

the rods (Fig. 1, C) about $110\ \mu$ in length, slightly curved and faintly bifurcated at each end.

The calcareous ring (Fig. 1, D) is rather broad. The large radial piece consists seemingly of three parts, the median cuspid part and a pair of antero-lateral wings, the anterior edge of which is projected out of each ends, especially markedly at the inner corner; with a conspicuous notch at the posterior one-third on each lateral side; concavity on the posterior margin insignificant. The interradial piece is considerably narrow, provided with a prominent median dent and posteriorly concave slightly. A single Polian vesicle is present; it is about 12 mm long, curved and issued from the left ventral part of the ring canal. As far as the present specimens were examined, no madreporic canal was detected. Two respiratory trees issued from a common base are extending anteriorly to the middle of the body, quite free from the plexus of pseudo-haemal vessels. Two branched genital tubes (Fig. 1, E) are present, one on each side of the dorsal mesentery. The gonads are mature, the eggs are $226\text{--}444\ \mu$ in diameter; $359\ \mu$ on an average. The longitudinal muscles form single bands.

Remarks: The calcareous ring of this new species resembles somewhat one of *P. aleutianus* Ohshima, but the present new species is devoid of any ossicle in the tentacles and the anal region. The ossicles in the large appendages of the anal region of this new species resemble somewhat those of *P. nudus* Ohshima, though the tentacles are devoid of any ossicle and the genital tubes are branched in the present new species.

Subgenus *Trachostichopus*

The body is slightly flattened. Appendages differ in size clearly between the ventro-lateral and other ambulacral rows. Ossicles are present around the anus and the body wall, especially around the gonopore.

Pseudostichopus (Trachostichopus) tachimaruae n. sp.

Japanese name: Chibi-waraji

(Fig. 2, A)

Holotype: 20 mm long and 8 mm wide male; locality around Shimo-Koshiki Island off the west coast of Kyushu Island, 400–450 m deep, collected by Imaoka on October 27, 1976; deposited at the Seto Marine Biological Laboratory, SMBL Type-311.

Paratypes: Two other specimens; 29 mm long and 13 mm wide, and 35 mm long and 13 mm wide respectively; collected and deposited the same as the holotype, SMBL Type-312.

The largest specimen is about 35 mm and 13 mm in length and width respectively. An optical section of the body is flattened as a whole, though the dorsal side is rather arched, while the ventral side is somewhat flattened. The mouth is situated ventrally, but slanting to the ventral surface at about 30° , near the anterior end of the body.

The anus is open on the ventral side at the bottom of the prominent vertical furrow. The natural appearance of the anal margin could not be confirmed as the margin had been more or less injured. The tentacles are entirely retracted, 19 in all and larger on the dorsal than of the ventral side; they are coloured whitish. Each tentacle is seemingly of the common shape in the genus, more or less shield shaped; no free tentacular ampulla is found.

The body surface except the tentacles is encrusted densely with sand, foraminiferan shells and especially with spicules of glass sponges. The tegument is slightly whitish but nearly transparent in alcohol. It is generally less than 1 mm in thickness, and of a moderate hardness. Any kinds of ridges or swellings are not formed on the body surface. The ambulacral appendages are very minute, about 1 mm long and 0.1–0.4 mm broad, and wholly indiscernible along the mid-ventral ambulacrum. The appendages are arranged in double rows along the dorsal ambulacrum, while in a

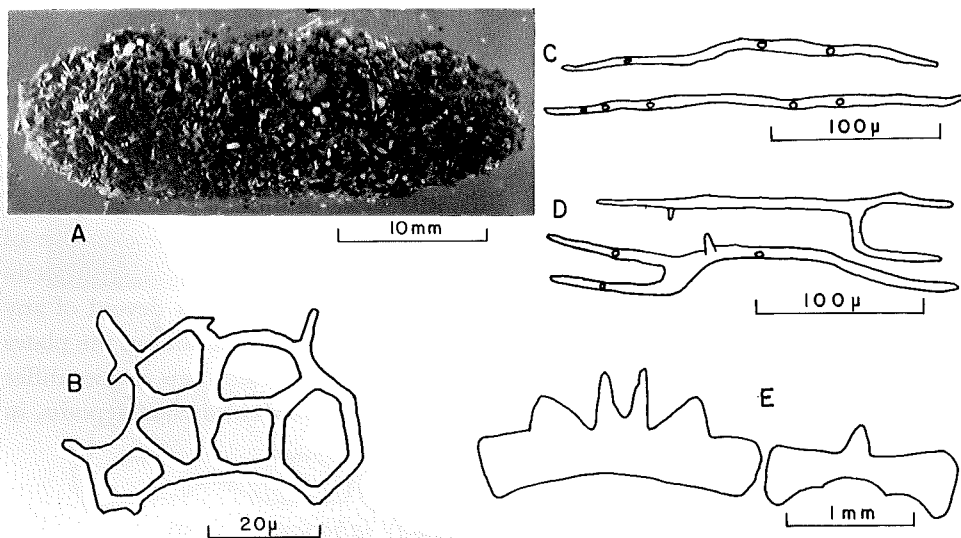


Fig. 2. *Pseudostichopus* (*Trachostichopus*) *tachimaruae* n. sp. A: Dorsal view. B: Perforated plate from around anus. C, D: Rods from a tentacle. E: Calcareous ring.

single row along the ventro-lateral ambulacrum. They are 35 and 11 along the right inner and outer rows and 31 and 13 along the left inner and outer rows respectively of the dorsal ambulacrum. Along the ventro-lateral ambulacrum, they are 57 and 53 on the right and left sides respectively. In every row, the appendages are crowded more densely near the posterior end. In size the difference between the dorsal ambulacral and ventro-lateral appendages is not clear. The interambulacral appendages, which are scattered on the body surface except the ventral surface, are also very small. Differentiation into the pedicels and papillae could not be confirmed in the present specimens; all the appendages were of a simple appearance without any kind of terminal structure.

The ossicles can be found exclusively around the anus and in the tentacles.

Only a few perforated plates are found in the tegument around the anus, they are about $55\ \mu$ in length and provided with 6 fenestra at the maximum, although these ossicles might be slightly injured (Fig. 2, B). The ossicles of the tentacles are found always paired when present, but wholly missing in some tentacles. Two kinds of them are distinguishable, the one (Fig. 2, C) is a simple rod with a few to several knobs, while the other (Fig. 2, D) is more or less forked at each end and further may be furnished in other parts with some minute projections; they are about $180\text{--}220\ \mu$ in length, $200\ \mu$ on an average.

The calcareous ring (Fig. 2, E) is rather narrow. The radial piece is provided on the anterior margin with a pair of smaller median dents and two large lateral ones, and slightly and gently concave on the posterior margin. The interradiial piece is a little narrower than the radial piece, provided with only a prominent median dent and concave more deeply in the posterior. A single Polian vesicle is present, about 2 mm long and roughly club-shaped with the distal end slightly swollen, and issued from the left ventral part of the ring canal. As far as the present specimens were concerned, no madreporic canal was detected. Two respiratory trees issued from a common base are extending anteriorly to the middle of the body and quite free from the plexus of pseudo-haemal vessels. Two unbranched genital tubes are present, one on each side of the dorsal mesentery. The gonads are mature in the holotype. The longitudinal muscles form single bands.

Remarks: The calcareous ring of this new species resembles somewhat one of *P. propinquus* Fisher, though in high the radial piece is much higher in this species than in the present new species. Further, the present new species is devoid of any ossicles in the ambulacral appendages and the genital tubes. In addition, the plates from the anal region and the rods from the tentacles of the present new species differ distinctly from those of any known species, that have the anal calcareous deposits, in their simplicity.

Pseudostichopus (Trachostichopus) japonensis n. sp.

Japanese name: Mukade-waraji

(Fig. 3, A)

Holotype: 35 mm male; locality the Japan Sea off the coast of Akita Prefecture, 200–300 m deep, collected by Dr. S. Nishimura in 1972–73; deposited at the Seto Marine Biological Laboratory, SMBL Type-313.

Paratypes: Four other specimens; 25, 34, 36 and 37 mm long respectively, collected and deposited the same as the holotype, SMBL Type-314.

As these five specimens had been preserved in alcohol, the condition was rather good, though the external appearances were somewhat changed. The largest specimen is about 37 mm in length. The mouth is situated ventrally near the anterior end of the body. The anus is open at the bottom of the shallow vertical furrow. The original appearance of the anal margin could not be confirmed as the margin had