

A new species of *Tetrastemma* from the Sea of Japan and redescription of *Tetrastemma laminariae* Uschakov, 1928 (Nemertea: Tetrastemmatidae)

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Tetrastemma kangauzi sp. n. from the Sea of Japan (Peter the Great Bay) is described. Internal morphology of *T. laminariae* Uschakov, 1928 from Barents Sea (Kola Bay) is briefly redescribed.

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The genus *Tetrastemma* Ehrenberg, currently with 110-115 species, is non-monophyletic and contains many inadequately described taxa. About 20-25 species of this genus are characterized by the uniformly coloured body without distinct pattern. Two species from this colour group are described below, *Tetrastemma kangauzi* sp. n. from the Sea of Japan and *T. laminariae* Uschakov, 1928 from Barents Sea.

The following abbreviations are used in the description: E – thickness of epithelium, D – thickness of dermis, C – thickness of outer circular muscle layer, L – thickness of longitudinal muscle layer, S – length of central stylet, B – length of basis, b – width of basis.

***Tetrastemma kangauzi* sp. n.** (Figs 1-3, 5)

Holotype. ♀, **Russia**, *Sea of Japan*, Peter the Great Bay, Ussuriyskiy Bay, Sukhodol bight, near estuary of Sukhodol (=Kangauz) River, depth 1 m, silty sand, salinity about 22-26 ‰, 10.IX.1998 (A.V. Chernyshev).

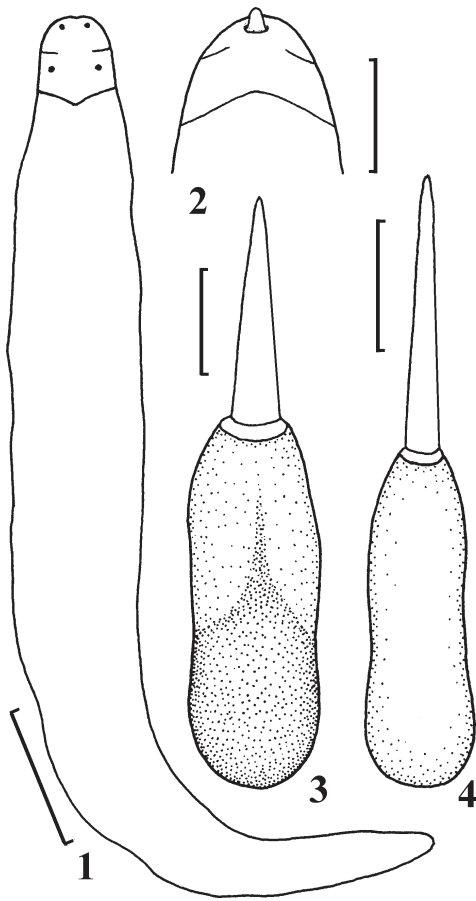
Five slides with transverse sections (no. IX-20234) are deposited at the Zoological Museum of Far East State University, Vladivostok (ZM FESU). The holotype was anaesthetized in 7% MgCl₂, fixed in Bouin's solution and subsequently sectioned at 7-8 µm in paraffin wax and stained by the Crandall's modification of the Mallory method.

Paratype. 1 specimen, with same data as in holotype; fixed specimen and glycerin preparation of the proboscis (no. IX-20235) (ZM FESU).

Other material examined. 1 specimen, same locality as for holotype, 28.X.1994 (A.V. Martynov); fragment of body and proboscis (ZM FESU).

Description. Body of live specimens 10-12 mm in length, tapering towards both ends; head bluntly rounded; tail from narrow to slender. Four eyes dark, irregularly shaped; anterior pair of eyes situated near anterior tip of head, smaller than posterior pair. Anterior cephalic furrows evident both from ventral and dorsal sides; neck furrow (= posterior cephalic furrows separating head from body) V-shaped, with apex directed posteriorly on dorsal side and anteriorly on ventral side. Body uniformly coloured, light yellowish pink; integument translucent; gonads pale yellow. Brain light pinkish or colourless. Blood colourless. Proboscis long, very slender, whitish; stylet region with brown glandular ring.

Body wall: E = 16-24 µm, D = 1.5-2 µm, C = 3.2-4.3 µm, L = 22-43 µm (in stomach region); E = 29-40 µm, D = 2.1-2.6 µm, C = 3.2-7.8 µm, L = 25-38 µm (in midbody region). Precerebral region with both circular and longitudinal body wall muscles. Diagonal muscles not visible in transverse and tangential sections. Dorsoventral muscles weakly developed or absent. Precerebral septum of closed type. Rhynchocoel extending to posterior tip of body, with a few shallow ventral caecal protrusions in intestinal region (probably, artifact of fixation). Rhynchocoel wall with two muscle layers 2-9 µm thick combined. Anterior proboscis chamber 122-142 µm in diameter, with 10 nerves, E = 44-57 µm, C = 2-2.2 µm, L = 8-15 µm, with very thin layer of inner circular musculature. Stylet apparatus: S = 67 µm, B = 102 µm, b = 39 µm (paratype); S = 66 µm, B =



Figs 1-4. *Tetrastemma*. 1-3, *T. kangauzi* sp. n.; 4, *T. laminariae* Uschakov. Living specimen in dorsal view (1), cephalic region of fixed specimen in ventral view (2), central stylet and basis (3, 4). Scale: 1 mm (1), 0.5 mm (2), 25 μ m (3, 4).

98 μ m, b = 44 μ m (damaged specimen). Basis non-pyriform, darker in posterior half. Two stylet pouches with 2-3 accessory stylets in each. Organization of foregut corresponds to Type A (Friedrich, 1956). Esophagus 34-60 μ m wide, with unciliated epithelium containing unclear gland components in stomach-esophageal junction. Stomach up to 190-196 μ m wide, with folded ciliated epithelium. Pylorus up to 175 μ m wide, about 1.2-1.3 times the stomach length. Intestinal caecum with 3-4 pairs of lateral diverticula, anterior pair reaching forward to dorsal portion of brain. Intestinal diverticula with short lateral lobes.

Fibrous core of dorsal brain lobes not bifurcated. Lateral nerve cords with 2-3 myofibrillae and lacking accessory nerves. Frontal organ

present. Cephalic glands moderately developed, however, not extending behind precerebral septum. Cerebral organs about 112 μ m in maximum diameter, open to outside ventrolaterally in front of precerebral septum, extending posteriorly to ventral commissure under ventrolateral side of brain. Mid-dorsal blood vessel with a small vascular plug in brain region; origin of mid-dorsal vessel not traced. Excretory system very weakly developed, extending from posterior brain region to pylorus; efferent ducts not found. Immature ovaries situated laterally and laterodorsally (between the lobes of intestinal diverticula).

Ecology. *Tetrastemma kangauzi* sp. n. is probably a brackish-water species. The water salinity in the type locality varies from 5 to 28 ‰.

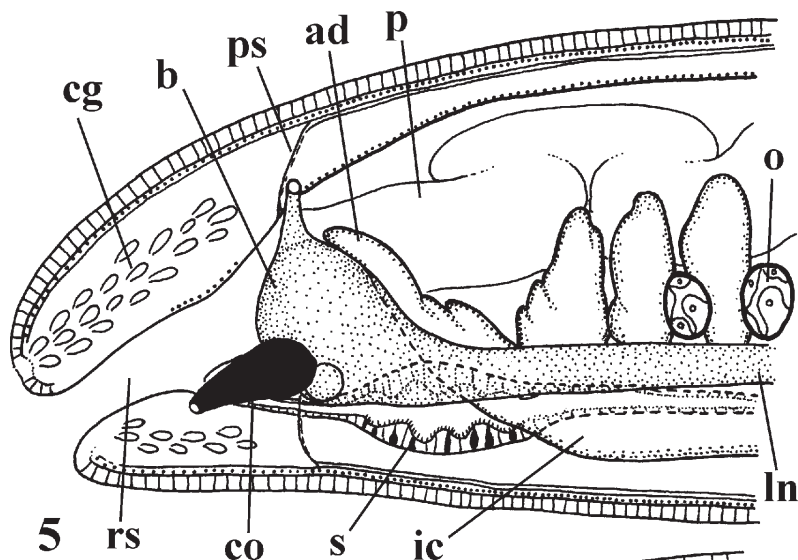
Comparison. Six species of *Tetrastemma* without any distinct colour pattern have been reported from the West Pacific: *T. pinnatum* Iwata, 1954, *T. dilutebasisae* Kulikova, 1987, *T. phaeobasisae* Kulikova, 1987, *T. viride* Kulikova, 1989, *T. stimpsoni* Chernyshev, 1992, and *T. appendiculatum* Chernyshev, 1998. *T. pinnatum* differs from all species of the genus *Tetrastemma* in the presence of fin-like lateral appendages of the body. *T. dilutebasisae* has been recently transferred to the genus *Antarctonemertes* Friedrich, 1955, which differs from *Tetrastemma* in the presence of an accessory nerve of the lateral nerve cords, extensive cephalic glands and absence of vascular plug (Chernyshev, 1999). *T. viride* and *T. stimpsoni* should be excluded from the genus *Tetrastemma*, because the first species has the cerebral organs situated under the brain, and the second species has a short accessory nerve in the lateral nerve cords. The new species differs from *T. appendiculatum* in the position of anterior eyes, absence of long gastric caecum and absence of small pigment dots on the dorsal body side. *T. kangauzi* resembles *T. phaeobasisae* but differs from this in the narrow tail, irregularly-shaped eyes, more terminal position of the anterior eyes, larger size of non-pyriform basis of the central stylet, and longer pylorus.

***Tetrastemma laminariae* Uschakov, 1928** (Figs 4, 6)

Tetrastemma laminariae Uschakov, 1928: 415.

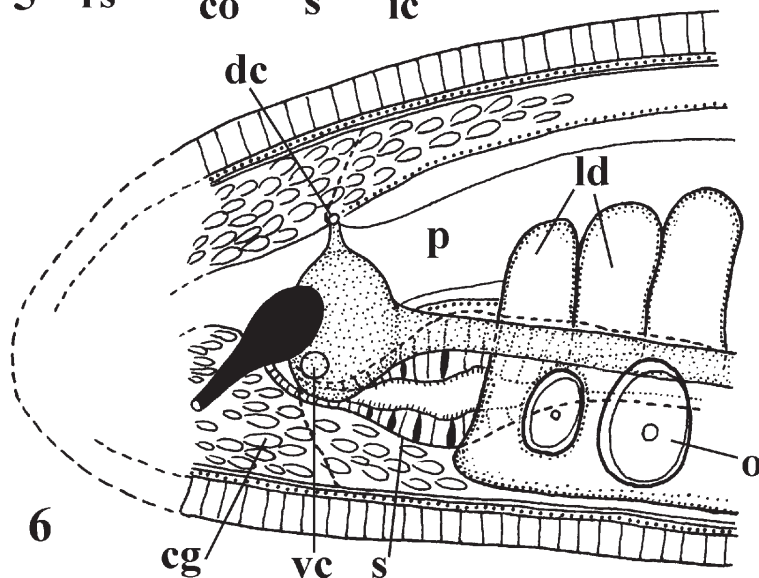
Syntypes. ♀, **Russia**, *Barents Sea*: Kola Bay, 1923 (P. Uschakov), two slides with incomplete (tip of head lacking) and partly discoloured transverse sections (no. 193); 1 specimen (slide with embedded proboscis), Kola Bay, Srednyaya Inlet, 10.VII.1923 (P. Uschakov). All material is kept at the Zoological Institute, St.Petersburg.

Description of internal morphology. Body wall: E = 44-88 μ m, D = 2-3 μ m, C = 2-4 μ m, L = 8-22 μ m (in stomach region); E = 38-58 μ m, D = 2 μ m, C = 2-3 μ m, L = 7-16 μ m (in midbody



Figs 5-6. *Tetrastemma*. Schemes showing structure of the anterior body end in lateral view. **5**, *T. kangauzi* sp. n.; **6**, *T. laminariae* Uschakov.

Abbreviations: *ad*, anterior diverticula of caecum; *b*, brain; *cg*, cephalic glands; *co*, cerebral organ; *dc*, dorsal commissure of brain; *ic*, intestinal caecum; *ld*, lateral diverticula of caecum; *ln*, lateral nerve cord; *o*, ovary; *p*, proboscis; *ps*, precerebral septum; *rs*, rhynchostomodeum; *s*, stomach; *vc*, ventral commissure of brain.



region). Dorsoventral muscles weakly developed. Precerebral septum open, weakly developed. Rhynchocoel extending to posterior end of body. Rhynchocoel wall with two muscle layers 3-9 μm thick combined. Diameter of anterior proboscis chamber from 60-88 μm (in stomach region) to 175-206 μm (in intestinal region). Proboscis with 10 nerves. Stylet apparatus: S = 60 μm , B = 67 μm , b = 23 μm . Basis light. Two stylet pouches with three accessory stylets in each. Esophagus 37-44 μm wide. Stomach up to 174 μm wide, with large dorsal fold; pylorus present. Intestinal caecum without unpaired anterior branch, with lateral diverticula. Anteriormost pair of caecal di-

verticula not reaching brain. Lateral nerve cords without accessory nerve. Cerebral organs about 100 μm in maximum diameter, opening externally ventrolaterally in front of precerebral septum and reaching to lateral sides of brain. Cephalic glands very well developed; ventral lobe reaching middle part of stomach and dorsal lobe reaching level of stomach-pylorus junction. Mature ovaries up to 260 μm in diameter, each containing a single large yolk-filled oocyte (possibly indicating lecithotrophic mode of development).

Discussion. Uschakov (1928) gave a brief description of *T. laminariae* without providing any

information on the digestive tract and cephalic glands. Sundberg (1979) redescribed *T. laminariae* on the basis of material from Iceland. The syntype of *T. laminariae* differs from Sundberg's specimens in the absence of anteriorly-directed diverticula of intestinal caecum and more developed cephalic glands behind the brain. It is possible that *T. laminariae* sensu Sundberg, 1979 represents a new species closely related to *T. laminariae* Uschakov, 1928. Both *T. laminariae* Uschakov and *T. laminariae* sensu Sundberg differ from all North Atlantic and Arctic species of the genus *Tetrastemma* in the well-developed cephalic glands and open precerebral septum.

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