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NEW SPECIES FROM THE ORDER CYCLOSTOMATA (BRYOZOA) FROM THE NORTHERN AND MIDDLE KURILE ISLANDS

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ABSTRACT

Six new species of cyclostome bryozoans are reported from the shelf of the northern and middle Kurile Islands. These include one new genus *Paulina* (type species *P. taylori*, sp. nov.), which is distinguished from *Stomatopora* Milne-Edwards, 1838 in having a basal gonozooid with a suborbicular shape, ultrastructure of frontal exterior wall with longitudinal stripes of calcification and unique ultrastructural fabric of coarse chevrons. The other five species are represented by *Crisiella chirpoiensis*, sp. nov., *Desmatelesia repens*, sp. nov., *Desmeplagioecia pastiliformis*, sp. nov., *Heteropora urupae*, sp. nov., and *Tubulipora duplicatocrenata*, sp. nov.

Key words: Bryozoa, Cyclostomata, epifauna, Kurile Islands, new taxa

РЕЗЮМЕ

Шесть новых видов циклостомных мшанок обнаружены в прибрежных водах северных и средних Курильских островов. Они относятся к одному новому роду: *Paulina* (типовой вид *P. taylori*, sp. nov.), который отличается от рода *Stomatopora* Milne-Edwards, 1838 формой полусферического базального гонозоида, ультраструктурой фронтальной наружной стенки с продольными известковыми ребрами и уникальной ультраструктурой известкового наружного слоя в виде грубого шеврона. Пять новых видов из других родов представлены *Crisiella chirpoiensis* sp. nov., *Desmatelesia repens*, sp. nov., *Desmeplagioecia pastiliformis*, sp. nov., *Heteropora urupae*, sp. nov. и *Tubulipora duplicatocrenata*, sp. nov.

Ключевые слова: Bryozoa, Cyclostomata, эпифауна, Курильские острова, новые таксоны

INTRODUCTION

The species composition of cyclostome bryozoans in the Far Eastern seas of the former USSR, in particular the Kurile Islands, has been insufficiently studied. Kussakin (1974) noted only one species – *Crisia eburnea* (L., 1758) in the intertidal zone of Urup Island, one of the middle Kurile Islands. The current paper describes one new genus with one new species and five more new species from the area of the northern and middle Kurile Islands, thereby contributing to a better understanding of bryozoan biodiversity in this region. Cyclostome diversity in the upper parts of the shelf of the Kurile Islands estimates the number of species as exceeding 20 (Gontar 2001). All these new species have been found in the epifauna of cheilostome bryozoans and hydrozoans, which probably accounts for the relatively small sizes

of cyclostome colonies, and, therefore, have not been studied before. Biogeographical analysis of the Kurile fauna of cheilostome Bryozoa has revealed (Gontar 1980, 1992, 2001) that the region of the middle Kurile Islands can be regarded as a centre of origin of new bryozoan species. All the new species of cyclostome bryozoans described below were found in the middle Kurile Islands, which corroborates this point of view. Noteworthy also is the discovery of the rare equatorial genus *Desmatelesia* in this region. Adequate understanding of the distribution of this taxon through geological time is yet to be obtained.

MATERIAL AND METHODS

Material was collected by the I, II, and III Expeditions of the Institute of the Marine Research of the Far Eastern Centre of the Russian Academy

of Sciences and Pacific Institute of the Fishery Research using standard diving methods and ships' gear (bottom trawl, dredge etc.). Specimens were studied with a light microscope and scanning electron microscopes.

At the first step of the research we used platinum coating specimens of each new species to prepare SEM photos. There were at least two specimens of each species accordingly, although we could not include the platinum coating specimens in the type series. *Desmeplagioecia pastiliformis*, sp. nov. is represented by compound colonies.

Type specimens of the new species are deposited in the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia (ZIN). Colonies are stored in ethanol.

The taxonomic order follows that of Taylor et al. (1995), Taylor and Weedon (2000), Weedon and Taylor (1996, 1997). Taxonomic diagnoses are provided for the genus and species described. Measurements are given for each species. The geographical distribution of the species is briefly noted.

SYSTEMATICS

Class Bryozoa Ehrenberg, 1831

Order Cyclostomata Busk, 1852

Family Oncousoeciidae Canu, 1918

Genus *Paulina*, gen. nov.

Type and only species. *Paulina taylori*, sp. nov.

Etymology. The genus is named after Dr. Paul D. Taylor, Department of Paleontology, The Natural History Museum, London, in order to sign his valuable contributions in studies of Cyclostomata. Besides that, Dr. Taylor provided SEM work on the type material also and rendered assistance in reviewing this manuscript.

Diagnosis. Colony adnate, uniserial, with dichotomous branching, with uniserial budding pattern, but near gonozooids with biserial budding pattern. Dichotomous branching creates an obtuse angle between two autozooids, sometimes almost 180°. Ancestrular zooid is smaller than others and has different shape. The postancestrular autozooid exceeds ancestrula in length, but it is shorter than two next autozooids in a first bifurcation. Autozooids cylindrical, fixed-walled, with many tiny pseudopores, the long erect peristome ending in a circular aperture, with high intersection angle of autozooids (more than 60° with

colony surface). Autozooid (average length 0.75 mm, average peristome diameter = 0.08 mm) is almost in two times less in comparison with *Stomatopora* autozooid. Frontal of erect peristome form transverse folds at its base. Frontal wall of autozooid adnate part looks like transverse lines in light microscope. Frontal exterior wall comprising longitudinal strips of calcification raised at their edges and with an ultrastructural fabric of coarse chevrons. Pseudopores distally tapered and occluded by sieve-like plates. Gonozooid basal, small, ovoidal in outline, exterior-walled, with many pseudopores; penetrated by a few autozooidal peristomes, which interrupt gonozooid roof integrity; oeciostome short, curved proximally with circular aperture smaller than in autozooids.

Comparison. Differences between genera *Paulina* and *Stomatopora* are the following (characters of *Stomatopora* are according to Taylor and Weedon [2000]): (1) Mean value of autozooidal apertural diameter in *Stomatopora* is 110–150 µm, it is less than 110 µm in *Paulina*. (2) Gonozooid is in peristomial position in *Stomatopora* and is in basal position in *Paulina*. (3) Gonozooid roof is unpierced by autozooidal peristomes in *Stomatopora*. *Paulina*, on the contrary, has a pierced gonozooid surrounded by autozooids. Weedon (1998) described two basic patterns of pseudopore distribution in a protoecium, when pseudopores either distributed in large numbers over the whole of the roof or situated only around the rim in a relatively small number. Distribution of protoecial pseudopores of *Paulina* follows the latter pattern.

Remarks. The uniserial colony-form of *Paulina* resembles *Stomatopora*. Basal gonozooids do not occur in *Stomatopora*, however: gonozooids are completely unknown in the type *S. dichotoma* (Lamouroux, 1821) and other Jurassic species of the genus, whereas gonozooids in the Recent *S. gingrina* (Harmelin, 1974) and in some other modern species (see Harmelin 1979) are born on the peristomes of autozooids. The raised edges of the strips of frontal wall calcification may be unique to the new genus; however, it is possible that similar structures also occur in *Anguisia jullieni* Ostrovsky, 1998 although it is not obvious from the relatively low magnification SEMs in Ostrovsky's paper (1998). The sieve-like plates occluding the pseudopores of *Paulina* have been found in only two other cyclostomate species (see below). Mean value of autozooidal apertural diameter in *Stomatopora* is 110–150 µm, but *Paulina* has mean value of this diameter less than 110 µm. Gonozooid roof integrity is unpierced by autozooidal

peristomes in *Stomatopora paulina*, on the contrary, has a pierced complex gonozooid which additionally is surrounded by autozooids.

***Paulina taylori*, sp. nov.**

(Figs. 1, 2)

Holotype. ZIN 1/48627, a mature colony, encrusting *Myriapora subgracilis variabilis* Androsova, 1958. Station 269, sample 667, Simushir Island, Pacific Coast, Cape Nerpochka, the middle Kurile Islands, stony ground, depth 30 m, 13 September 1970, coll. A.M. Murachveri.

Etymology. The species is named after Dr. Paul D. Taylor.

Description. Colony adnate, uniserial, branching by bifurcation (Fig. 1A). Autozooids have rugose exterior wall calcification by low magnification. The ancestrula consists of a protoecium (= primary disc) and a distal short erect tube, growing directly from the upper distal part of protoecium roof (Fig. 2C). Diameter of protoecium is about 0.15 mm; width of distal ancestrular tube is 0.15 mm. The protoecium is a gently domed, hemispherical structure addressed basally against the substrate (Fig. 1B). The skeletal ultrastructure of the protoecium exhibits a granular outer layer (Fig. 1C). Pseudopores (about 10 μ m long by about 4 μ m wide) are ovoidal and occur in a single irregular row, approximately parallel with the outer margin of the protoecium and about half-way up (Fig. 1C). The pseudopores have tapering

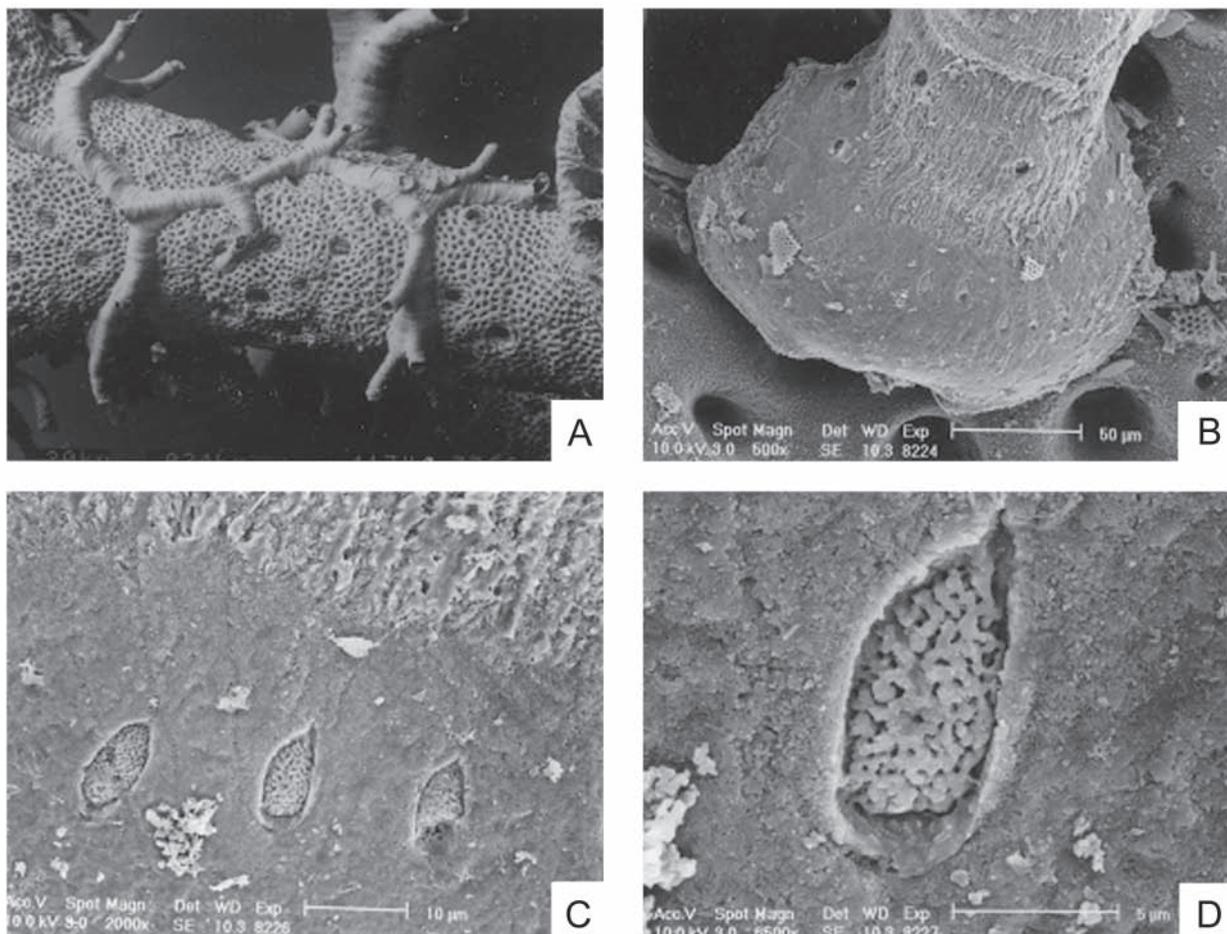


Fig. 1. *Paulina taylori*, sp. nov., ZIN 1/48627 (holotype): A – colony; B – protoecium; C – ultrastructure of protoecium; D – pseudopores of ancestrula.

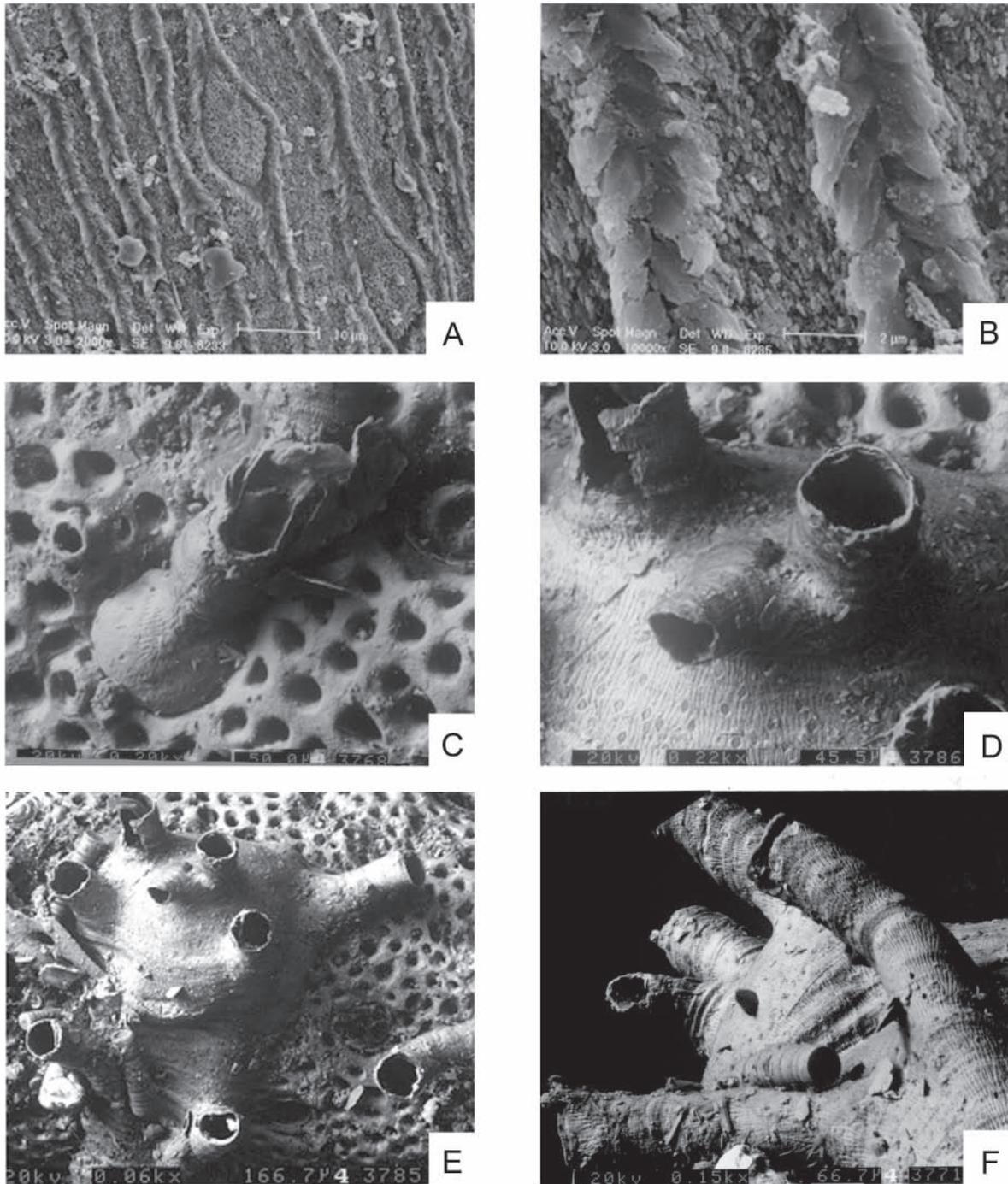


Fig. 2. *Paulina taylori*, sp. nov., ZIN 1/48627 (holotype): A – outer fabric; B – shevrons; C – distal tube; D–F – gonozooids.

distal ends and are aligned along strip boundaries. These pseudopores are occluded by characteristic sieve-like plates containing many tiny circular holes less than 0.2 μm in diameter (Fig. 1D). Uniserial branches consist of attached cylindrical autozooids, with erect peristomes and circular apertures; length of periancestrular zooid = 0.33 mm; average length of zooids succeeding bifurcations = 0.75 mm; average peristome diameter = 0.08 mm. Postprotoecial ancestrular walls and frontal walls of autozooids and gonozooids have an outer fabric of longitudinal strips parallel to growth direction (Fig. 2A). Strip boundaries are raised into ridges with a coarse surface fabric of flat, distally-pointing chevrons (Fig. 2B). These units are 2–3 μm wide and consist of two halves divided by a central groove. The lobes are imbricated, with distal lobes overlapping more proximal lobes. Lower lying areas between the chevron-like units consist of tiny rod- or wedge-shaped crystallites aligned parallel to wall growth direction. Internal lining of autozooidal wall comprises regular distally foliated fabric. Pseudopores taper distally and are occluded by porous plates. They are located along strip boundaries, causing splitting of the chevron ridges (Fig. 2A). Gonozooid exterior-walled, basal, ovoidal in outline, barely inflated, densely pseudoporous; ooeciostome short, curved proximally (Fig. 2D–F); ooeciopore circular, its diameter less than that of an autozooidal aperture. Colony in the area of gonozooid is partly multiserial.

Remarks. Autozooidal dimensions in this new species are almost half the size of those in the superficially similar *Stomatopora gingrina* (Jullien, 1882).

The distinctive pseudopores of the frontal walls warrant comment. They are occluded by characteristic sieve-like plates containing abundant, tiny circular holes less than 0.2 μm in diameter. Pseudopores with similar sieve-like occlusions have previously been recorded in only two cyclostomate species, both Pacific in distribution: the jointed erect species *Crisulipora occidentalis* Robertson, 1910 (see Weedon and Taylor 1998), and the encrusting tubuliporine *Tetrastomopora giselae* Moyano, 1991.

Tubuliporine cyclostomes typically have outer surfaces of exterior walls comprising parallel strips of fine-granular or planar spherulitic fabric (Weedon and Taylor 1997; Taylor and Weedon 2000). In contrast, the post-protoecial exterior walls of *P. taylori* have a distinctive outer fabric which has not been

noted previously. In *P. taylori* longitudinal strips of exterior wall calcification consist of two fabric types:

1. Marking the strip boundaries are slightly raised units consisting of flat plates arranged in a chevron-like or 'herring-bone' pattern, pointing distally. These units are 2–3 μm wide and consist of two halves divided by a central groove. Each half comprises an oblique array of lobe-shaped, flattened crystallites aligned at about 30–45° to the central groove. The lobes are imbricated, with distal lobes overlapping more proximal lobes.

2. Separating the chevron-like units are lower lying areas of tiny rod- or wedge-shaped crystallites aligned parallel to wall growth direction. Individual wedges are about 0.2–0.3 μm long and less than 0.1 μm wide. Similar wedge-shaped, granular fabrics form precursory skeletal layers in a number of cyclostomes.

The inner lining of the zooids consists of a foliated fabric which is predominantly distally imbricated; interfacial angles of the constituent crystallites are approximately 102°, which corresponds to interior fabric suite 2 (see Taylor and Weedon 2000). Similar fabrics are a characteristic feature of all rectangulates ('lichenoporids') and most cerioporines (Taylor et al. 1995; Weedon and Taylor 1996), but are less common in tubuliporines (Weedon and Taylor 1997; Taylor and Weedon 2000) like *Paulina*.

Previously (Gontar 2000, 2001), the new species was cited as *Vittatopora subrotunda* Gontar 2000, nomen nudum.

Distribution. Known only from the type locality, the middle Kurile Islands.

Family Tubuliporidae Johnston, 1838

Genus *Tubulipora* Lamarck, 1816

Tubulipora duplicatocrenata, sp. nov.

(Fig. 3)

Holotype. ZIN 1/48631, small mature colony; station 351, sample 909, Brouton Island, near Sivuchy Island, the middle Kurile Islands, rock ground with sandy clearings, depth 17–20 m, 19 September 1971, coll. V.I. Lukin.

Etymology. The species is named in reference to the connate pairs of autozooidal peristomes passing through the frontal wall of the gonozooid.

Differential diagnosis. The new species, at first sight, is similar to *Tubulipora flabellaris* (Fabricius,

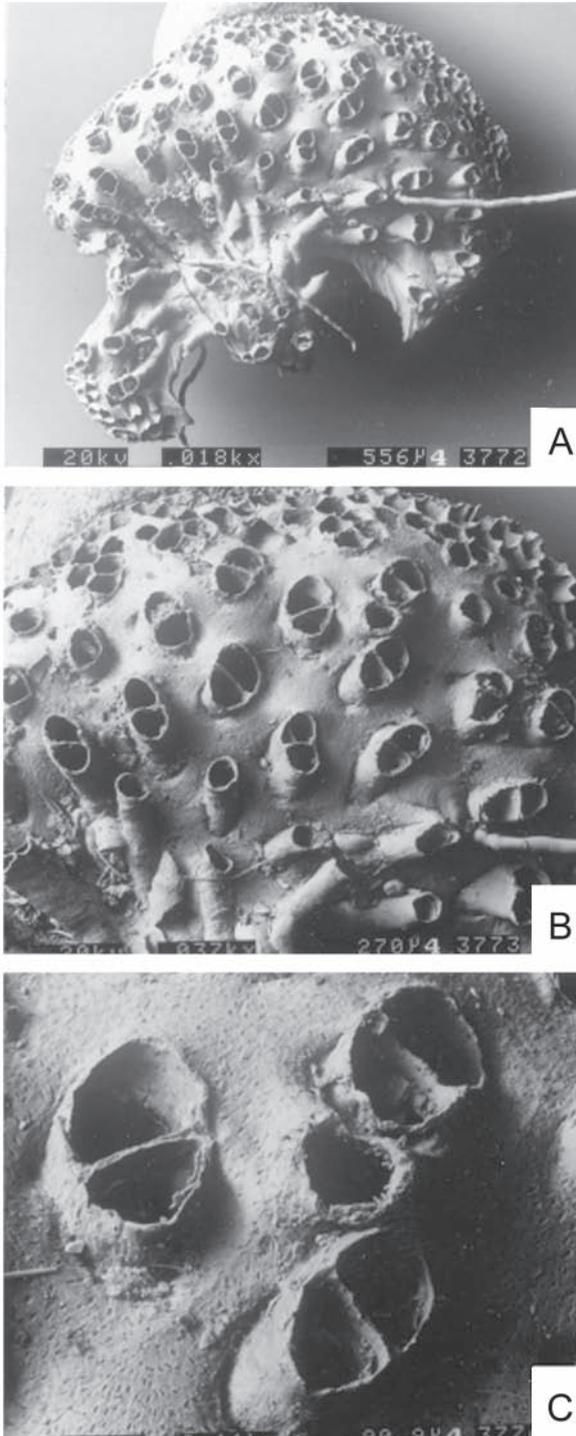


Fig. 3. *Tubulipora duplicatocrenata*, sp. nov., ZIN 1/48631 (holotype): A – colony; B – gonozooid; C – oeciostome.

1780). The species possess the following features, which is similar with *T. flabellaris*: (1) may has relatively small adnate lobe-shaped colonies; (2) upright ends of autozooids may be free or grouped; (3) autozooids moderately long. Nevertheless the differences between these two species are significant. *T. flabellaris* has groups of two-three autozooids, sometimes even longer rows, whereas autozooids in *T. duplicatocrenata* are arranged in connate pairs, or, sometimes single.

T. duplicatocrenata has fan-shaped arrangement of single autozooids in its initial part only This is not typical in colony of *T. flabellaris*. In the distal part of fertile colony of *T. flabellaris* rows of autozooids are directed radially and colony acquire pronounced fan-shaped appearance. It should be stressed also that Kluge (1962) did not mention a marginal budding zone in *T. flabellaris*.

Description. Colony (4.65 mm × 3.8 mm) encrusting, multiserial, initially fan-shaped and then dividing into two asymmetrical lobes, one having area approximately six times greater than the other in the holotype (Fig. 3A). Marginal budding zone produced two tiers of budding zooids. Initial part of colony small, approximately the same size as the lesser lobe. Ancestrula has been destroyed.

Autozooids isolated and irregularly arranged during early astogeny near the ancestrula but arranged in pairs during later astogeny when the colony surface of the larger lobe is mostly occupied by gonozooid (Fig. 3B). There are two pairs of connate autozooids in the lesser lobe of the colony. Autozooids fixed-walled, long, cylindrical, with long exterior-walled peristomes and rare pseudopores; inclined at a high angle to the colony surface; isolated apertures in initial part of colony elliptical; paired apertures semi elliptical (0.27 mm × 0.16 mm; 0.16 mm × 0.16 mm) penetrating gonozooid and with peristomes slightly raised above the its frontal wall and distally inclined. Gonozooid extensive, frontal wall inflated, with dense oval pseudopores, pierced by paired autozooidal peristomes; preserved oeciostome short, located between two connate pairs of peristomes (Fig. 3C); oeciopore smaller than an autozooidal aperture, subcircular, mural spines visible within.

Remarks. This new species differs from *T. flabellaris* in having paired autozooidal peristomes passing through the roof of the inflated gonozooid. *T. flabellaris* on the contrary has a gonozooid in the form of elongated or lobed sacks as was described by

Kluge (1962). Such gonozooids may fuse to form a wide roof surrounding separate zooids or groups of zooids. Ooeciostome is a laterally compressed long tube, straight or weakly curved, freely arranged between two neighbouring autozooids or adjoining the nearest autozooid; ooeciopore slit-shaped. In *T. duplicatocrenata*, ooeciostome probably short, arranged between two pairs of connate autozooids; ooeciopore subcircular, mural spines visible within. Mural spines “are common in relatively few tubuliporine species (cf. lichenopoid and cerioporine cyclostomes)” (Weedon and Taylor 1997) and their presence in this species is a notable feature.

According to characters given by Taylor and Weedon (2000) for the genus *Tubulipora* (low intersection angle of autozooids with colony surface, unpierced gonozooid roof integrity [unpierced by autozooidal peristomes], terminal ooeciostome location and long ooeciostome length) it can be noted that all of these characters are absent in *T. duplicatocrenata*.

Distribution. Known only from the type locality, the middle Kurile Islands.

Family Diastoporidae Gregory, 1899

Род *Desmeplagioecia* Canu et Bassler, 1920

Desmeplagioecia pastiliformae, sp. nov.

(Fig. 4)

Holotype. ZIN 1/48648, a small mature colony; station 269, sample 678, Simushir Island, Pacific Coast, Cape Nerpochka, the middle Kurile Islands, stony ground, depth 30 m, 13 September 1970, coll. A.M. Murachveri.

Etymology. The species is named in reference to the shape of the colony: *pastiliformae* (Latin) means pastil-shaped.

Differential diagnosis. At first sight, the type and only colony of *D. pastiliformae* is very similar to *Berenicea lineata* (MacGillivray, 1885) as depicted by Harmer (1915). More careful examination shows, however, many differences between this Australian species and *D. pastiliformae*. *B. lineata* was made the type species of *Desmeplagioecia* by Canu and Bassler (1920). Dried colonies of *D. lineata* often retain a purple pigmentation, a feature which is not present in *Desmeplagioecia pastiliformis*. Although *D. pastiliformis* has zooids arranged in uniserial rows similar *Desmeplagioecia*, although the new rows do not arise by intercalation as in the *D. lineata*. The zooids ar-

ranged in rows in *D. pastiliformis* have shapes very similar to those of *Plagioecia patina* (Lamarck, 1816) but are unlike *Desmeplagioecia*. MacGillivray (1885) wrote that in *D. lineata* the sides of the zooidal rows are finely punctate and transversely ridged. These features are not evident in *D. pastiliformae*. The distal fringe of basal lamina in *D. pastiliformae* is narrower than in *D. lineata*. As Harmer (1915) mentioned, the inflated part of the ovicell (gonozooid) in *D. lineata* originates very abruptly, a feature which is not characteristic of *D. pastiliformae*. He noted also that the ovicells (gonozooids) form a ring in *D. lineata*; this structure is absent in *D. pastiliformae*. The gonozooid of *D. pastiliformae* is not abruptly inflated and has an ooeciostome similar to that of *Desmeplagioecia amphorae* Harmelin, 1974. Taylor and Gordon (2001) described the gonozooid of *D. lineata* as transversely elongate, interrupting and spanning about four fascicles in width, with a terminal ooeciostome and a transversely elongate ooeciopore. These features are not observed in *D. pastiliformae*.

Description. Colony unilamellar, small, encrusting or free, oval in outline; tablet-shaped (0.75 mm × 0.575 mm) (Fig. 4A); budding zone thick; common bud comprising polygonal zooidal tubes of relatively constant size; basal lamina extending as a narrow and thin rim around outer growing edge bearing widely-spaced pustules and crossed for most of its width by low septa (incipient vertical interior walls) (Fig. 4B); underside of holotype bears concentric growth lines and evidence of breakage from an earlier subcolony. There is a small subcolony on the frontal surface of the colony close to the edge. Initial colony, from which the colony in question had budded but not separated, is of smaller size; attached to it is a colony of the cheilostome *Corynoporella tenuis* (Hincks, 1888), consisting of several autozooids. Fixed-walled autozooids in the central zone of the colony of *D. pastiliformae* are commonly arranged irregularly, with isolated apertures only slightly prominent above the colony surface. There are concentric lines between them. Peripheral autozooids have apertures arranged in longitudinal, non-bifurcating rows and are more prominent (Fig. 4A). Pseudopores circular, small, partly filled by radial spines (Fig. 4D). Autozooids central zone closed by pseudoporous recessed terminal diaphragms; similar diaphragms occasionally close apertures of peripheral zone autozooids, and the apertures of autozooids in peripheral subcolonies. Polygonal kenozooids sometimes present between

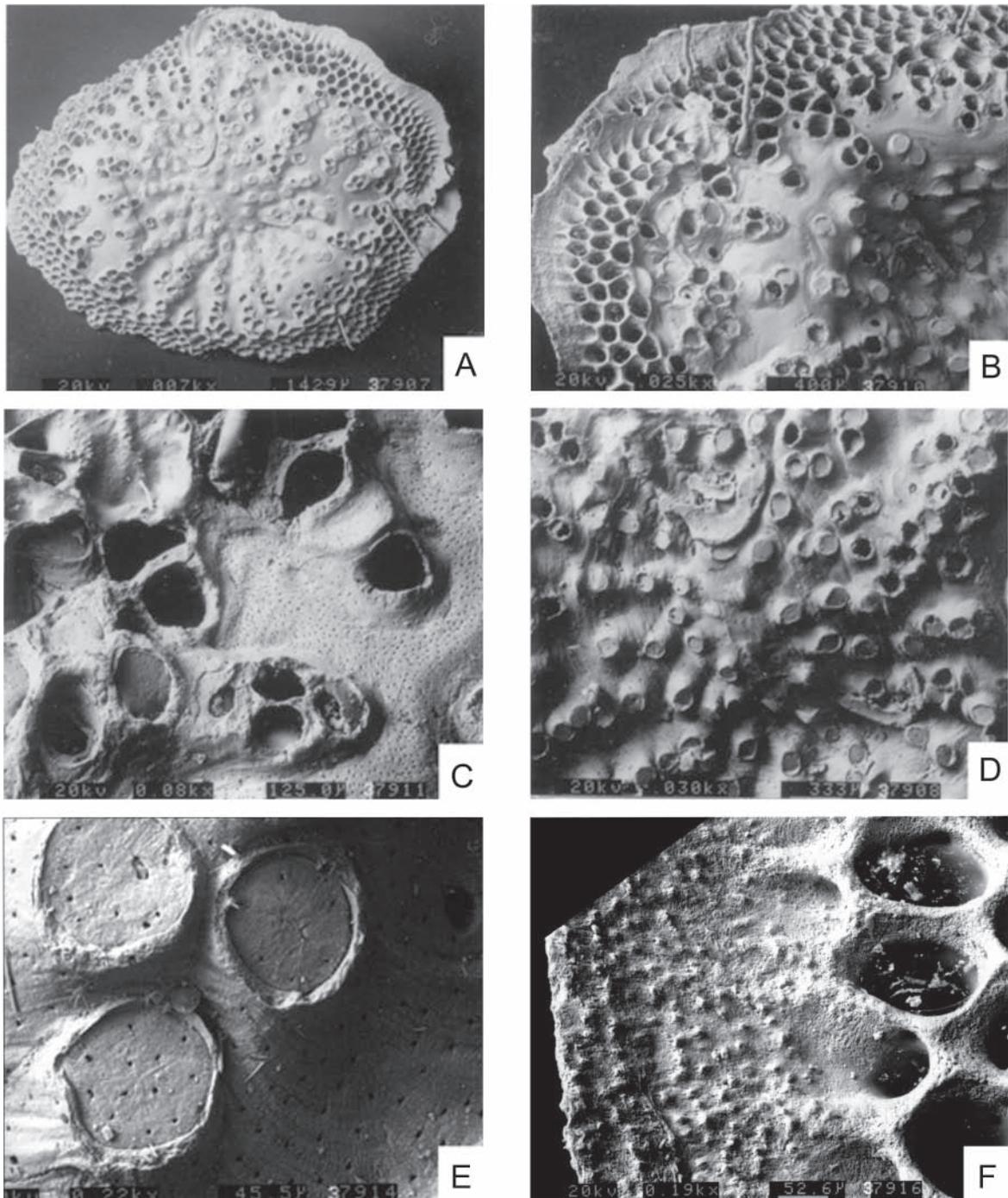


Fig. 4. *Desmeplagioecia pastiliformis*, sp. nov., ZIN 1/48648 (holotype): A – colony; B – common bud; C – oeciostome; D – fix-walled autozooids; E – pseudopores; F – common bud segment.

autozooids, closed by pseudoporous terminal diaphragms. Three brood chambers visible near edge of type colony, each branching between the zooidal rows and having a pseudoporous flat roof (Fig. 4B, C). Ooeciopore large, circular; ooeciostome short, not adnate to an autozooidal peristome (Fig. 4C).

Ultrastructure of exposed basal lamina is represented by distally-imbricated foliated fabric (see Taylor and Weedon 2000).

Remarks. Compared with the type species of *Liripora*, *L. fasciculata* (MacGillivray, 1885), *D. pastiliformae* shows many differences. The only specimen of the former species available to MacGillivray had zooids arranged in distinct, elevated, radiating ridges, very much enlarged and prominent at the edge of the colony. The zooids are arranged in distinct, radiating bundles, very prominent and narrow proximally, but becoming broader and partially free at their extremities. The outer parts of the colony are represented by apertures of numerous, close-packed zooids opening in clusters or in a vertical single or double series. The colony surface between the ridges is punctate and transversely rugose. MacGillivray (1885) did not describe a gonozooid in *L. fasciculata*. He noted a similarity with *Fasciculipora* in having distinct bundles of zooids opening at the colony edge. Taylor and Gordon (2001) gave a revised diagnosis of *L. fasciculata*: *Liripora* with very few autozooids opening on frontal colony surface proximal of the growing edge; apertures becoming aligned into raised, biserial fascicles in proximal part of common bud; continuous kenozooidal space at the growing edge; strongly distally concave transverse ridges on colony surface between autozooids. All of the above-mentioned features are not characteristic of *D. pastiliformae*: this species lacks fascicles, transversely rugose surface between the ridges, and a continuous kenozooidal space at the growing edge. Secondary subcolonies observed in *D. pastiliformae* have no equivalents in *Liripora*. Therefore, *D. pastiliformae* is not considered to be closely related to *L. fasciculata*.

Distribution. Known only from the type locality, the middle Kurile Islands.

Genus *Desmatelesia* Canu et Lecointre, 1933

Desmatelesia repens, sp. nov.

(Fig. 5)

Holotype. ZIN 1/48690, a mature colony; station 337, sample 894, Onkotan Island, Cape Angibi,

middle Kurile Islands, depth 30 m, rocky and pebble ground, 12 September 1971, coll. Skachkov.

Paratype. ZIN 2/48691, colony from the type locality.

Etymology. The species name is from *repens* (Latin) for growth form of the colony.

Differential diagnosis. The new species differs from the only extant species in this genus *D. coerulea* (Canu et Bassler, 1929), in the color of the colony, larger size of the zooids, greater distances between fascicles, and a greater number of autozooids in one fascicle to 5–6. Canu and Bassler (1929) also did not describe a marginal budding zone in *D. coerulea*, and a budding zone is not visible in the photographs given by them. According to Dr. Taylor, who has made a comparison between the holotype of *D. repens* and Canu and Bassler's types of *D. coerulea*, the latter species has a branching colony which is narrowly multiserial (oligoserial). In addition, the shape of the ooeciopore in *D. coerulea* is seemingly crescentic, although it has evidently been artificially enlarged by breakage so that the original form is uncertain, whereas *D. repens* is multiserial and has circular ooeciopore.

Description. Colonies are white or yellow in color, encrusting, compact, strongly calcified, of rounded-rectangular shape, with wide branches, long or short, flabellate and lobed, with a marginal budding zone, situated on distal side of the rectangle and are comprising 5–6 tiers of budding zooids (Fig. 5A, B, D). Sizes of their openings range from 0.2–0.25 mm, sometimes 0.35 mm. No data available about ancestrula. Autozooids situated closest to the budding zone are sometimes in the shape of tall tubes (with high intersection angle of autozooids more than 60° with colony surface), usually isolated from each other and with numerous pseudopores. Sometimes they form tall fascicles of 5–6 autozooids. More proximal autozooidal apertures either isolated and arranged irregularly, or often grouped in uniserial or biserial fascicles of 2 to 6 autozooids. Fascicles can be arranged irregularly. Autozooidal peristomes in fascicles are very short, thin and orbicular. Peristome diameter ranges from 0.1–0.15 mm, and the distance between neighboring fascicles ranges from 0.25–0.45 mm. There are sometimes 1 or 2 autozooids arranged apart from a fascicle, but in the same line. The depressed surface between fascicles looks like a deep U-shaped groove. If there are two adjoining longitudinal lobes in a colony, pseudoporous kenozooidal areas are situated between autozooids of neighboring, almost touching fascicles

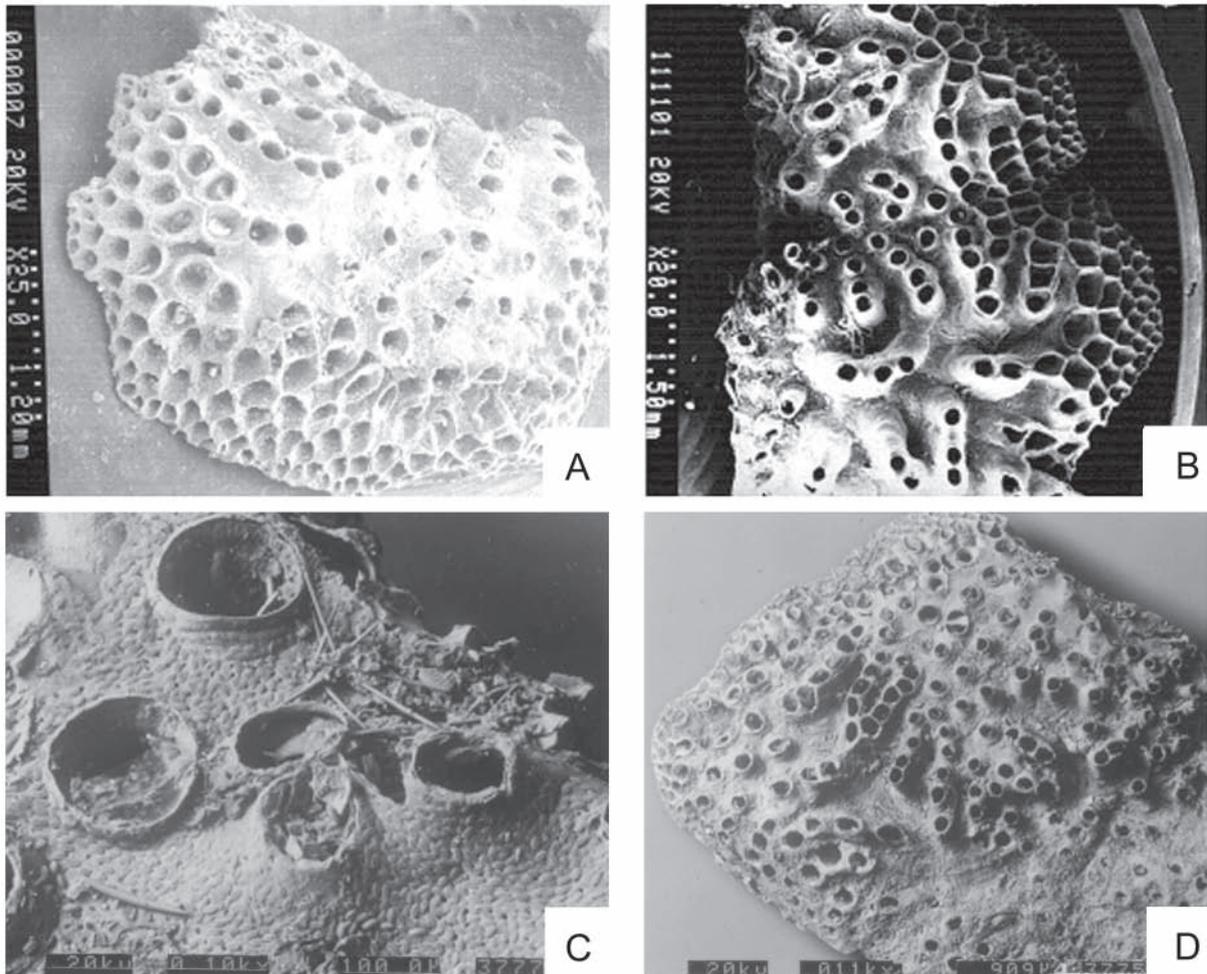


Fig. 5. *Desmatelesia repens*, sp. nov., ZIN 1/48690 (holotype): A, B, D – colonies; C – oeciostome.

of these adjoining colony lobes. In such area there are no grooves between fascicles.

When a colony has two adjoining lobes, some fascicles are arranged in such a way that two longitudinal grooves are arranged parallel to growth direction of colony, each in one lobe. Fascicles are disposed along the axes of the grooves and some fascicles are situated opposite each other at an angle of approximately 45 degrees to the axis in some parts of the colonies (Fig. 5B).

The gonozooid is small, irregular, convex, perforated by the fascicles, situated in the distal part of the colony. Peristome diameter in these fascicles ranges from 0.15–0.20 mm. The oeciostome is small, circular and slightly salient, and situated mediolaterally, close to an autozooidal peristome (Fig. 5C).

Frontal surface of the holotype is covered by diatoms. Basal surface of the colony is flat, with fan-shaped longitudinal striation. If there are two adjoining lobes in the colony, their fan-shaped longitudinal striations meet to mark the border between these lobes on the basal surface.

Remarks. Extant representatives of the genus *Desmatelesia* are very rare. The only recent species in this genus has been described by Canu and Bassler (1929) initially as *Tubulipora coerulea* Canu et Bassler, 1929 from the equatorial zone off the Sulu Archipelago, Philippines. In their comments to the genus *Tubulipora* they noted “In 1920 we considered the grouping of the tubes in fascicles as a generic feature and used the prefix *Desme* to indicate this character. We were much influenced by the old classification and by the ideas of

Waters. We are now less positive because in comparing the fasciculated species with the nonfasciculated species we find the ovicells are perfectly identical. However, if the grouping in fascicles is an important and generic character it will be perhaps useful to separate the nonfasciculated Tubuliporas and to resurrect the old genus *Criserpia* established by Milne Edwards in 1838 had created for them” (p. 540).

Later, Canu and Lecointre (1933) established a new genus for seven fossil species from the Miocene, France, with genotype, *Desmatelysia (Tubulipora) coerulea* Canu et Bassler, 1929 (the Philippines). They described this genus as having “ovicell globose and perforated by tubes and fascicles; oocystome is a small tube, always situated prior to two tubes of fascicle, which is situated nearby; oocystopore oriented as the tube. Tubes are situated on the medial axis of lobes of zooaria in fascicles, which are regular and opposed, but incomplete, each fascicle terminates laterally by isolated tubes.

The genus differs from *Desmediaperoecia* Canu et Bassler, 1920, in the lack of pores between fascicles. It is equatorial”. (Translated from French by the author).

Two modern species *D. coerulea* and *D. repens* possess similar characters. (1) The colony creeps over substrata. (2) They formed of wide branches, flabellate and lobed. (3) The autozooids are sometimes isolated and often grouped in uniserial fascicles, occasionally opposite. (4) Colonies choose the most unexpected places and creep. As Canu and Bassler (1929, p. 541) wrote: “This is a true parasite for it can live only on the debris of other animals. This one lived in waters of little depth. Sea bottoms covered by organic debris and rich in diatoms were necessary for its life”. It should be stressed that colony of *D. repens* covered by diatoms as well.

Distribution. Known only from the type locality, the middle Kurile Islands.

Family Crisiidae Johnston, 1847

Genus *Crisiella* Borg, 1924

Crisiella chirpoiensis, sp. nov.

(Fig. 6)

Holotype. ZIN 1/48628, a small mature colony; station 228, sample 541, Chirpoy Island, western part of Peschanaya Bay, the middle Kurile Islands, rocky ground, depth 5m, 4 September 1970, coll. A.M. Murachveri.

Paratypes. ZIN 2/48629 and 3/48630, colonies; station 266, sample 666, Simushir Island, Pacific Coast, Cape Rolling, the middle Kurile Islands, rocky ground, depth 10 m, 11 September 1970, coll. A.M. Murachveri.

Etymology. The species name refers to the name of the type locality.

Differential diagnosis. The new species has some features in common with *C. diversa* (Kluge, 1955): colonies of both species are small, slender, and rarely branching; branches are thin; zooids are connate, the aperture facing frontally; basis rami are short. Differences between the two species consist in the following: (1) some early internodes of *C. chirpoiensis* near the colony base consist of one zooid only, whereas in *C. diversa* only the first internode consists of one zooid; (2) fertile internodes of *C. chirpoiensis* consist of 7–8 autozooids, but 9–12 autozooids in *C. diversa*; and (3) the gonozooid of *C. chirpoiensis* originates between autozooids 1–2 in internode, whereas in *C. diversa* it originates between autozooids 2–7 (see also Gontar, 2000).

Description. Colonies small (height of holotype 5.25 mm, width in the upper part of colony 3.75 mm), delicate, slender, rarely branching, maturing early (Fig. 6A, B). Branches thin, consisting of autozooids with irregular pseudopores in their wall. Autozooids fixed-walled, connate almost to their distal tips which turn sharply, the aperture facing frontally. The length of autozooids near the base of the colony is 1 mm, increasing to 2 mm distally. Autozooid diameter is 0.1 mm. Internodes connected by brown nodes (joints). Articulation surface has a smooth narrow ring diaphragm (Fig. 5D).

Early internodes near the colony base consist of one autozooid only, later internodes comprise 2–3 autozooids. Possibly the first internode is represented by the ancestrula distal tube and its basal part remained attached to substratum.

Beginning from the third internode, branches diverge on both sides of the colony. Basis rami short, approximately two times less than the autozooid. The fertile internode as a rule is situated at the very end of a branch; it is larger than the other sterile internodes and consists of 7–8 autozooids attached in a fan-shaped mode to one gonozooid on its basal side. Gonozooid originates between autozooids 1 and 2. Gonozooid shape is reminiscent of an inverted bell with flat roof, densely pseudoporous (Fig. 5C). Gonozooid is twisted around its axis, long (1.45 mm),

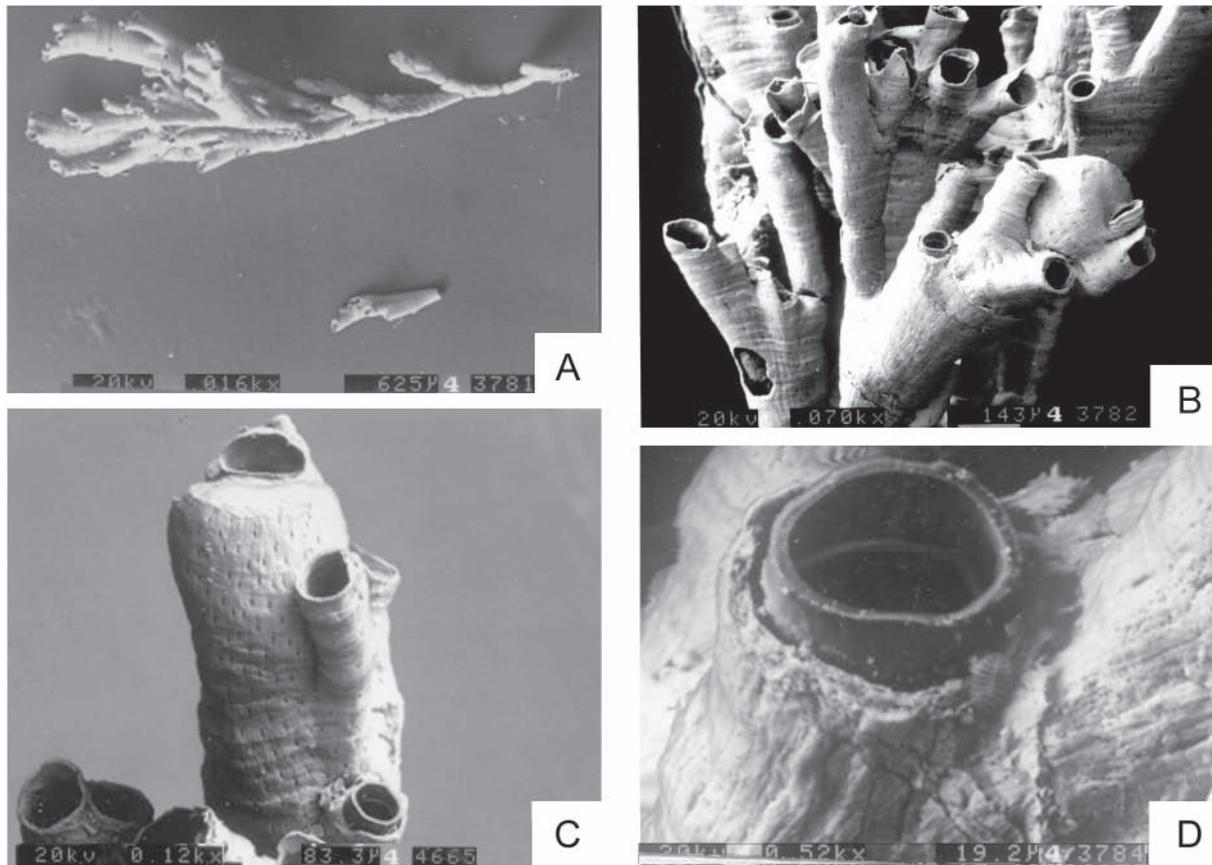


Fig. 6. *Crisiella chirpoiensis*, sp. nov., ZIN 1/48628 (holotype): A, B – colony; C – gonozooid; D – chitinous node.

narrow proximally (0.1 mm), swollen distally (0.35 mm) before narrowing again (0.30 mm). The oeciostome has the shape of a short, curved tube with a transversely oval oeciopore (0.1mm wide, 0.05 mm high) opening upwards (Fig. 5B, C); mural spines visible within. Stunted gonozooids occur in some internodes.

At high magnification the outer surface of the frontal wall of autozooids and gonozooid display longitudinal flat-lying strips of calcification bounded by fine grooves with aligned slit-like pseudopores, situated at boundaries between strips of calcification.

Remarks. According to Borg (1926), a forking of the fertile internode in connection with torsion around its own axis gives rise to the very characteristic umbellate arrangement of the autozooids surrounding the gonozooids in *Crisiella*. Gonozooids usually replace the third autozooid in the internode,

and the whole of their basal sides are adnate to the neighbouring autozooids. Like the autozooids, gonozooids are very long. The boundary between the proximal and middle portion of the gonozooids is indistinct. The oeciostome, which narrows distally, would have been bent sharply upwards had not the gonozooid been turned on its axis. If the torsion angle is 180° , the oeciopore is oriented in the opposite direction to that which otherwise would have been the case. The oeciopore is transversely oval in shape. Borg mentioned that in *Crisiella producta* (Smitt, 1865) it is not uncommon to observe stunted gonozooids scattered here and there in fertile internodes. All of these features are also seen in *C. chirpoiensis* and permit the new species to be placed in *Crisiella* rather than the commoner genus *Crisia* (Gontar 2000).

Distribution. Known only from the middle Kurile Islands.

Family Cerioporidae Busk, 1859

Genus *Heteropora* de Blainville, 1830

***Heteropora urupae*, sp. nov.**

(Figs. 7, 8)

Holotype. ZIN 1/48632, a small mature colony; station 294, sample 754, Urup Island, Urup Strait, Tair Islands, Third Tair Island, middle Kurile Islands, rocky ground, depth 20 m, 18 September 1970, coll. P.G. Krainyuk.

Paratypes. ZIN 2/48633–3/48634, colony from the type locality. ZIN 4/48635–5/48636, colonies,

station 325, sample 857, Makanrushi Island, Vecherny Cape, rocky ground, depth 20 m, 10 September 1971, coll. B.I. Sirenko; 6/48637–7/48638, colonies, the station 323, sample 848, Makanrushi Island, Vecherny Cape, rocky ground, depth 10 m, 10 September 1971, coll. B.I. Sirenko; 8/48639, colony, the station 341, sample 898, Ekarma Island, Okrugly Cape, rocky ground, depth 20m, 16 September 1971, coll. B.I. Sirenko; 9/48640, colony, the station 99, sample 83, Urup island, Klyuchevoy Cape, depth 10 m, 12 September 1969, Coll. Glushenko; 10/48641, colony, station 325, sample 857, Makanrushi Island,

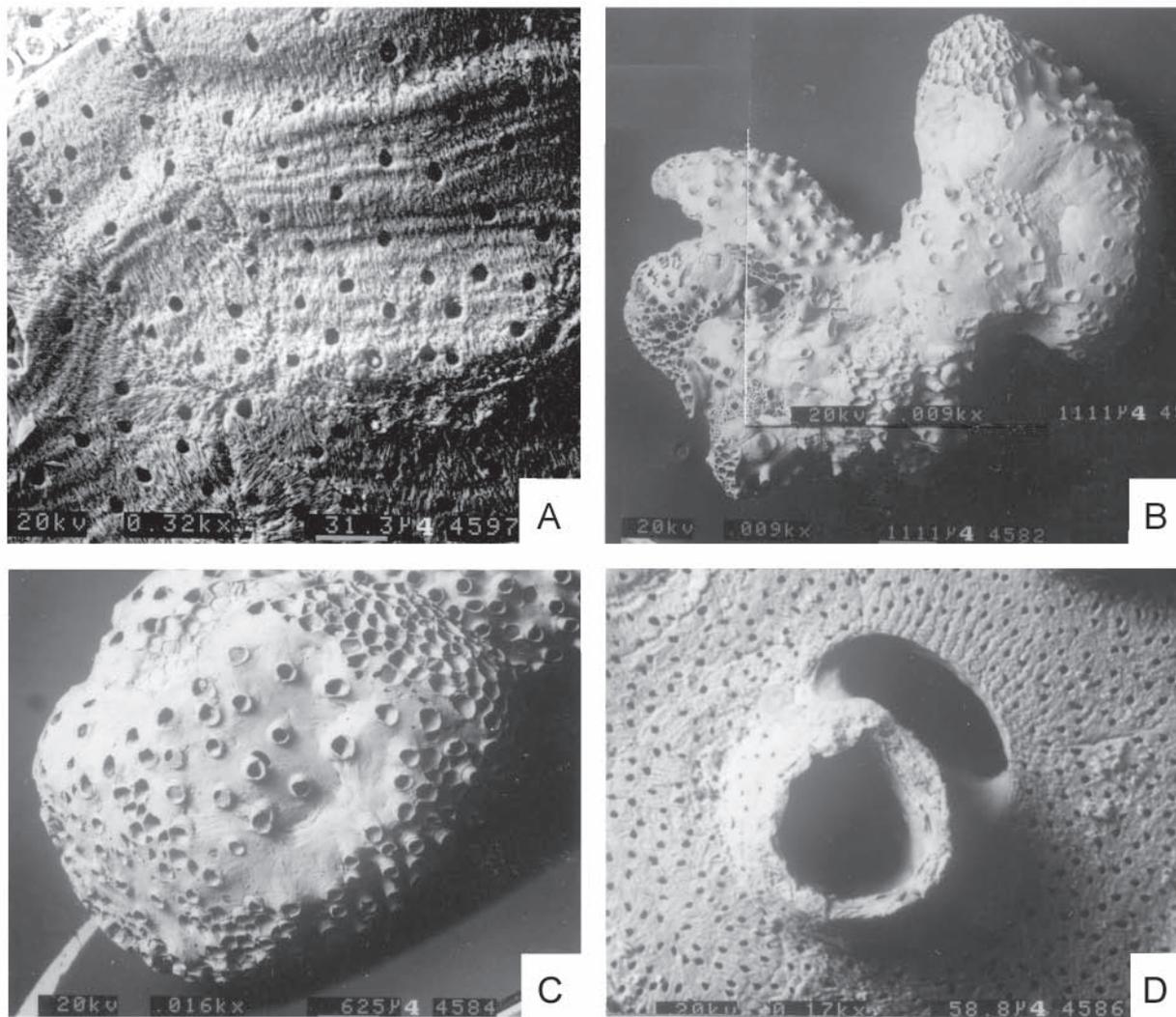


Fig. 7. *Heteropora urupae*, sp. nov., ZIN 1/48632 (holotype): A – planar spherulitic fabric of “stalk” zooid; B – colony; C – upper surface of capitulum; D – oeciostome.

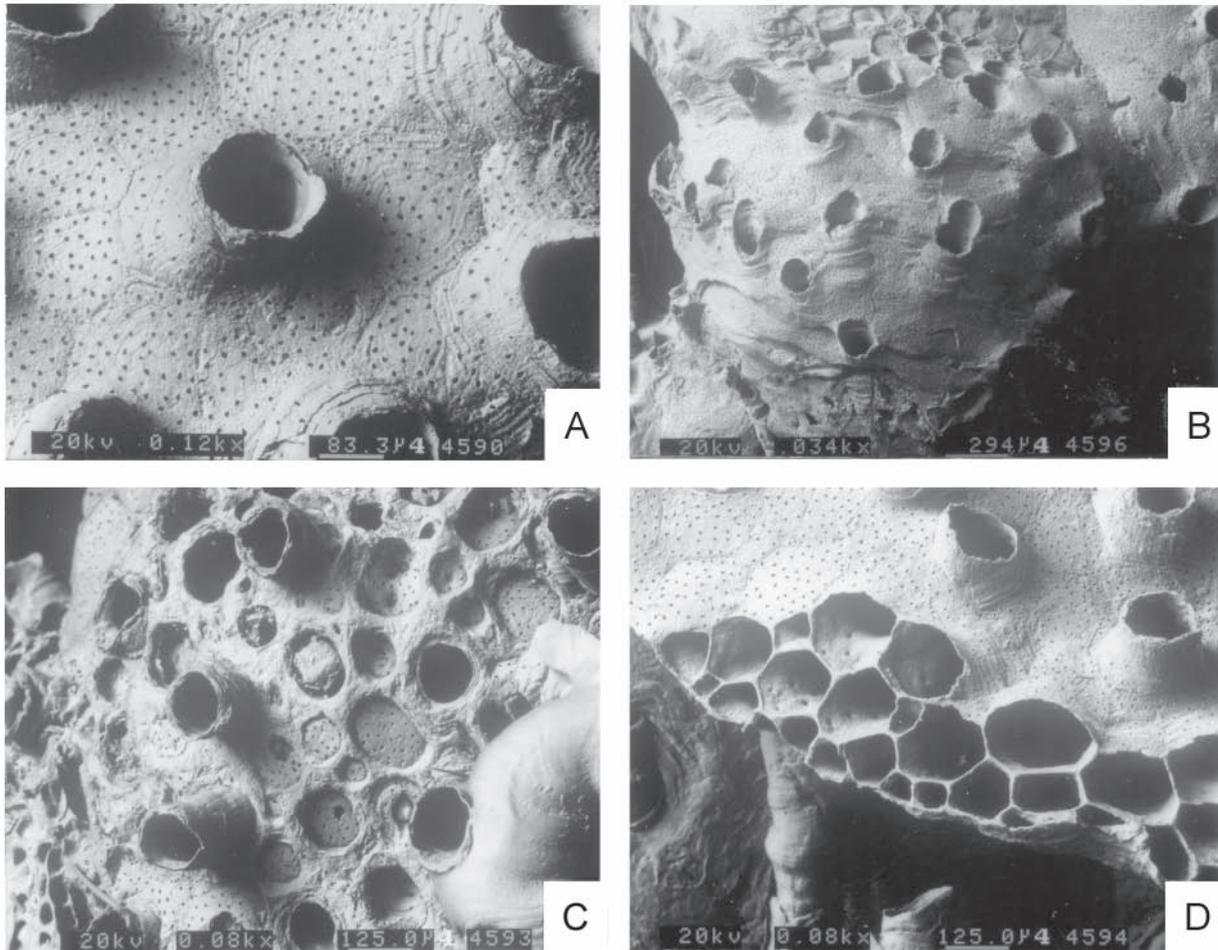


Fig. 8. *Heteropora urupae*, sp. nov., ZIN 1/48632 (holotype): A – kenozooids; B – “stalk” zooids; C – recessed terminal diaphragms; D – polygonal budding autozooids.

Vecherny Cape, rocky ground, depth 20 m, 10 September 1971, Coll. B.I. Sirenko; 11/48642, colony, station 103, sample 136, Urup Island, Temny Cape, rocky ground, depth 15 m, 18 September 1969, coll. Glushenko; 12/48643, colony, station 228, sample 541, Chirpoy Island, Peschanaya Bay, rocky ground, depth 5m, 4 September 1970, coll. A.M. Murachveri; 13/48644, colony, station 347, sample 904, Ketoy Island, Okrugly Cape, rocky ground, depth 24–30m, 18 September 1971, coll. V.I. Lukin; 14/48645, colony, station 319, sample 835, Makanrushi Island, rocky ground, depth 10 m, 9 September 1971, coll. B.I. Sirenko; 15/48646, colony, station 226, sample 535, Chirpoy Island, Lapka Peninsula, stony ground, depth 15m, 4 September 1970, coll. A.M. Murachveri; 16/48647, station 186, sample 435, Atlasov Island,

Vladimir Peninsula, boulder ground, depth 7–10m, 11 August 1970, coll. V.I. Lukin.

Etymology. The species name refers to the name of the type locality.

Differential diagnosis. The new species differs from the related species *H. pelliculata* Waters, 1879 in the size and shape of the colony. Colonies of *H. urupae* were found as fouling on erect cheilostomes and hydrozoans, and are unusually minute and capitulate, about 6.0×3.0 mm. By contrast, colonies of *H. pelliculata* reach 5–7 cm in height and 10–12 cm in width and are profusely branched. The latter species has autozooids and kenozooids of different size compared with *H. urupae*; the kenozooids are smaller and have more angular apertures closed by porous calcareous diaphragms. Autozooidal apertures are

arranged in long bands often extending obliquely across the surfaces of the branches, a feature not seen in *H. urupae* because of the capitulate colony. In *H. urupae* apertures of autozooids and kenozooids often have the same size and are sometimes closed by terminal diaphragms. In *H. pelliculata* brood chambers take the form of a capitulum at the top of a branch, or the branch may have a widening, as described by Kluge (1962). Neither Kluge (1962) nor Borg (1933) described the oeciostome in *H. pelliculata*; that of *H. urupae* resembles those observed in other species of this genus. Finally, autozooidal aperture diameters are much larger in this minute new species in comparison with those in 3 other species of the genus *Heteropora* given by Taylor and Weedon (2000).

Description. Colony small, white, capitulate, stud-shaped, consisting of two capitula in the holotype which is 6 mm high, 3 mm wide basally and 6 mm wide distally (Fig. 7B). The colony is attached by a wide and flat base to the substratum. No data available about ancestrula. The extended part of the colony is situated on a narrow stem with wide capitula approximately in the middle of the base. Lateral surfaces of the colony are comparatively smooth, or sometimes bear circular or oval openings of stalk autozooids with areas of kenozooids between them (Fig. 8B). Frontal exterior wall ultrastructure of stalk autozooids is represented by planar spherulitic fabric (Fig. 7A). Upper surface of capitula is uneven (Fig. 7C). Maculae are absent. On the upper surface of the colony, autozooids free-walled with large, circular or polygonal apertures raised above the surrounding polygonal kenozooids which have openings closed by pseudoporous terminal diaphragms (Fig. 8A). These latter are finely punctate with concentric circles weakly arising above frontal surface seen by high magnification. Kenozooids outnumber autozooids, variable in size, some equal in size to the autozooids, but others smaller. Some kenozooids are irregular and have recessed terminal diaphragms (Fig. 8C). Pseudoporous terminal diaphragms may also be developed in autozooidal apertures, located proximally of the apertural rim (Fig. 7C). The diameter of autozooidal apertures is 0.15–0.22 mm, and that of kenozooids is 0.075–0.15 mm. Brood chambers are located at the top of the capitulum and are marked by an area of pseudoporous roof where borders between zooids cannot be seen (Fig. 7C). Peristomes of autozooids, sometimes closed by ter-

minial diaphragms, protrude through and are elevated above the brood chamber roof. The oeciostome is adnate to the peristome of one of these protruding autozooids (Fig. 7D). The oeciopore has a crescentic shape. Juvenile brood chambers lack the oeciopore. Growing edge of capitulum has tiers of polygonal budding autozooids (Fig. 8D).

Frontal exterior wall ultrastructure in a new bud is represented by distally-imbriated foliated fabric (see Taylor and Weedon 2000).

Distribution. This species is widespread along the upper part of the shelf of the northern and middle Kurile Islands.

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