uniform light brown colour, except for the lower part of the base, which often is of a darker shade of brown. The same applies to the shells from Safi, of which, however, the upper spiral row of tubercles on each whorl is of a lighter colour than that shown by the remainder of the whorl.

The shells in a sample from Sezimbra, 30 km S. of Lisboa (my collection), differ from those from Tangier and surroundings in smaller dimensions and colour. The length does not exceed 7.5 mm; as to the colour the shells resemble those from Mazagan, but are of a darker shade of brown. Fig. 4 shows two specimens from Sezimbra.

It should be mentioned that in all forms of *B. lacteum* which possess four well developed spiral rows of tubercles, the fourth spiral row does not, as in *B. latreillii*, develop separately from the neighbouring ones. Instead, it springs from the uppermost row, which, after having broadened considerably, is divided into two spiral rows by a furrow which gradually deepens (fig. 4). If, however, the fourth spiral row of tubercles appears late and stays weak, as in the Mediterranean forms of *B. lacteum*, it develops more or less independent from the upper row, although rarely as independent as in *B. latreillii*.

Watson himself (1897: 246) draws attention to the great similarity between *B. incile* Watson, 1897, and *B. lacteum*. Of a lot of five specimens in the Dautzenberg collection, marked: "Bittium incile Watson/Madeira A.M.N. 1897/Norman ded. 9.98", the apical dimensions are about 0.14/0.25 mm. On the body whorl of some specimens a weak fourth spiral row of tubercles appears in the same way as in Mediterranean forms of *B. lacteum*. The colour is as described by Watson: "dark brown, ...with a whitish band round the top of each whorl, occupying the highest... spiral ridge, with an occasional intrusion to the ridge-tubercles here and there". The largest specimen measures

[7] This lot proves that, if Pallary's (1920: 45) record of *B. lacteum* from Tangier and Casablanca is not based on personal observations, it may well refer to the subspecies *hanleyanum*. In my opinion, we therefore better surmise that only the latter form of *B. lacteum* occurs on the Atlantic coast of Morocco, until the opposite has really been proved.

about 4 mm. Watson also mentions the form from the Islas Canarias. Judging from a large lot from Hierro, Playa de Arenas Blancas (RGM No. 221.288), the latter form, however, is somewhat larger (up to 6 mm) and differently coloured. Though completely white specimens are not rare, the colour of most specimens differs from that of the Madeiran form in that the brown parts are of a very light shade, with darker spots between the tubercles, as in *B. lacteum tessellatum*. In contrast to that form, one or two of the spiral ridges on the base of the shells from Hierro may show tubercles, which, however, are much less pronounced than those on the whorls. The lower part of the base is often of a darker shade of brown. In my opinion, *B. incile* is another subspecies of *B. lacteum*.

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