Commemorative volume for the 80th birthday of Willem Vervoort in 1997

Wimveria gen. nov. for *Schizotricha divergens* Naumov, 1960, from the Commander Islands, with comments on the scope of the family Kirchenpaueriidae (Cnidaria: Hydrozoa)

S. Stepanjants, A. Svoboda, A. Peña Cantero & O. Sheiko

Stepanjants, S., A. Svoboda, A. Peña Cantero & O. Sheiko. *Wimveria* gen. nov. for *Schizotricha divergens* Naumov, 1960, from the Commander Islands, with comments on the scope of the family Kirchenpaueriidae (Cnidaria: Hydrozoa).
Zool. Verh. Leiden 323, 31.xii.1998: 221-234, figs 1-9.— ISSN 0024-1652/ISBN 90-73239-68-0.
S. Stepanjants, Zoological Institute, Russian Academy of Sciences, St Petersburg 199034, Russia
A. Svoboda, Ruhr-Universität Bochum, Fakultät für Biologie, Universitätstrasse 150, D-44780, Bochum, Germany.
A. Peña-Cantero, Departamento de Biologia Animal, Facultad de Ciencias Biologicas, E-46100 Burjassot, Valencia, Spain.
O. Sheiko, Kamchatka Institute of Ecology, Petropavlovsk-Kamchatskiy 683000, Russia.

Key words: Commander Islands; Kurile Islands; hydroids; colonies; branching; forked hydrocladia; hydrothecae; nematothecae; biogeography; *Wimveria* gen. nov.
Wimveria gen. nov. is established to accommodate *Schizotricha divergens* Naumov, 1960. Though this species should clearly be referred to the family Kirchenpaueriidae, no existing genus seems suitable. A redescription of the species and a diagnosis of Wimveria gen. nov. are given.

Introduction

The systematic position of the hydroid *Schizotricha divergens* Naumov, 1960, has been regarded as unclear (Stepanjants et al., 1997). Assignment of this species to the genus *Schizotricha* Allman, 1883, and to the family Plumulariidae (by Naumov, 1960, and Antsulevich, 1987), can be criticized because its most important character states are inconsistent with accepted diagnoses of those taxa. It is our pleasure to introduce the genus *Wimveria* gen. nov., named in honour of the 'King of Hydroids', Professor Wim Vervoort, to accommodate this species.

Abbreviation: ZINRAS = Zoological Institute, Russian Academy of Sciences, St Petersburg.

Systematic section

Wimveria divergens (Naumov, 1960) comb. nov.
(figs 1-5)

Schizotricha divergens Naumov, 1960: 469-470
non *Schizotricha divergens*; Antsulevich, 1987: 116

Material.— Lectotype (designated here). Colony composed of 12 small stems, growing from filiform hydrorhiza on a stone. Nine stems devoid of hydrocladia and tissues. Only one stem undamaged, described below, ZINRAS N 10299/1, Medny Island, Commander Islands, Bering Sea, coll. r.v. 'Vityaz', 19.vi.1950, sta. 529; 54°22.7'N 168°17.1'E, depth 110 m. A small stem taken from this colony is in the collection of the Kamchatka Institute of Ecology (KIE N 1/1476).

Small fragment of colony (ZINRAS N2), Kunashir Island, Pusanov Peninsula, Kurile Islands, 110 m; Kurile Expedition of ZINRAS, 22.vi.1969, sta. 7, collector A. Golikov. This specimen, identified by Antsulevich (1987) as *Schizotricha divergens*, is of another species.

Small fragment of colony (ZINRAS N3), Urup Island, Sea of Okhotsk, Schukin Bay, Kurile Islands, inshore, 30-38 m, r.v. 'Krilatka', 8.ix.1969, sample no. 51A; collector A. Shornikov. This specimen, identified by Antsulevich (1987) as *Schizotricha divergens*, also belongs to another species.

Colony in good condition (ZINRAS N4), comprising 14 stems growing from filiform hydrorhiza on stone; fertile; identified by A. Antsulevich; 'Odyssey', 25.vii.1984, Iturup Island (Kurile Islands), 1100-1200 m.

Description of lectotype.— Stem straight, divided into 19 internodes (figs 1-2). All internodes without hydrothecae and nematophores, each internode with only one apophysis. Apophyses alternately arranged, in slightly differing planes (fig. 2). Stem bearing up to 19 branching hydrocladia. Hydrocladium connected to cauline apophysis through one short ahydrothecate internode; distal hydrocladia having up to 4 athecate internodes (fig. 2, dh). In axil between apophysis and cauline internode there is one nematophore, without nematotheca and emerging through a 'mamelon' (fig. 3). Distal to a short intermediate internode each hydrocladium bears one forked hydrothecate internode (fig. 3). Each prong of this fork supports either a secondary hydrocladium with the same structure as the primary forked hydrocladium, or an unbranched hydrocladium with the first internode hydrothecate. Each hydrocladium may branch in the same way 2-3 times. Last internode of each hydrocladium terminated by hydrotheca (fig. 3). Hydrotheca deep, cylindrical, rim even and smooth. Adcauline hydrothecal wall free for half or most of its length. Hydrothecal aperture inclined away from internode, directed strongly abcaudally ('*Halopteris*-like'). Angle between adcauline hydrothecal wall and internode about 45°. Hydrothecate hydrocladial internode with one infrathecal nematophore borne in an oval monothalamic nematotheca. In some specimens nematotheca absent, its location represented by small hole in perisarc. With a single mesial superior nematophore, enclosed by monothalamic nematothe-

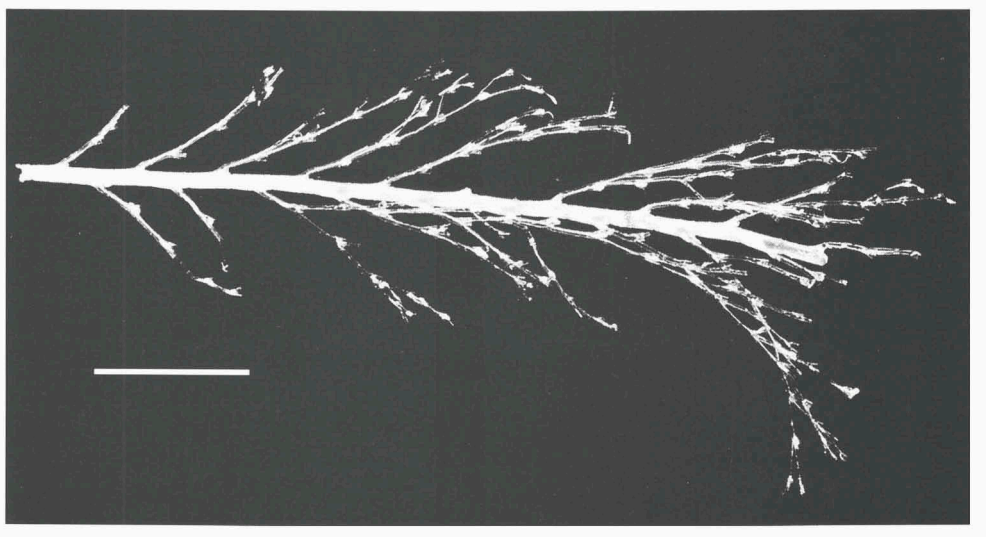

Fig. 1. *Wimveria divergens* (Naumov, 1960), lectotype colony. Scale bar 5 mm.

ca, in front of hydrothecal aperture. Nematotheca may be absent, and then only mesial perisarc hole present. Each short prong in front of hydrothecal aperture in some specimens with perisarcal hole (fig. 3A).

Three types of nematocysts: microbasic mastigophores, microbasic euryteles and an indeterminate 'desmoneme-like' type (fig. 3F).

Measurements (in mm): Length of cauline internodes 0.98-1.17; diameter of cauline internodes 0.33-0.39; length of cauline apophyses 0.23-0.26; length of hydrothecate hydrocladial internodes 0.65-0.85; length of abcauline side of hydrothecal wall 0.19-0.20; length of adnate part of adcauline hydrothecal wall 0.06-0.13; length of free part of adcauline hydrothecal wall 0.13-0.14; diameter of hydrothecal aperture 0.10.

Nematocysts (measurements in μm): microbasic mastigophores 6.3-7.5 × 2-2.5; microbasic euryteles 14-16.5 × 7-8; 'desmoneme-like' type 5.5-6.3 × 3-4.

Other specimens.— The stems of the colony collected by r.v. 'Odyssey' from near Iturup Island (ZINRAS N4) have the same morphology (fig. 5). They are in better condition and it is possible to see in this material nematothecae below the hydrotheca and in front of the hydrothecal aperture more frequently distributed than in the lectotype colony. The nematophores on the cauline apophyses are also in better condition than in the lectotype colony. Each prong of the fork of the hydrothecate internode in some specimens may have a hole in the perisarc or a monothalamic nematophore (fig. 5A). The gonothecae are inserted on cauline apophyses. They are inverted conical, with a flexible narrow basal part and a wide, flat top (fig. 5F).

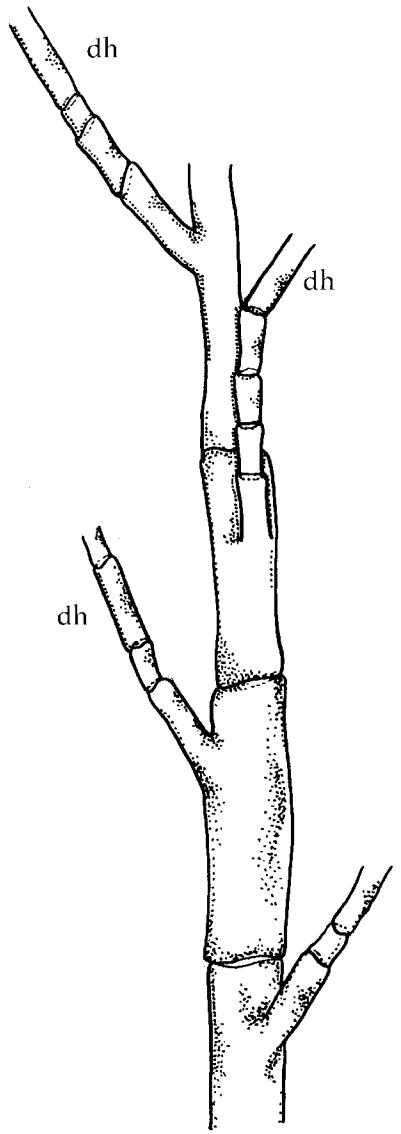

Fig. 2. *Wimveria divergens*, section of lectotype colony; arrangement of cauline apophyses and hydrocladia; distal hydrocladia (dh) with 2-3 ahydrothecate internodes.

Measurements (in mm): Length of cauline internodes bearing apophysis 0.91-1.04; length of cauline internodes lacking apophyses 0.42-0.91; diameter of cauline internodes 0.19-0.39; length of cauline apophyses 0.13-0.19; diameter of apophyses 0.11-0.13; length of ahydrothecate hydrocladial internodes 0.13-0.21; length of hydrothecate hydrocladial internodes 0.39-0.52; length of 'prongs' 0.23-0.26; abcauline hydrothecal wall 0.19-0.20; length of free part of adcauline hydrothecal wall 0.13-0.14; length of adnate part of adcauline hydrothecal wall 0.04-

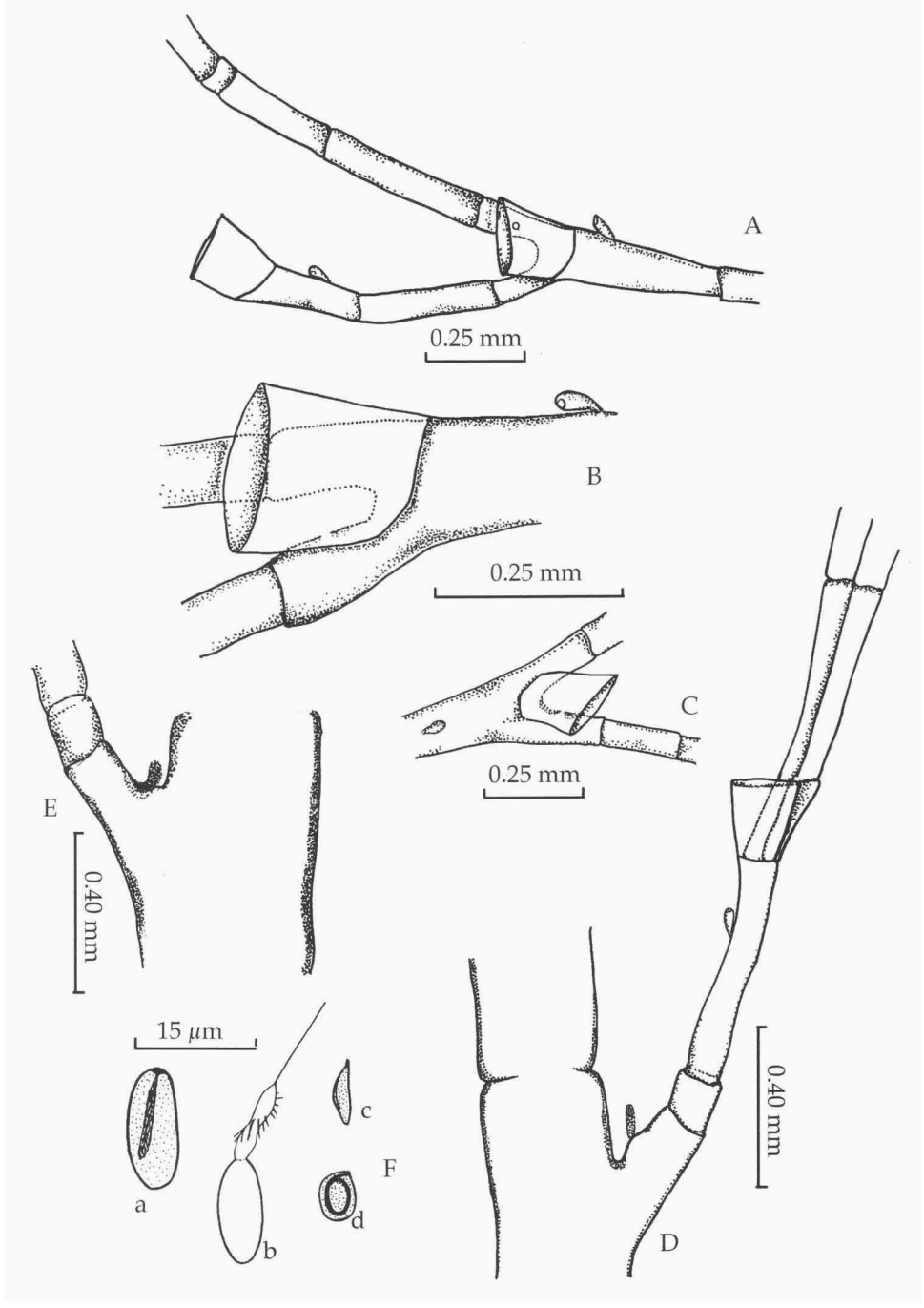

Fig. 3. *Wimveria divergens*, lectotype colony. A, forked hydrocladial internode; B, C, sections of hydrocladia with hydrothecae and intrathecal nemathothecae; D, E, sections of colony with cauline apophyses and nematophores; F, nematocysts: a, b, microbasic eurytele, undischarged (a) and discharged (b); c, microbasic mastigophore; d, desmoneme-like capsule.

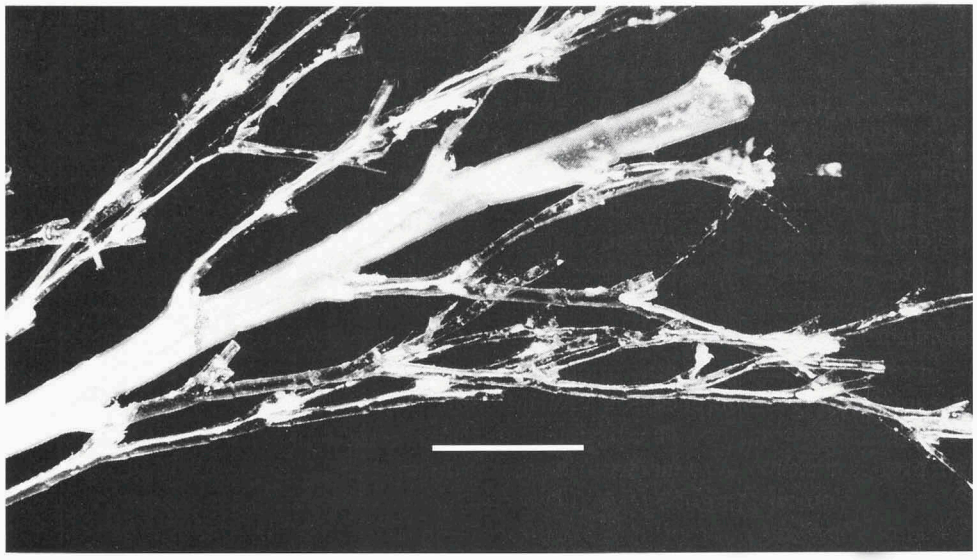

Fig. 4. *Wimveria divergens*, lectotype. Part of colony. Scale bar 1.0 mm.

0.10; length of hydrothecal base 0.10-0.13; diameter of hydrothecal aperture 0.18-0.19; length of infrathecal nematotheca 0.065; length of gonotheca 0.80-1.0; maximum diameter of gonotheca 0.40; diameter of gonothecal base 0.05-0.10; angle between longitudinal axis of internode and free part of adcauline hydrothecal wall about 45°.

The fragments of colonies from the Kurile Islands identified by Antsulevich (1987) as *Schizotricha divergens*, in our opinion belong to some closely similar species.

The small fragment of colony collected near Kunashir Island, Kurile Islands (ZINRAS N2) (Antsulevich, 1987), comprises a small stem divided into internodes of differing lengths. Not every internode has an apophysis for a hydrocladium. Between a cauline apophysis and a hydrocladium there are 2-3 short ahydrothecate internodes. No nematophores occur in the axil between the apophyses and the cauline internodes (fig. 6). The hydrocladia of the Kunashir material have a branching pattern similar to that of *Wimveria divergens*, but its hydrothecate internodes are shorter (0.25 mm). The hydrothecae of the present fragment are shorter than those of *W. divergens* (e.g. length of abcauline hydrothecal wall 0.10 mm, and diameter of hydrothecal aperture 0.10 mm), and are adnate to the internode along most part of their adcauline wall; with infrathecal nematotheca, but without nematotheca in front of hydrothecal aperture. Colony sterile. Only one type of nematocyst, a microbasic eurytele 10 × 4-4.5 μm (fig. 6), has been observed in that fragment. In our provisional opinion the fragment should be referred to a species which is closer to the material described by Antsulevich (1987) as *Halecium linkoi* Antsulevich, 1980, from the Kurile Islands, but further study is necessary to confirm this.

The other small fragment identified by Antsulevich (1987) as *Schizotricha divergens* (ZINRAS N3), Urup Island, closely resembles *W. divergens* in size of hydrothecate hydrocladial internodes (0.40 mm length) and hydrotheca (for example, in length of abcauline hydrothecal wall 0.20 mm, in having the same type of hydrocladial branching (fig. 7), and in having the same types of nematocyst: microbasic euryteles (13.5-15

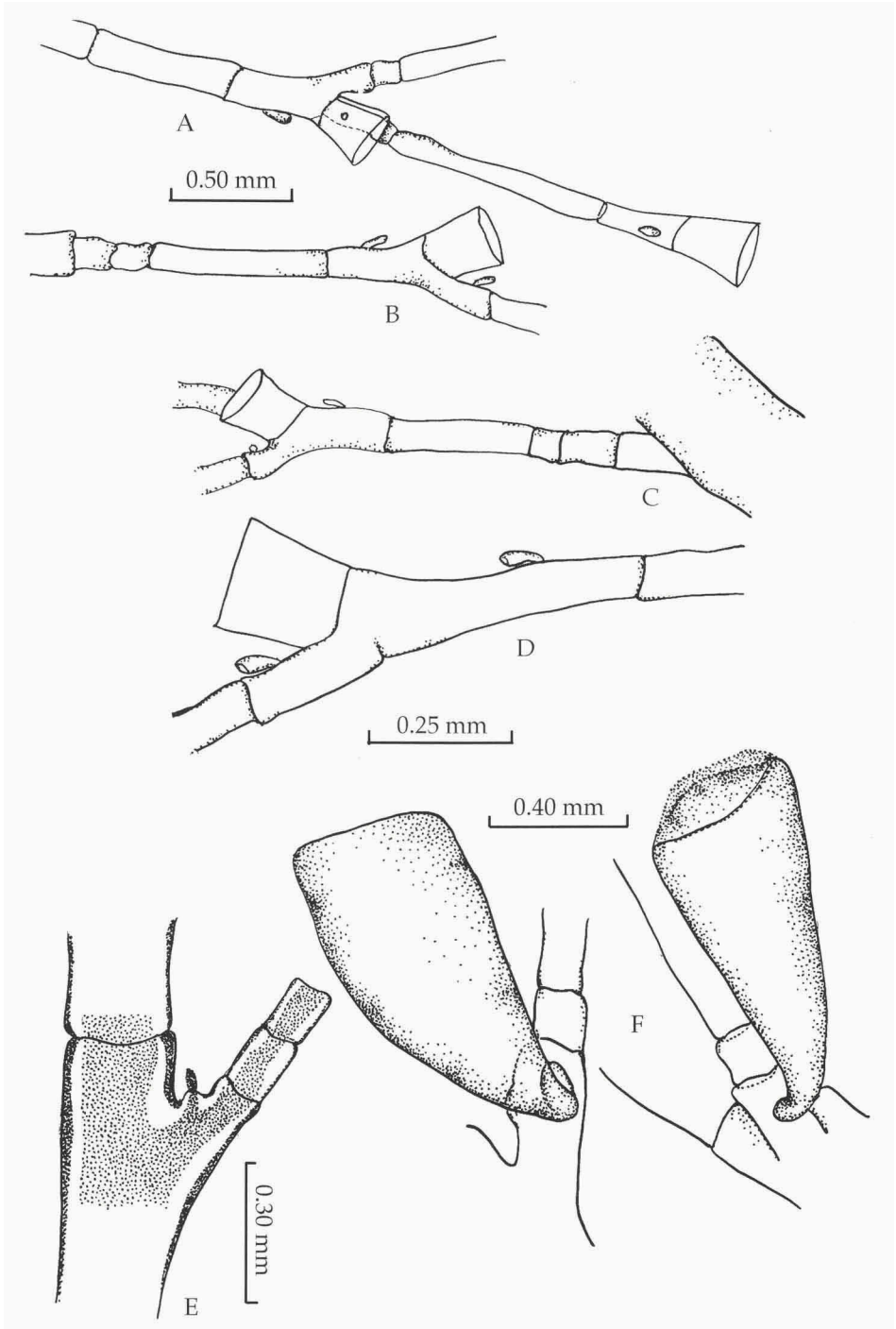

Fig. 5. *Wimveria divergens*. 'Odyssey', Iturup Island, 1100-1200 m. A-D, sections of hydrocladia with hydrothecae and nematothecae; E, cauline apophysis with 'mamelon' and nematophore; F, gonothecae.

× 5-6.5 μm), microbasic mastigophores (6.3-7.5 × 2 μm) and 'desmoneme-like' capsules (5-6.3 × 3.3-4 μm) (fig. 7B). In this colony, however, the hydrothecae are adnate to the internode along most of their adcauline wall; there is no nematophore in front of hydrothecal aperture; and there is no 'mamelon' in the axil between the apophysis and the cauline internode. However, paucity of material may have resulted in our not noting these last two features. The colony is sterile. This small colony closely resembles material from near the Kurile Islands identified by Antsulevich (1987) as *Hydrodendron gracilis* (Fraser, 1914), and later found by O. Sheiko in a collection from the North Kurile Islands, and named 'Kirchenpaueriidae gen. et spec.?' (figs 8-9). The difference between *W. divergens* and the *H. gracilis* is the presence of branched hydrocladia in *W. divergens*, these being unbranched in the other two species.

According to the literature and confirmed by the present study, the specimens from Urup Island (ZINRAS N3), *Hydrodendron gracilis* sensu Antsulevich and Kirchenpaueriidae gen. et spec. indet. sensu Sheiko from the North Kurile Islands, are sterile with unbranched cladia, possibly because the colonies are young. The nematocyst types found in these colonies are uniform with those present in *W. divergens* (figs 3, 7-9). Perhaps the colonies described should be referred to another species of *Wimveria* gen. nov. Further material is needed to determine this.

Rediagnosis of the species.— Colonies comprising small monosiphonic plumose cormoids arising from a filiform hydrorhiza growing on stones and possibly on other hard substrata. Stem divided into internodes, each internode with apophysis supporting hydrocladium. Cauline apophyses alternately arranged, in differing planes. With one short ahydrothecate internode between apophysis and hydrocladium, though distal hydrocladia with 3-4 ahydrothecate internodes; hydrocladium forked. Hydrothecate hydrocladial internodes long, with one hydrotheca and two fork-like prongs situated in front of hydrothecal aperture. Each prong giving rise to next-lower order of hydrocladia with the same structure or with unbranched hydrothecate internode. Each hydrocladium may branch in the same way 2-3 times. Typically hydrocladia ending in long hydrothecate internode. Hydrotheca deep, cylindrical, with rim even and smooth. Hydrotheca adnate to internode along short part of adcauline wall. Angle between free part of adcauline hydrothecal wall and longitudinal axis of internode of c. 45°; consequently, hydrotheca strongly directed abcaudally ('*Halopteris*-like') (figs 3, 5). Perisarc of hydrocladia and hydrotheca thin. Hydrocladial internode with 2 nematophores: one infrathecal, situated within a thin monothalamic oval nematotheca, and another nematophore in front of hydrothecal aperture, also situated within a thin monothalamic nematotheca; sometimes nematotheca absent. The fork-like prongs sometimes with hole in perisarc or with monothalamic nematotheca. There is one nematophore, emerging through a 'mamelon' on cauline apophyses, in axil between apophysis and cauline internode. Gonothecae inserted on cauline apophyses; inverted conical, with curved narrow basal part and a flattened wide distal part (fig. 5F.). Three types of nematocysts known: microbasic euryteles, microbasic mastigophores and an undescribed 'desmoneme-like' type.

Measurements (in mm): length of abcauline hydrothecal wall 0.19-0.20; length of free part of adcauline hydrothecal wall 0.13-0.14; length of adnate part of adcauline hydrothecal wall 0.04-0.10; diameter of hydrothecal aperture 0.10-0.19; length of nematothecae 0.065; length of gonothecae 0.80-1.0; maximum diameter of gonothecae

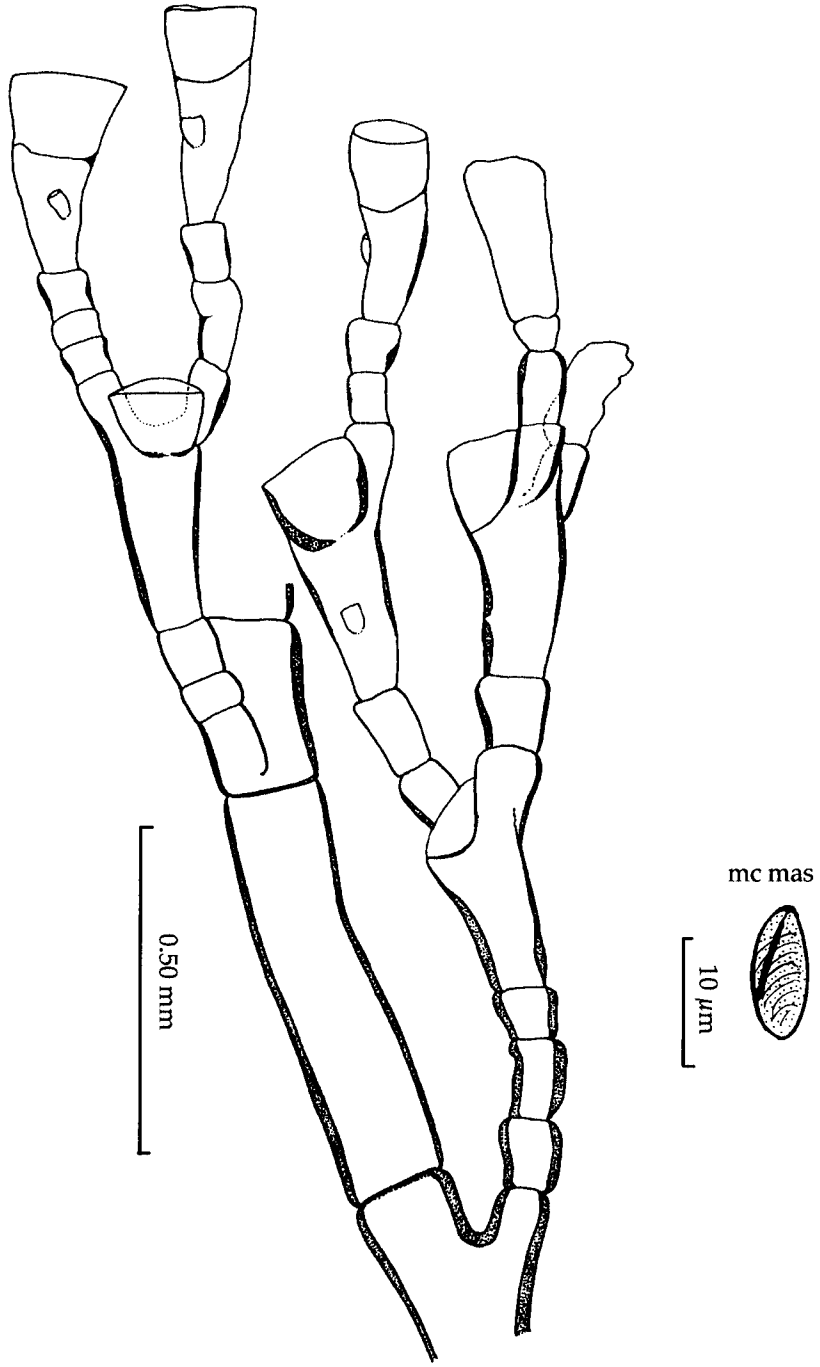

Fig. 6. Fragment of colony from Kunashir Island, mistakenly determined as *Schizotricha divergens* (ZINRAS N2); mc mas = microbasic mastigophore.

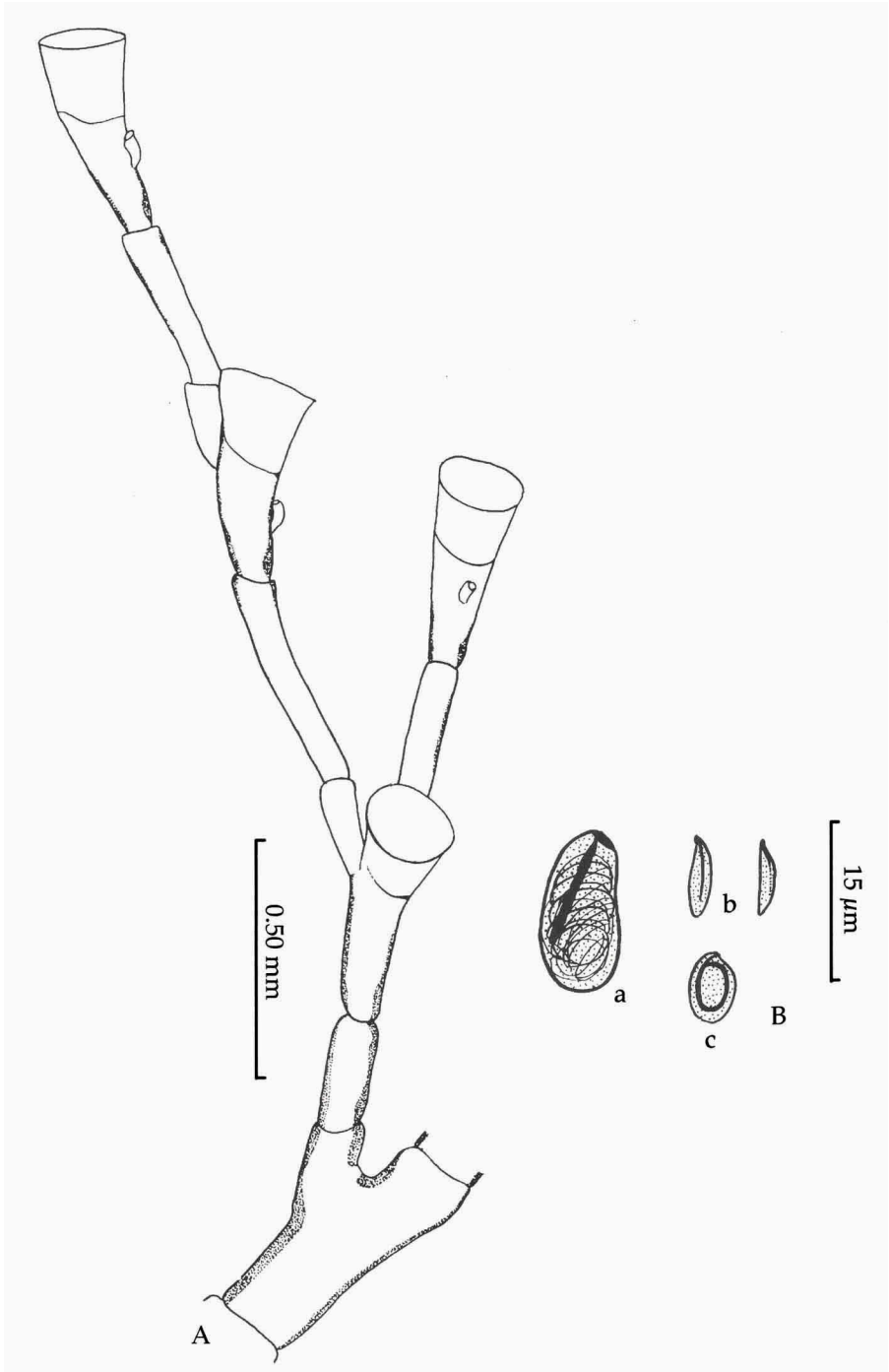

Fig. 7. Fragment of colony from Urup Island, determined as *Schizotricha divergens* (ZINRAS N3). A, bifurcate hydrocladium; B, nematocysts: microbasic eurytele (a), microbasic mastigophores (b) and desmoneme-like capsule (c).

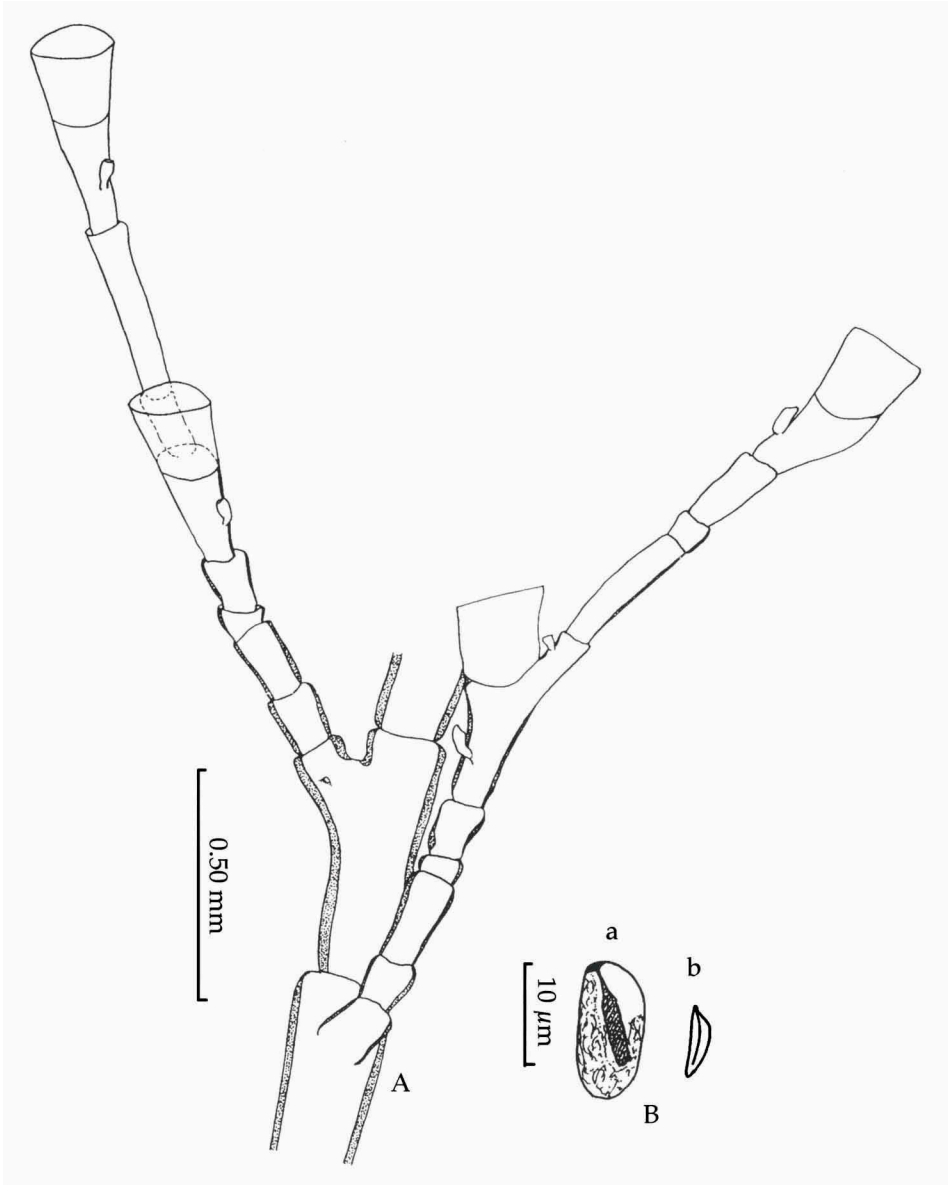

Fig. 8. Fragment of colony determined by O. Sheiko as Kirchenpaueriidae gen. sp. (North Kurile Islands, 48°N 155°E, 382-490 m); A, part of colony; B, nematocysts: microbasic eurytele (a) and microbasic mastigophore (b).

0.40; minimum diameter of gonothecae 0.05-0.10.

Comparison with other species.— Naumov (1960) referred *Schizotricha divergens* to the genus *Schizotricha* on the basis of the forked hydrocladia. Despite having this character *Wimveria divergens* is best not referred to *Schizotricha*, however, because it has no cauline hydrothecae nor cauline nematothecae, and because the nematothecae

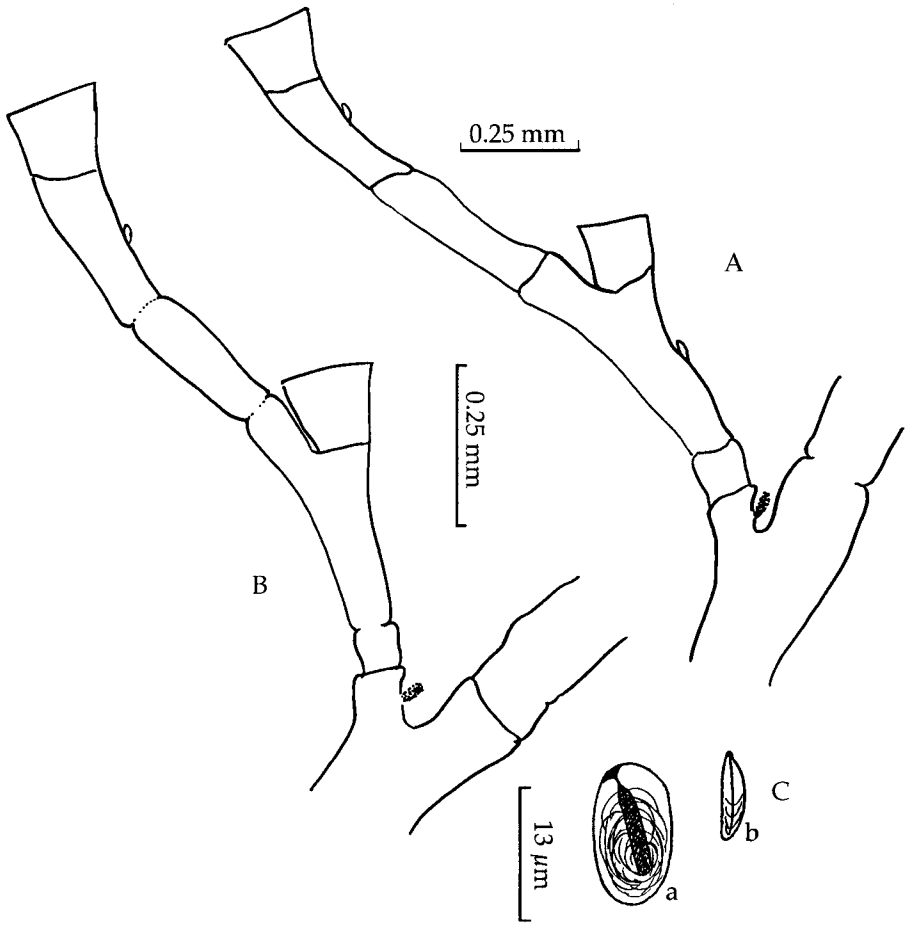

Fig. 9. Fragments of colony determined as *Hydrodendron gracilis* (Fraser, 1914) (Kurile Islands, Zeleniy Island, 28 m); A, B, hydrocladia; C, nematocysts: microbasic eurytele (a), microbasic mastigophore (b).

that occur elsewhere on the colony are monothalamic. Some essential character states of *Schizotricha* are (1) the presence of cauline hydrothecae and cauline nematothecae and (2) the bithalamic nature of the nematotheca (Peña Cantero et al., 1996).

Colonies of *Wimveria divergens* are generally similar to those of other species referred to the family Kirchenpaueriidae, and the species is undoubtedly best referred to that family. A diagnosis of the Kirchenpaueriidae has been given elsewhere (Stepanjants et al., 1997).

From other genera of the family Kirchenpaueriidae, *Wimveria* gen. nov. differs mainly in (1) its forked hydrocladial branching and (2) in the shape of the hydrotheca which is free along most of its adcauline wall which has the aperture directed sideways from the longitudinal axis of hydrocladium and upwards ('*Halopteris*-like').

In its branching pattern, *Wimveria divergens* most closely resembles some species of *Oswaldella* Stechow, 1919, especially *O. bifurca* (Hartlaub, 1904), *O. billardi* Briggs,

1938, *O. garciacarrascosai* Peña Cantero et al., 1997, *O. grandis* Peña Cantero et al., 1997, *O. incognita* Peña Cantero et al., 1997, *O. rigida* Peña Cantero et al., 1997, *O. stepanjantsae* El Beshbeeshy, 1991, and some others which have forked hydrocladia (Peña Cantero et al., 1997). But *Wimveria divergens* is distinguished from these species in the shape of the hydrotheca and in its position on the hydrothecate internode. Hydrothecae in species of *Oswaldella* are adnate to the internodes along most of the length of the adcauline wall. Other differences between *Wimveria* and *Oswaldella* are the following: in *Oswaldella* the gonothecae are situated on the hydrocladia, whereas in *Wimveria* they occur on the cauline apophyses; in *Oswaldella* the nematophores in front of the hydrothecal aperture are naked, whereas those of *Wimveria* have a nematotheca; in *Wimveria* the intrathecal nematophores are placed on the flat perisarc surface of internode, whereas in *Oswaldella* they emerge through a perisarcal 'hillock'; in *Oswaldella* only one type of nematocyst (microbasic mastigophore) has been reported, whereas in *Wimveria divergens* three types (microbasic mastigophores, microbasic euryteles and a 'desmoneme-like' type) have been found.

From *Kirchenpaueria, Wimveria* differs mainly in the bifurcate branching of the hydrocladia, in the presence of cauline nematophores, in the naked nature of the nematophores in front of the hydrothecal aperture, and in the position of the gonothecae on cauline apophyses (in species of *Kirchenpaueria* they are on the stem).

From *Ventromma, Wimveria* differs in its bifurcate branching of the hydrocladia, in the presence of cauline nematophores, and also in there being transverse ridges on the surface of the gonotheca in *Ventromma*.

From *Naumovia, Wimveria* differs in having branched hydrocladia, in the presence of intrathecal nematophores, and in the presence of 3 types nematocysts (*Naumovia* has only microbasic mastigophores in two size groups).

From *Ophinella, Wimveria* differs in the forked hydrocladia and in the presence of a stem (*Ophinella* is characterised by its stolonal colonies).

Since it is impossible to refer *Schizotricha divergens* Naumov, 1960, to any previously defined genus of Kirchenpaueriidae, it is proposed to introduce a new genus to accommodate it, *Wimveria*, named in honour of the famous Hydroida investigator Professor Wim Vervoort, National Museum of Natural History, Leiden, The Netherlands.

Wimveria gen. nov.

Type species.— *Schizotricha divergens* Naumov, 1960 (by monotypy).

Diagnosis.— Colonies with monosiphonic stems, each internode with one apophysis. Alternate cauline apophyses arranged in different planes. Cauline internodes without nematophores. Cauline apophyses with nematophores and 'mamelons'. Apophyses supporting forked hydrocladia. Each hydrocladium branching 1-3 times and bearing athecate and thecate internodes. Thecate hydrocladial internodes with only one hydrotheca and two thin monothalamic nematothecae (one intrathecal nematotheca and another in front of hydrothecal aperture). Hydrothecal shape distinctly different from that of other known genera of Kirchenpaueriidae, resembling that of species of the family Halopteridae. Hydrotheca deep, cylindrical, with even

rim. Adcauline wall free along most of its length. Angle between adcauline hydrothecal wall and longitudinal hydrocladial axis about 45° and, accordingly, hydrothecal aperture strongly abcaudally directed. Gonothecae on cauline apophyses, inverted conical, with curved narrow basal part and flat wide distal part.

Known geographic distribution.— *Wimveria divergens*, the only known species in the new genus *Wimveria*, is a cold-water species that has been collected from the North Pacific region (Commander and Kurile Islands) at a depth-range of 110-1200m. This is in accordance with the view that the family Kirchenpaueriidae has a bipolar distribution (see Stepanjants, Svoboda & Vervoort, 1996, 1997; Stepanjants et al., 1997).

Identification key to the genera of Kirchenpaueriidae

As mentioned above, a diagnosis of the family Kirchenpaueriidae and an identification key to its genera have been published elsewhere (Stepanjants et al., 1997). For the sake of completeness that key is here reproduced with the addition of *Wimveria* gen. nov. The genera *Halicornopsis* and *Pycnotheca* are conventionally, but in our view questionably, included in the Kirchenpaueriidae. For that reason the names of these genera are placed in brackets.

1(2) Hydrothecal aperture with cusps ..... [*Halicornopsis*]
2(1) Hydrothecal aperture without cusps

3(4) Hydrotheca with internal septum ..... [*Pycnotheca*]
4(3) Hydrotheca without internal septum

5(6) Colony without distinct stem ..... *Ophinella*
6(5) Colony with well defined stem

7(10) Stem with nematophores
8(9) Nematophores provided with bithalamic nematothecae; no naked cauline nematophores; gonotheca annulated ..... *Ventromma*

9(8) Nematophores without bithalamic nematothecae; cauline nematophores frequently naked. Gonotheca not annulated ..... *Kirchenpaueria*
10(7) Stem without nematophores
11(12) Hydrothecate hydrocladial internodes without mesial inferior nematophore ... . *Naumovia*
12(11) Hydrothecate hydrocladial internodes with mesial inferior nematophore

13(14) Hydrotheca adnate along most of adcauline wall ..... *Oswaldella*
14(13) Hydrothecae free along most of adcauline wall ..... *Wimveria* gen. nov.

Acknowledgements

The authors are grateful to Professor Wim Vervoort, whose special Anniversary allowed us to unite in this work and to propose a new genus on his honour. This

work was carried out using the collections of the Zoological Institute of the Russian Academy of Sciences, partly using financial support from the Science and Technology State Committee of Russian Federation (Reg. No. 97-03-16).

References

Antsulevich, A.E., 1987. Gidroidy shel'fa Kuril'skykh ostrovov: 1-166. (Hydroids from the shelf waters of the Kurile Islands).— Zool. Inst. Acad. Sci. USSR, Leningrad. [Russian with English summary].

Naumov, D.V., 1960. Gidroidi i gidromedusi morskikh, solonovatovodnykh i presnobodnikh basseinov SSSR.— Opredeliteli po faune SSSR, Zool. Inst. Acad. Sci. USSR, Leningrad 70: 1-626 (Russian; English translation by Israel Program for Scientific Translation, 1969, No. 5108).

Peña Cantero, A.L., A. Svoboda & W. Vervoort, 1996. Species of *Schizotricha* Allman, 1883 (Cnidaria, Hydrozoa) from recent antarctic expeditions with r.v. 'Polarstern', with the description of a new species.— Zool. Med. 70: 411-435.

Peña Cantero, A.L., A. Svoboda & W. Vervoort, 1997. Species of Oswaldella Stechow, 1919 (Cnidaria, Hydrozoa) from recent antarctic expedition with r.v. 'Polarstern', with the description of eight new species.— Zool. J. Linn. Soc. 119: 339-388.

Stepanjants, S.D., A.L. Peña Cantero, O.V. Sheiko & A. Svoboda, 1997. *Naumovia* gen. n. for *Plumularia microtheca* Naumov, 1960, a deepwater North Pacific species, with remarks on other genera and species of the family Kirchenpaueriidae (Cnidaria, Hydrozoa).— Zoosyst. Rossica 6: 9-20.

Stepanjants, S.D., A. Svoboda & W. Vervoort, 1996. Problema bipolarnosti na materiale Medusozoa (Cnidaria). (The problem of bipolarity in Medusozoa (Cnidaria).— Russkiy gidrobiologicheskiy Zurnal (Russian Hydrobiological Journal), Special Issue: 5-34.

Stepanjants S.D., A. Svoboda & W. Vervoort, 1997. The problem of bipolarity, with emphasis on the Medusozoa (Cnidaria: Anthozoa excepted). In: J.C. den Hartog (ed.). Proc. 6th Internat. Conference on Coelenterate Biology, 1995: 455-464.— Nationaal Natuurhistorisch Museum, Leiden.