

# *Pseudoplacentela smirnovi* gen. et sp. n. (Tunicata, Ascidiacea), with a discussion of its phylogenetic relationships

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*Pseudoplacentela smirnovi* gen. et sp. n., a colonial ascidian from the Kuril Islands, is described and placed in the holozoidae. The related species *Placentela crystallina* Redikorzev also seems to belong to the Holozoidae rather than to the Polyclinidae.

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## Introduction

Among ascidians collected around the Kuril Islands by R. V. 'Lebed' in 1954 and R. V. 'Ac. Opariri' in 1991, three colonies representing a new aplousobranchiate genus were found. *Pseudoplacentela smirnovi* gen. n., sp. n. seems closely related to the genus *Placentela*, and may partly clarify the uncertain systematic position of the latter genus.

## Material and methods

The material was located in the collections of the Zoological Institute of the Russian Academy of Sciences (St Petersburg, ZIN) and the Kamchatka Institute of Ecology and Environment of the Far Eastern Branch of the Russian Academy of Sciences (Petropavlovsk-Kamchatsky, KIEE). Ascidiaceans were preserved in 4% formaldehyde and 70% alcohol.

## *Pseudoplacentela* gen. n.

The genus is characterized by the following features: zooids embedded, atrial and branchial siphons open separately to the exterior by 6-lobed apertures, more than 3 rows of stigmata, presence of placental membrane, abdomen with gut, heart and gonads, posterior abdomen with muscles, larva with sagittally placed adhesive papillae.

## *Pseudoplacentela smirnovi* sp. n. (Figs 1, 2, 3A)

**Material.** Holotype, ZIN 2692. Location: R.V. 'Ac. Opariri', 10 September 1991. St. 90. Small Kurilian Islands, 43°33.5'N, 146°36.2'E, depth 101 m, 1 colony with larvae and embryos, coll. A. Smirnov. Paratypes: ZIN 2693. R.V. 'Lebed', 6 July 1954. Isl. Paramushir, 50°09.7'N, 156°2.4'E, depth 210-246 m, 1 colony with embryos, coll. A. Spirina. ZIN 2694. Location: R. V. 'Lebed', 8 August 1954. 4th Kurilian Strait, 49°51'N, 155°14.3'E, depth 190-195 m, 1 colony.

All three found specimens are alike in the external appearance, structure of zooids and sizes.

**Description.** Colony. Slightly elongated zooid bearing head 2.5 x 1.5 cm on cylindrical stalk 1.5-2 mm in diameter and 9 cm long. Serially arranged cylindrical or spherical pinkish parenchymal bodies in conical enlargement in middle part of stalk and lower part. Test surface without incrusting matter. Test of head colourless and transparent, glass-like and very soft, zooids clearly visible

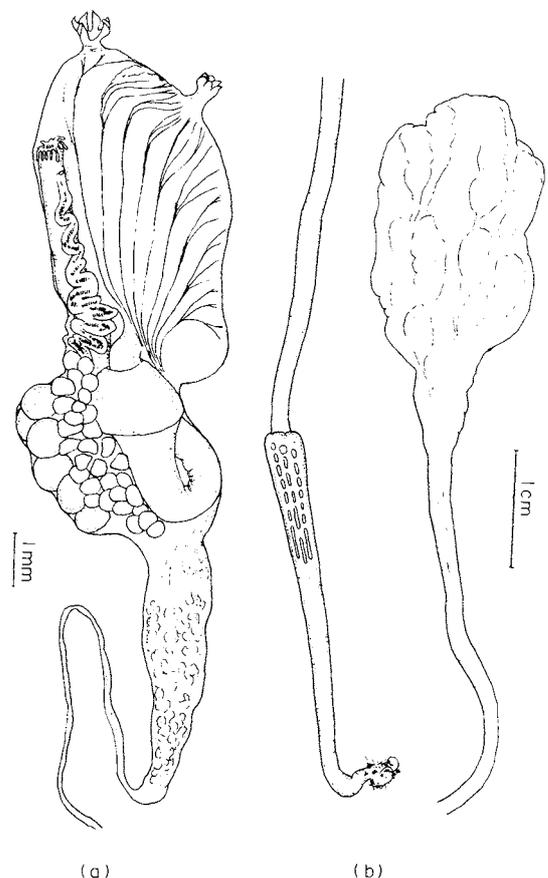


Fig. 1. *Pseudoplacentela smirnovi* gen. n., sp. n.—A. Zooid.—B. Colony.

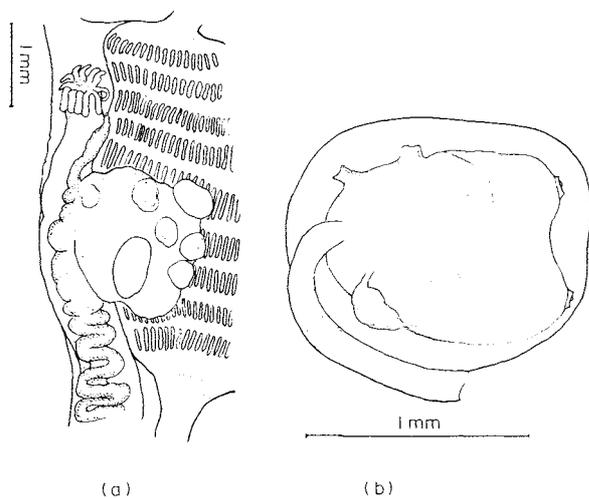


Fig. 2. *Pseudoplacentela smirnovi* gen. n., sp. n.—A. Part of the thorax showing placental membrane.—B. Larva.

through test. Test of peduncle less transparent and much harder, slightly pinkish.

**Zooid.** Divided into thorax, abdomen and posterior abdomen, 12–13 mm long. Zooids situated along longitudinal axis of colony head, completely embedded in common test. Apertures 6-lobed, open separately around colony head surface, atrial on top of zooids, branchial on ventral side, at considerable distance from anterior end. Body muscles longitudinal, about 9 strongly branched thoracic bands, 4 originating from ventral part of thorax, others from branchial siphons. Muscles extend posteriorly over thorax and become more thin at abdomen and posterior abdomen. Branchial tentacles 26, large, of three sizes. Branchial sac with up to 40 stigmata in each half, in 9–12 rows. No traces of inner longitudinal vessels, no parastigmatic vessels. Dorsal languets long and curved, slightly displaced to left. Oesophagus short. Stomach surface quite smooth. Gut smooth, without differentiating structures. No gastric reservoir. Anus with border divided into up to 20 long cylindrical lobes. Heart in abdomen. Testis follicles grape-like clusters in and beside gut loop, ovary between testis and body wall. Sperm duct robust in all examined zooids, situated along rectum with opening near anus. Upper part of posterior abdomen enlarged and filled with yellowish parenchymal tissue, 4.5–5 mm in length, posterior part of posterior abdomen long and thin. Between 10 and 20 embryos and larvae present in atrial cavity, some found quite freely, some attached to placental membrane (Fig. 2A). Placental membrane visible in all examined zooids with embryos. Larva with trunk 1.2 mm long, two simple sagittally placed adhesive papillae, four stigmatal rows. No ocellus, otolith, ampullae or vesicles.

### Discussion

Judging from the following features, *Pseudoplacentela smirnovi* appears close to *Placentela crystallina* Redikorzev, 1913: presence of so-called "placenta", or placental membrane, similar to those reported for *P. crystallina* by Redikorzev (1913) and described in detail by Nishikawa (1984), which 'may probably be a modification of the epithelial tissue around the female genital aperture'

(Nishikawa, 1984), similar structure of the branchial sac, apertures, body muscles, position of the heart at the posterior end of the abdomen, position of the anus near the atrial aperture. Moreover, both species appear to have a similar mode of survival budding.

In the process of survival budding the rounded parenchymal 'survival buds' remain in the lower hard part of each cormidium of *P. crystallina*, while the upper soft zooids bearing part of cormidium, break off and degenerate. A considerable number of colonies of *P. crystallina* collected off Kamchatka coasts represent all stages of this process; one colony was found with the lower and upper parts of each cormidium very easily separating from each other. The peculiar dendriform colony of *P. crystallina* (see Nishikawa, 1984, fig. 2) is a result of such a mode of survival budding. Colonies of *Pseudoplacentela smirnovi* differ only in not being branched (only one zooids bearing head grows from any head with survival buds, rather than several as in *P. crystallina*). Colonies of *P. smirnovi* are also much more elongated. Thus, it is very possible that both species have one method of survival budding, and that the parenchymal bodies seen in the middle part of the stalk of *P. smirnovi* represent the survival buds of this year, and bodies in the lower part the remains of the last year survival buds.

*Pseudoplacentela smirnovi* differs from *Placentela crystallina* in having short oesophagus, fringed anus, only two larval adhesive organs and lacking a branched colony. The principal difference separating the two species is the position of the gonads beside the gut loop in *P. smirnovi*, while in *P. crystallina* they are situated in the posterior abdomen. In some specimens of *P. crystallina* which I have examined, the gonads occur in the mutilated condition as figured by Nishikawa (1984, figs 1C, 3B), and fill both the postabdomen and the lower part of abdomen. In specimens with well-developed gonads, however, they are located in the postabdomen (Fig. 3B, C) as figured by Redikorzev (1913, fig. 6). Occurrence of the gonads in *P. crystallina* beside the gut loop in mutilated condition can be explained by contraction of zooids during fixation. On the other hand, well-developed gonads never occur beside the gut loop in *P. crystallina* as in all three examined specimens of *P. smirnovi*. The position of gonads has a high taxonomic significance and, according to this feature, the newly described species cannot be allocated to the genus *Placentela*.

**Systematic position.** A posterior abdomen filled with parenchymal tissue as in *P. smirnovi*, is not a true polyclinid postabdomen, lacking both heart and gonads. A similar structure occurs in some Holozoid genera. Some similarity may be found between *Pseudoplacentela* and *Sigillina*, which also has a vascular stolon with muscular fibres. In some species of *Sigillina* the upper part of the vascular stolon is enlarged and contains epicards (see for example, *S. grandissima* Kott, 1990). *Sigillina*, *Hypodistoma* and *Polydistoma* also seem closely related to *Pseudoplacentela*, judging from the presence of 6-lobed aperture, smooth stomach, and, in *Hypodistoma* and *Polydistoma*, very short oesophagus. Thus, the described genus most probably belongs to Holozoidae.

The systematic position of *Placentela* is more uncertain.

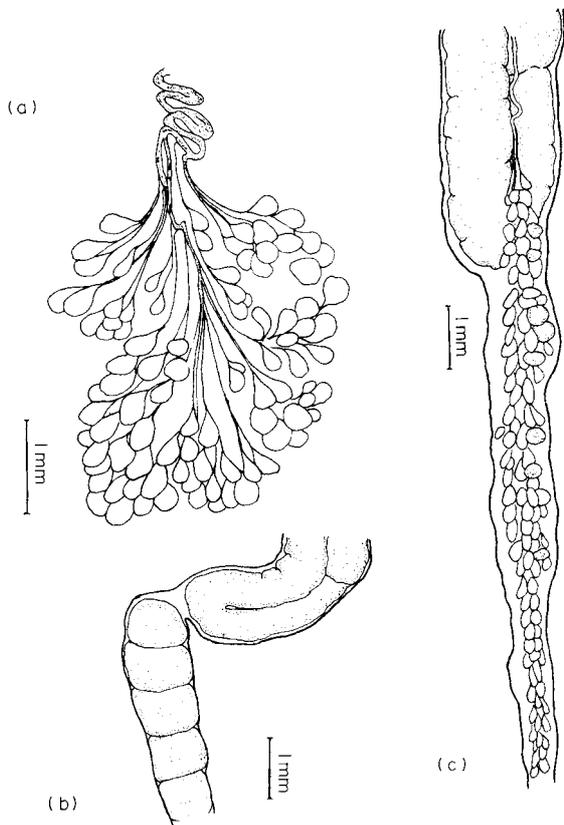


Fig. 3.—A. *Pseudoplacentela smirnovi* gen. n., sp. n. Male gonad.—B. *Placentela crystallina* (specimen KIEE 7/448). Part of the abdomen and posterior abdomen with well-developed gonads.—C. *Placentela crystallina* (KIEE 8/449). Mature eggs in the postabdomen.

The genus was previously referred to the Synoicidae (=Polyclinidae) by Redikorzev (1913). By Nishikawa (1984) later it was provisionally placed in the polyclinid subfamily Euherdmaniinae, since *T. crystallina* is seemingly related most closely to polyclinid genus *Homoedistoma* rather than to polycitorid genus *Hypsistozoa*. Earlier, Kott (1957) synonymized genus *Homoedistoma* with *Placentela*, although without examining any specimens. I re-examined the holotype of the type species of the genus *Homoedistoma*, *H. michaelsoni* Redikorzev, 1927 (ZIN). The material is represented by several cormidia from a single colony. In some zooids several embryos attached to the placental membrane are found. As in *P. crystallina*, the position of the heart is in the abdomen beside the intestinal loop, and not in the middle part of the posterior abdomen as it appears from Redikorzev's (1927) figure; the larva is also quite similar to those of *P. crystallina*, and *H. michaelsoni* is therefore considered to be a junior synonym of *P. crystallina*, and referring the latter species to Polyclinidae becomes consequently even more doubtful. The relation between holozoid genus *Hypsistozoa* and *P. crystallina* mentioned by Nishikawa (1984), and the similarity between the latter species and

*Pseudoplacentela smirnovi*, shows that *P. crystallina* belongs in the family Holozoidae rather than in the Polyclinidae.

A new aplousobranchiate genus and species *Citorclinum laboutei* of uncertain systematic position was described (Monniot & Millar 1988) and simply placed in the Aplousobranchiata. Although *C. laboutei* is quite distinct from *P. crystallina* in numerous features, it resembles *Placentela* in having the heart beside or below the intestinal loop, and the testis in the postabdomen (but the ovary in the thorax).

Kott (1957, 1963) defined the genus *Placentela* as follows: 'without papillae in the branchial sac; with more than 3 rows of stigmata; stomach without folds; zooids embedded but atrial and branchial siphons open separately to the exterior', and according to these features some species were placed in this genus. The following features should be added to the definition: heart in abdomen, presence of placental membrane, ovary and testis beside each other in the postabdomen. All other species except *P. crystallina* and, possibly, *P. longigona* (= *Homoedistoma longigona* Tokioka: Tokioka 1959) should be excluded from the genus *Placentela* [for discussion see Nishikawa (1984)]. According to Millar (1963) and Kott (1990) the last species may be a member of the diazonid genus *Pseudodiazona*.

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#### References

- Kott, P. 1957. The ascidians of Australia. 2. Aplousobranchiata Lahille: Clavelinidae Forbes and Hanly and Polyclinidae Verrill.—*Aust. J. mar. Freshw. Res.* 8: 64-110.
- Kott, P. 1963. The ascidians of Australia. 4. Aplousobranchiata Lahille: Polyclinidae Verrill (continued).—*Aust. J. mar. Freshw. Res.* 14 (1): 70-118.
- Kott, P. 1990. The Australian Ascidiacea. P. 2, Aplousobranchia (1).—*Mem. Qd. Mus.* 29 (1): 1-266.
- Millar, R. 1963. Australian ascidians in the British Museum (National History).—*Proc. zool. Soc. Lond.* 747:689-746.
- Monniot, F. & Millar, R. 1988. A new genus and species of an aplousobranchiate ascidian (Tunicata: Ascidiacea) from New Caledonia, of uncertain systematic position.—*Indo-Mal. Zool.* 5: 321-327.
- Nishikawa, T. 1984. Contribution to the Japanese ascidian fauna 38. Notes on the morphology and systematic position of *Placentela crystallina* Redikorzev from the North Pacific.—*Proc. Jap. Soc. syst. Zool.* 29: 37-56.
- Redikorzev, V. 1913. Neue Ascidien.—*Zool. Anz.* 43: 204-213.
- Redikorzev, V. 1927. Zehn neue ascidien aus dem Fernen Osten.—*Zool. Jahrb.* 63: 373-404.
- Tokioka, T. 1959. Contribution to the Japanese ascidian fauna 13. Sporadic memoranda (4).—*Publ. Seto mar. biol. Lab.* 7: 27-40.