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Structure of the venom gland — muscular bulb complex in the family Turridae (Gastropoda, Conoidea)

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ABSTRACT. The histological structure of poison gland and muscular bulb in the family Turridae has been examined. The data on anatomy of about 50 species studied form the basis of the work. A correlation was revealed between the structure of poison gland itself, position of its duct, and the inner structure of muscular bulb. Six main types and 3 subtypes were recognized in the structure of poison gland — muscular bulb complex. Taking into account the high variability of the anterior part of digestive system in Turridae, the isolation of the complex of characters, which can unite groups of genera, is of certain interest for the taxonomy of the family.

Venom gland is one of the most characteristic features of conoidean gastropods and is present in nearly all taxa possessing a radula. It is formed by the venom gland proper — a long and strongly convoluted tube — and the muscular bulb which is basically a sort of muscular sac. The gland passes through the nerve ring and opens into the foregut [Robinson, 1960; Ponder, 1970, etc.].

Before recently, it was believed that the venom apparatus structure in the Conoidea is not very variable, even if not uniform. It was known [Taylor et al., 1993] that the venom gland opens just after the radular sheath, at the border of buccal mass, and anterior part of the gland before the nerve ring is duct-like and lacks venom granules in some species. The gland was studied in more detail for Conidae.

Simone [1999] found that the venom gland of *Cochlespira elongata* (Cochlespirinae, Turridae) opens not at the buccal mass border, as was considered usual, but near the nerve ring. He did not study the histological structure of muscular bulb in detail, but this finding forced to draw more attention to the venom gland complex structure in Turridae. The study of Cochlespirinae [Medinskaya, 1999] has not only shown that other representatives of the subfamily possess a similar structure of the venom gland but also revealed some other, previously unknown peculiarities of the complex. Recently obtained data [Kantor et al., 1997; Medinskaya, 1999; Simone, 1999] allowed to reconsider the information about the topology and relationship of different parts of the venom apparatus of Turridae. Such an analysis became the primary goal of the present paper.

Material and methods

Published data on the foregut structure in the turrid subfamilies Crassispirinae [Taylor et al., 1993; Kantor et al., 1997], Cochlespirinae [Medinskaya, 1999], and Turrinae [Medinskaya, 2002] were used in the work.

Besides, photographs were taken from serial sections 10 μm thick and stained with Masson's triple stain.

List of species, which have been sectioned, with details of their collection location.

Subfamily Turrinae

1. *Decollidrillia nigra* Habe et Ito, 1965
R/V "Vityaz", sta. 7498, 43°37,7'N, 147°00,7'E, 180 m.
2. *Cryptogemma corneus* (Okutani, 1966)
R/V "Vityaz", sta. 3578, 38°35'N, 142°53,3'E, 1660m.
3. *Fusiturris similis* (Bivona, 1838)
R/V "Cryos", Balgim, sta. CP145, 35°57'N, 03°08'W, 373 m.
4. *Fusiturris undatiruga* (Bivona, 1832)
R/V "Cryos", Balgim, sta. DR75, 33°53'N, 08°15'W, 40-60 m.
5. *Gemmula cosmoi* (Sykes, 1930)
SW Madagascar, campagnie crevettière 86, sta. 57, 22°26'S, 43°06'E, 460 m.
6. *Gemmula* sp. 1
R/V "Alis", BATHUS 2, sta. DW719, 22°48'S, 167°16'E, 444-445 m.
7. *Gemmula* sp. 2
R/V "Alis", BATHUS 3, sta. DW817, 23°42'S, 168°16'E, 405-410 m.
8. *Gemmula thielei* (Finlay, 1930)
R/V "Alis", BATHUS 2, sta. CP766, 22°10'S, 166°02'E, 650-724 m.
9. *Gemmuloborsonia jarrigei* Sysoev et Bouchet, 1996
R/V "Jean Charcot", BIOCAL, sta. DW44, 22°47'S, 167° 14'E, 440-450 m.
10. *Gemmuloborsonia neocaledonica* Sysoev et Bouchet, 1996
R/V "Alis", BATHUS 4, sta. CP899, 20°17'S, 163°50'E, 500-600 m.
11. *Iotyrris cerithiformis* Powell, 1964
NO "Alis", MUSORSTOM 9, sta. CP1227, 9°44.2'S 138°52,5' W, 84-85 m.
12. *Lophiotoma acuta* (Perry, 1811)
Expedition Montrouzier, sta. 1286, 20°38'-20°39'S, 164°16'-164°17'E.
12. *Lucerapex casearia* (Hedley et Petterd, 1906)
RW "Vauban", MUSORSTOM 4, sta. DW161, 18°39'S, 163°11'E, 550 m.
13. *Turris crispa* (Lamarck, 1816)
Expedition Montrouzier, sta. 1278, 20°34'S, 164°16'E.
14. "*Turris" torta* (Dautzenberg, 1912)