

The first isolation of *Cochliopodium gulosum* Schaeffer, 1926 (Lobosea, Himatismenida) since its initial description. I. Light-microscopical investigation

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Summary

A marine lobose amoeba possessing characteristic features of the genus *Cochliopodium* (Hertwig and Lesser, 1874) Kudryavtsev, 1999 was found in the upper layer of sand at the beach of Keret Island, Kandalaksha Bay, the White Sea. Light-microscopical identity of this isolate and *Cochliopodium gulosum* Schaeffer, 1926 has been shown. This species has never been isolated and studied since its initial description. Its validity and generic position are confirmed by the results of light-microscopical investigation. Problems of biogeography of amoebae are briefly discussed.

Key words: amoebae, systematics, Lobosea, Himatismenida, *Cochliopodium gulosum*

The genus *Cochliopodium* (Hertwig and Lesser, 1874) Bark, 1973 comprises about 20 species of lobose amoebae (Bark, 1973; also see A.A.Kudryavtsev, in this issue). Among these species only 3 – *C. bilimbosum* (Auerbach, 1856) Leidy, 1879, *C. minus* Page, 1976 and *C. larifeili* Kudryavtsev, 1999 were studied with electron microscopy together with 3 unidentified strains which correspond to the diagnosis of this genus, but cannot be identified with any of known species (Bark, 1973; Nagatani et al., 1981). The majority of other species were never isolated since their initial description, and re-investigation of these species with modern techniques seems to be necessary. One of such species is *Cochliopodium gulosum* Schaeffer, 1926.

The results of its light-microscopical investigation and identification are presented here. This species was found in the samples of sand collected at the intertidal zone of the Keret Island (the Chupa Inlet, Kandalaksha Bay, the White Sea; salinity about 15–17‰) in September, 1997.

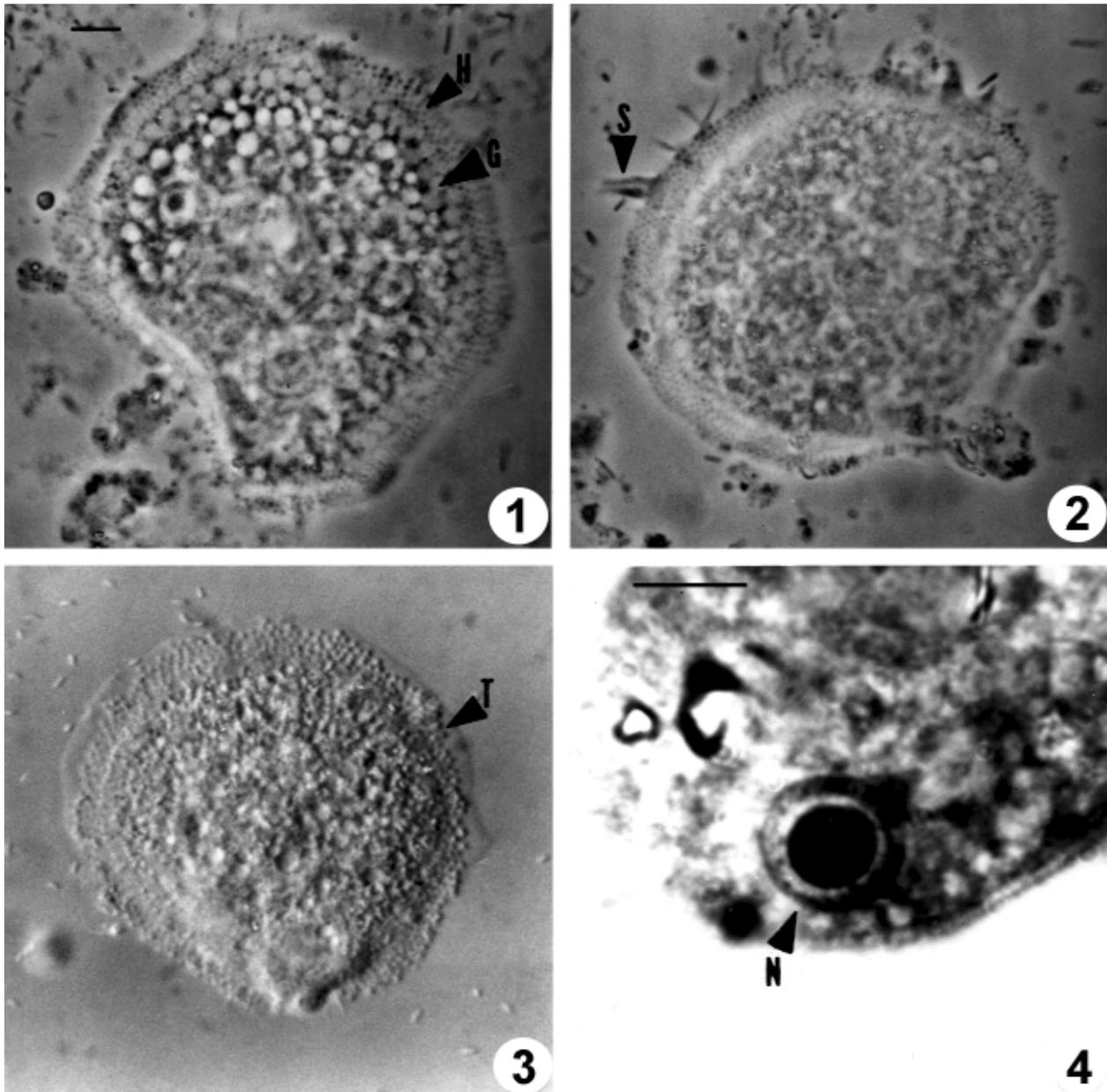
In locomotion amoebae were rounded or oval (Fig. 1–3), with length often slightly greater than breadth. Granuloplasmic hump was rounded and located centrally or, in rapid movement, post-centrally (when viewed from above; see Fig. 1–3). It was surrounded by a hyaloplasmic veil. The anterior margin of hyaloplasm was smooth (Fig. 1, 3) or with 2–3 to 10 subpseudopodia (Fig. 2), usually less than 10 µm in length. The posterior end of the body was smooth.

Length of the locomotive form varied from 56 to 90 µm (mean 80 µm), breadth, from 56 to 86 µm (mean 73 µm).

Amoebae had one spherical nucleus of vesicular type with large central nucleolus (Fig. 4). Diameter of nucleus varied from 8 to 15 µm (mean 12 µm), of nucleolus, from 6 to 10 µm (mean 8 µm). Granuloplasm contained large number of rounded refractive yellow crystals and minute transparent vesicles (Fig. 1). Sometimes food vacuoles with diatoms could be seen.

Scales constituting tectum were seen with light microscope as large conspicuous dots on the surface of the hyaloplasmic veil (Fig. 1–3). They were arranged in 1 layer more or less equidistantly from each other. Sometimes in locomotion, the anterior parts of hyaloplasm and subpseudopodia were not covered by tectum (Fig. 2–3).

Light-microscopical characters of this isolate correspond to the diagnosis of *Cochliopodium gulosum* designed by Schaeffer (1926; see tab. 1). The differences concerned only the set of cytoplasmic inclusions and interpretation of the appearance of tectum. Schaeffer stated that amoebae studied by him possessed «bluish-green refractory granules» but «no crystals could be demonstrated» (Schaeffer, 1926, p. 107). We suggest that these «refractory granules» are identical with the crystals of amoebae described here. Judging from the text and illustrations of Schaeffer's paper (Fig. 5), amoebae studied by him pos-



Figs. 1–4. *Cochliopodium gulosum*. Light-microscopical photographs. **1–2.** Locomotive forms on glass surface (phase contrast). **3.** Locomotive form on glass surface (differential interference contrast). **4.** Haematoxylin stained preparation (bright field). H – hyaloplasm, G – granuloplasm, S – subpseudopodia, T – tectum, N – nucleus. Scale bar 10 μ m throughout.

sessed tectum visible with light microscope which had the same appearance as that of amoebae described here, although Schaeffer (op. cit.) considered scales to be the minute granules located inside the cytoplasm, not on the surface of an amoeba.

Therefore, the amoeba strain studied in present work can be included in the genus *Cochliopodium* due to the presence of tectum (for modern generic diagnosis see A.A.Kudryavtsev, in this issue), and it would be identified as *C. gulosum*. In the combination of light-microscopical characters it differs from any of the previously described species of this genus (Archer, 1877; Korotneff, 1879;

Leidy, 1879; Penard, 1890, 1902, 1903; West, 1901; Page, 1976a) as well as from any of the unidentified strains studied by now (Bark, 1973; Nagatani et al., 1981). Thus, it can be considered to be a separate species within the genus *Cochliopodium*. Subsequently its diagnosis would be modified by the addition of electron-microscopical characters (in particular, the scale structure).

C. gulosum was initially found in the coastal waters of North America. Its isolation from the White Sea (North-Western Eurasia) confirms the idea of distribution of many species of amoebae at the territory of both continents (Page, 1976b). However, the biogeography of rhizopods remains

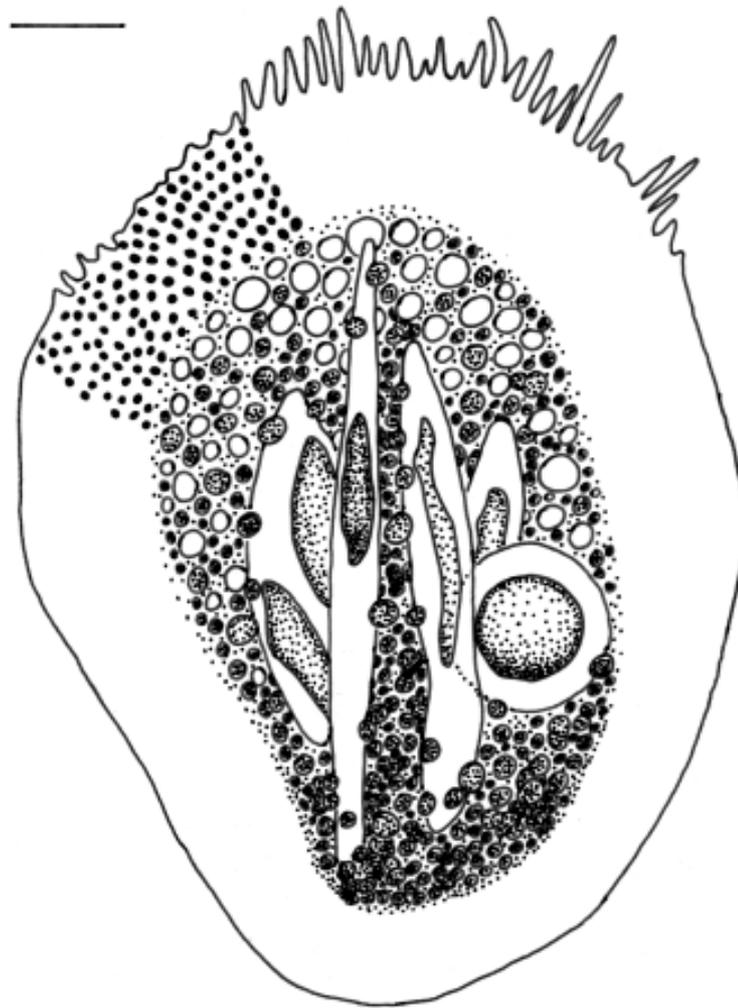


Fig. 5. *Cochliopodium gulosum*. Schematic drawing of the locomotive form (modified from Schaeffer, 1926). Scale bar 10 µm.

very poorly studied. Therefore, isolation of species from remote habitats is important for understanding the peculiarities of their distribution over the world.

Acknowledgements

I am grateful to Dr Alexey V. Smirnov for general supervision over the work and to Dr Andrew V. Goodkov for valuable discussion of the manuscript. The collecting and preliminary treatment of the material were carried out at the Marine Biological Station of the Saint-Petersburg State University.

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Table 1. Comparison of the characters given by Schaeffer (1926) for *Cochliopodium gulosum* with the characters of amoebae isolated from the White Sea

Character	Schaeffer's description	Characters of the White Sea isolate
1. Length of the locomotive form	80 μm	56–90 μm (mean 80 μm)
2. Shape during locomotion	Oval to circular with a "thin sheet of protoplasm" (hyaloplasm) surrounding the "main mass of protoplasm" (granuloplasm); "pseudopods" (subpseudopodia) on the outer edge of the sheet of protoplasm	Oval to circular with granuloplasmic hump surrounded by hyaloplasmic veil with subpseudopodia at the anterior edge
3. Size and shape of the nucleus	Nucleus spherical, 15 μm in diameter, with "central chromatin mass" (nucleolus), 10 μm in diameter	Nucleus spherical, 8–15 (12) μm in diameter, with large central nucleolus, 6–10 (8) μm in diameter
4. Cytoplasmic inclusions	Food vacuoles with diatoms, numerous small transparent vacuoles, "bluish-green refractory granules"; no crystals	Food vacuoles with diatoms, numerous small transparent vacuoles, rounded refractive crystals
5. Appearance of tectum	Small (less than 1 μm) pale granules filling the thin protoplasmic sheet surrounding the central mass of cytoplasm	Conspicuous dots on the surface of the hyaloplasmic veil

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