

1 **Some new *Haliclona* species (Demospongiae, Haplosclerida)**
2 **from British Columbia Shallow Waters and a Re-**
3 **Description of *Haliclona mollis* (Lambe, 1893)**
4

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15 NOTE: THIS MANUSCRIPT IS NOT A PUBLICATION WITH RESPECT TO NEW
16 SPECIES BUT A PRE-PRINT UNREVIEWED DRAFT

17

18 **Abstract**

19

20 **Background.** A number of *Haliclona* species (Demospongiae, Haplosclerida) in the Austin and
21 McDaniel collections at the Royal British Columbia Museum (RBCM) are identified only to
22 genus or genus and species. The collections are representative of over 40 years of sampling
23 principally by the late Dr. William C. Austin and one of us (Neil McDaniel) through SCUBA
24 diving on the west coast of British Columbia and specimens provided by others to Dr. Austin.
25 We have selected representative *Haliclona* species in the collections for detailed examination
26 and placement in subgenera and species (where species were not identified). *Haliclona* is
27 recognized to have several subgenera, thus identification of specimens to genus and species is
28 incomplete. Our study updates this status for the species examined.

29 **Methods.** Methods of collection included intertidal scrapings or removal of non-encrusting
30 specimens usually accompanied by in-situ photos, similar methods at SCUBA diving depths
31 (subtidal to 35 m) and from other dredging, trawling and biological sampling activities.

32 **Results.** We describe eleven new *Haliclona* (Demospongiae Haplosclerida Chalinadae) species
33 and a range extension for *Haliclona* (*Flagellia*) *edaphus* de Laubenfels, 1930 for shallow waters
34 of Southwestern British Columbia, Canada. New species include *Haliclona* (*Gellius*) *hartmani* **n. sp.**,
35 *Haliclona* (*Gellius*) *shishalhensis* **n. sp.**, *Haliclona* (*Reniera*) *gesteta* **n. sp.**, *Haliclona*
36 (*Rhizoniera*) *aborescens* **n. sp.**, *Haliclona* (*Rhizoniera*) *blanca* **n. sp.**, *Haliclona* (*Rhizoniera*)
37 *boothensis* **n. sp.**, *Haliclona* (*Rhizoniera*) *filix* **n. sp.**, *Haliclona* (*Rhizoniera*) *kunetchina* **n.sp.**,
38 *Haliclona* (*Rhizoniera*) *meandrina* **n. sp.**, *Haliclona* (*Rhizoniera*) *penelakuta* **n. sp.**, and
39 *Haliclona* (*Rhizoniera*) *vulcana* **n. sp.** We also redescribe *Haliclona mollis* (Lambe, 1893
40 [1894]) and propose placing it in the subgenus *Haliclona*. Except for Lambe's syntype slides of
41 *Haliclona mollis* which are deposited at the Canadian Museum of Nature, Ottawa, Canada, all
42 holotypes and voucher specimens of species described are deposited at RBCM.

43

44 **Key Words**

45

46 Porifera, Demospongiae, Haplosclerida, *Haliclona* (*Flagellia*), *Haliclona* (*Gellius*), *Haliclona*
47 (*Haliclona*), *Haliclona* (*Reniera*), *Haliclona* (*Rhizoniera*), invertebrate systematics, British
48 Columbia, marine biogeography.

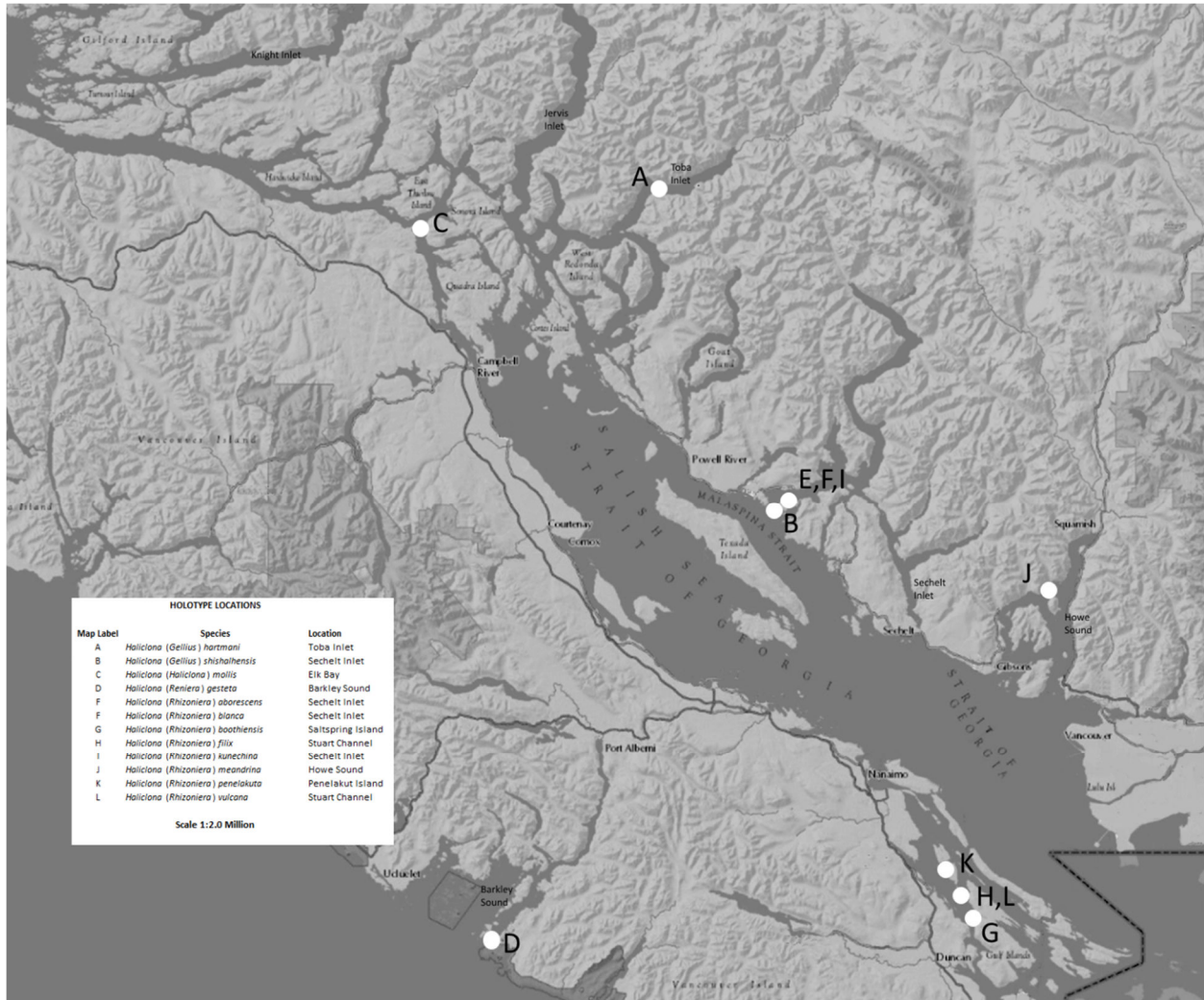
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50 **Introduction**

51 In this report we describe eleven new *Haliclona* (Demospongeae Haplosclerida) species in the
52 Royal British Columbia Museum (RBCM) collected over a 40-year period by William C. Austin
53 and Neil McDaniel. Re-examination of *Haliclona* (*Flagellia*) *edaphus* de Laubenfels, 1930
54 specimens in the collection confirms their presence in British Columbia from previously reported
55 Washington State, USA (de Laubenfels 1961). We also redescribe *Haliclona mollis* (Lambe,
56 1893 [1894]) from syntype slides loaned to RBCM by the Canadian Museum of Nature (CMN).
57 The new species are all from littoral and shallow water locations in southwest British Columbia
58 (Figure 1) and many fairly commonly encountered. To date most BC *Haliclona* have only been
59 identified to genus or genus and species. De Weerd (1989) proposed a major revision of the
60 family Chalinidae that included erecting six subgenera in *Haliclona*; Van Soest (2017) added
61 *Flagellia* to de Weerd's *Gellius*, *Halichoclona*, *Haliclona*, *Reniera*, *Rhizoniera* and *Soestella*.
62 We selected *Haliclona* to provide some insight into the diversity of this sponge below the genus
63 level in British Columbia waters.

64

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65
66 Figure 1 Holotype Location Map (Adapted from a Government of BC map, printed with
67 permission).
68

69 *Haliclona* is represented by four subgenera and unclassified to subgenus in BC waters where
70 collections have been made. Previously recorded *Haliclona* species specifically in the southwest
71 BC marine area (based on unpublished species lists compiled by the late Dr. W.C. Austin)
72 include *Haliclona (Flagellia) edaphus* (de Laubenfels, 1930), *Haliclona (Flagellia) porosa*
73 Fristedt 1887, *Haliclona (Gellius) species cf. emiltopsenti* Van Soest & Hooper, 2020 [formerly
74 *H. (G.) foraminosa* (Topsent, 1904)], *Haliclona mollis* (Lambe, 1893) and *Haliclona species cf.*
75 *mollis* (Lambe, 1893).
76

77 This report adds two new *H. (Gellius)* species, one new species of *H. (Reniera)* and eight new *H.*
78 (*Rhizoniera*) species to *Haliclona* species previously recorded for British Columbia. The new
79 species include: *Haliclona (Gellius) hartmani* n. sp., *Haliclona (Gellius) shishalhensis* n. sp.,
80 *Haliclona (Reniera) gesteta* n. sp., *Haliclona (Rhizoniera) aborescens* n. sp., *Haliclona*
81 (*Rhizoniera) blanca* n. sp., *Haliclona (Rhizoniera) boothiensis* n. sp., *Haliclona (Rhizoniera)*
82 *filix* n.sp., *Haliclona (Rhizoniera) kunechina* n.sp., *Haliclona (Rhizoniera) meandrina* n. sp.,
83 *Haliclona (Rhizoniera) penelakuta* n. sp. and *Haliclona (Rhizoniera) vulcana* n. sp.

84

85 **Material and Methods**

86 Methods of collection included intertidal scrapings or removal of non-encrusting specimens
87 usually accompanied by in-situ photos, similar methods at SCUBA diving depths (subtidal to 35
88 m) and from other dredging, trawling and biological sampling activities. Skeletal thick sections
89 and tissue-free spicule slides were prepared as described in Austin, et al. (2014). Spicule
90 micrographs were made with a compound light microscope and camera at RBCM. Spicule
91 dimensions are in microns (μm) as minimum (average) maximum. Number measured = 50
92 unless indicated. In spicule dimension tables holotypes are listed first and stations bolded. Scale
93 bars on in-situ figures are approximate. Abbreviations: BO Bruce Ott; CMN Canadian Museum
94 of Nature, Ottawa, Canada; KML Khoyatan Marine Laboratory; NM Neil McDaniel; PBS
95 Pacific Biological Station, Nanaimo, BC.; PEI Pacific Environment Institute of Fisheries &
96 Oceans Canada; RBCM Royal British Columbia Museum; RH Rick Harbo; VT Verena
97 Tunnicliffe.

98

99 **Systematics**

100 Sponge classification follows that of Morrow & Cárdenas (2015) and specifically for
101 Haplosclerida that of de Weerd (2002 [2004]) and Van Soest (2017).

102 Demospongia Sollas, 1885

103 Haplosclerida Topsent, 1928

104 Chalinidae Gray, 1867

105 *Haliclona* Grant, 1841

106 *Haliclona* (*Flagellia*) Van Soest, 2017

107

108 **Synonymy**

109 For world synonymy and distribution see Van Soest (2017).

110

111 ***Haliclona* (*Flagellia*) *edaphus* de Laubenfels, 1930** (Figure 2)

112 *Haliclona* (*Flagellia*) *edaphus* (as *Sigmatocia edaphus*) was reported in a web-based database
113 by the late Dr. W.C. Austin. Portions of Austin's database are listed in an undated University of
114 British Columbia on-line PDF and noted by Van Soest, 2017, p.7. We have re-examined the
115 Austin specimens in the RBCM collections and provide data to support a range extension of the
116 species to British Columbia. We include a brief description and spicule dimensions.

117

118 **Material Examined**

119 RBCM 018-00262-001, station KML 85/73 off Whitlestone Point, Barkley Sound, 48° 49.28' N /
120 125° 11.06' W, 10–13 m depth, 5 May 1973, collector W.C. Austin, 1 specimen. RBCM 018-
121 00262-002, same location and station, 1 specimen. RBCM 018-00278-001, station KML 90A/73,
122 Barkley Sound, cave, 48° 48.8' N / 125° 10.6' W, +3 m, 5 Aug 1973, collector W.C. Austin, 1
123 specimen. RBCM 018-00381-001, station KML 240/70, Barkley Sound, 48° 48.9' N / 125° 10.7'
124 W, 12 m depth, 21 Sep 1970, collector W.C. Austin, 1 specimen. RBCM 018-00382-001, station
125 KML 89/77, James Island, near Sidney, 48°36.18' N / 123°21.00' W (approximate), depth not
126 recorded, 27 Mar 1977, collector W.C. Austin, 1 specimen. Station PBS 1960, Graham Island,
127 Haida Gwaii, BC, 54° 06.09' N 132° 26.24' W, 66 m depth, 24 Sep 1960, collector PBS,
128 Nanaimo, BC, 1 non voucher specimen.

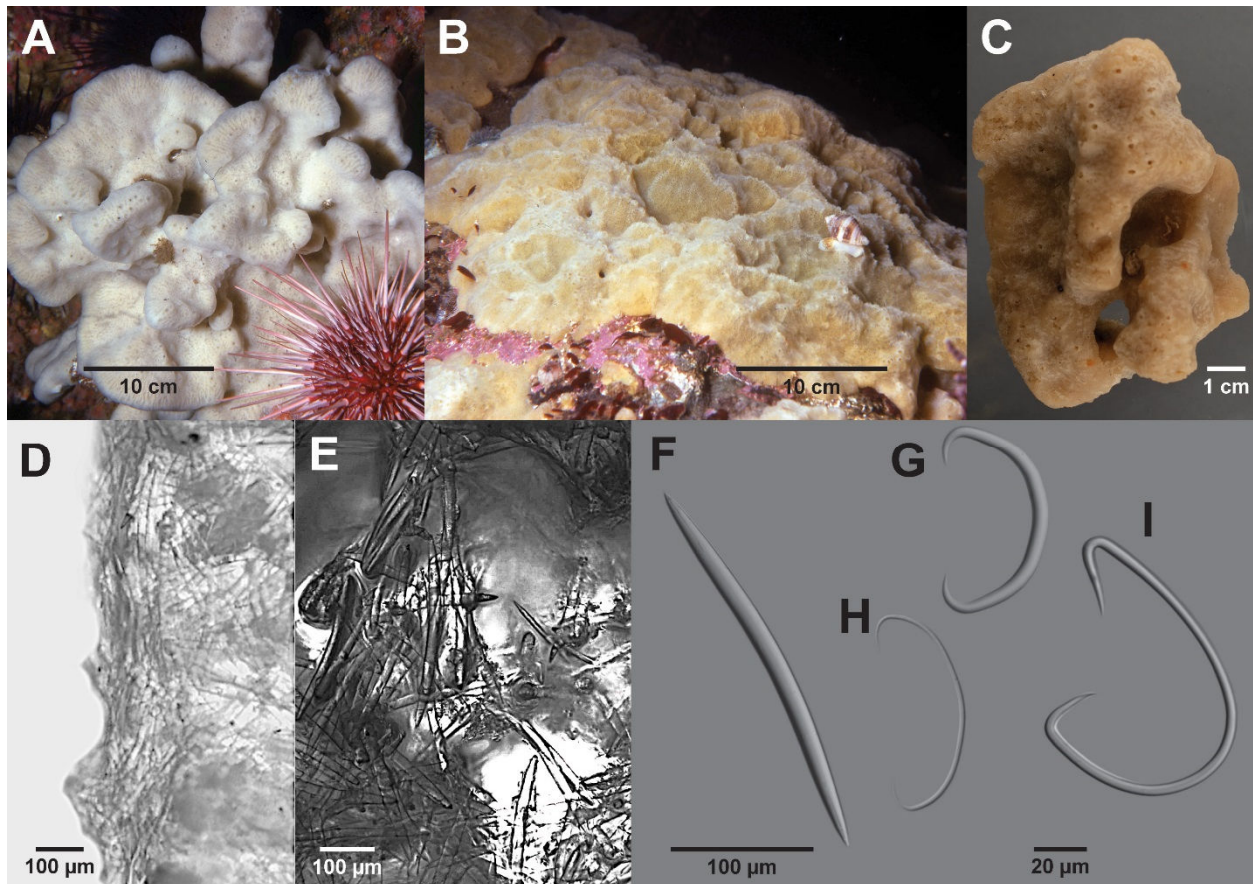
129

130 **Description**

131 RBCM 018-00262-001, station KML 85/73 is representative of the Austin specimens and the
132 best preserved. Representative living specimens were photographed by one of us (N.M.) are
133 hard, spreading thickly encrusting and a shade of white.

134 **External** (Figure 2A) Described from an alcohol-preserved specimen. Massive, irregular
135 shape, 88 mm L x 55 mm W x 60 mm H. Oscula on low conules, 2 mm diameter. Colour in
136 alcohol light brown. Consistency firm, preserved specimen easily torn.

137



138

139 Figure 2 *Haliclona (Flagellia) edaphus*. A in-situ high energy current swept area. B in-situ high
140 energy surf swept area. C whole preserved specimen. D ectosome and upper choanosome,
141 oblique view. E choanosome. F oxea. G thick Normal sigma. H immature Normal sigma. I
142 flagellosigma. A, B photographs only, no voucher specimens. C, RBCM 018-00262-001, D-I,
143 RBCM 018-00262-002.

144

145 **Skeleton** Ectosome (Figure 2D) Discontinuous layer of oxeas parallel to surface with
146 oxeas penetrating at various angles randomly along the surface. Ectosome 50 µm thick. Oxeas
147 penetrate up to 200 µm. Choanosome (Figure 2E) Vague multispicular reticulation of oxeas
148 around widely-spaced cavities a few hundred microns in diameter.

149

150 **Spicules** Spicules are oxeas including immature stages (abundant), Normal sigmas
151 including immature stages (common), and flagellosigmas (uncommon). Stylote forms of oxeas
152 occur occasionally. Oxeas (Figure 2F) are curved, have a cylindrical shaft and acerate apices

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153 slightly less than one fifth the total oxea length. Immature oxeas are about the same length as
154 fully developed ones but thinner. Normal sigmas (Figure 2G) have a generally uniform arc with a
155 0.06 width to chord length ratio and sharp, strongly recurved apices. Immature Normal sigmas,
156 while also C-shaped, have a more variable arc (typical form shown in Figure 2H), a width to
157 chord length ratio of approximately 0.03; apices are similar to thick Normal sigmas.
158 Flagellosigmas (Figure 2I) are typical for the subgenus (Van Soest 2017). Spicule dimensions of
159 BC specimens are listed in Table 1.

160 Table 1 *Haliclona (Flagellia) edaphus* BC Specimens Spicule Dimensions (μm)

Specimen	Oxeas	Normal sigmas fully developed	Normal sigmas immature	Flagellosigmas			
				Long Length	Short Length	Width	Thickness
KML 85/73 RBCM 018- 00262-002	242 (284) 315 x 11.7 (18.1) 21.0	33.8 (52.1) 68.9	44.2 (70.0) 96.2	70.2 (95.9) 107 ^a	36.4 (63.4) 72.8	46.8 (73.1) 93.6	2.6 (4.0) 7.3
KML 90A/73 RBCM 018- 00278-001	245 (285) 315 x 8.8 (16.9) 26.3	15.6 (46.5) 65.0	9.0 (64.7) 125	78.0 (89.8) 104 ^a	52.0 (60.5) 70.2	54.6 (63.3) 78.0	2.3 (2.7) 3.6
KML 240/70 RBCM 018- 00381-00	175 (273) 315 x 9.6 (17.1) 21.9	23.4 (53.6) 70.2	39.0 (68.5) 109	54.0 (88.0) 109 ^b	36.4 (62.6) 80.6	52.0 (69.1) 93.6	2.6 (4.2) 5.2
KML 89/77 RBCM 018- 00382-001	221 (300) 336 x 10.4 (20.3) 23.4	39.0 (55.8) 83.2	33.8 (67.8) 88.4 (n=40)	57.2 (81.9) 101 ^c	49.4 (55.9) 65.0	59.8 (71.5) 88.4	4.7 (5.2) 5.5
PBS 1960 non voucher specimen	263 (297) 357 x 13.0 (17.2) 19.5	44.2 (72.7) 91.0	23.4 (38.5) 49.4	75.4 (92.2) 112	39.0 (61.3) 80.6	41.6 (74.1) 101	1.3 (3.0) 5.2

161 ^a flagellosigmas n=15 ^b flagellosigmas n=14 ^c flagellosigmas n=6 ^d flagellosigmas n=17

162 **Distribution**

163 British Columbia (BC), west coast of Vancouver Island, intertidal to Graham Island, Haida
164 Gwaii, BC 66 m. The species in British Columbia is found on both inner and outer coasts.

165

166 **Remarks**

167 BC preserved specimens fit fairly closely the type description (de Laubenfels, 1932 as amended
168 by Lee, et al. 2007 and Van Soest 2017) with the following exceptions:

- 169 • oscula are up to 3 mm diameter vs. about 1 mm for California specimens, possibly a
170 preservation artifact of the BC specimens;
- 171 • oxeas are larger (to 389 x 26 μm vs. 300 x 15 μm of California specimens) possibly explained
172 by higher silica concentration in the BC sea water (Austin, et al. 2014, p. 8);

173

174 ***Haliclona (Gellius) Gray, 1867***

175 **World Distribution**

176 There are 78 *Haliclona (Gellius)* subspecies world-wide (de Voogd, et al. 2024). Nine species of
177 *H. (Gellius)* are reported for the North Pacific and three for the Northeast Pacific; two *Haliclona*
178 no subgenus species with at least oxeas and sigmas are also reported for the Northwest Pacific
179 (Japan) (Table 2).

180
 181 Table 2. North Pacific *Haliclona* (*Gellius*) and *Haliclona* No Subgenus Species with Oxeas and Sigmas

Species	Location	Depth (m)	External	Skeleton	Spicules
<i>Haliclona</i> (<i>Gellius</i>) cf. <i>cymiformis</i> (Esper, 1806).	Barkley Sound	Littoral	Erect, branching, encrusting. Surface smooth. Oscula flush, 0.8–1.5 mm. Colour in life dark green.	Unispicular isodictyal reticulation in ectosome; may be broken. Choanosome: unordered except 5–6 spicule short tracts. No spongin. Sigmas throughout sponge.	Oxeas: curved, long, sharp points, 128–160 x 2–7.5 µm. Sigmas: C, 16–20 µm.
<i>Haliclona</i> (<i>Gellius</i>) <i>emiletopsenti</i> Van Soest & Hooper, 2020 [formerly <i>Haliclona</i> (<i>Gellius</i>) <i>foraminosa</i> (Topsent, 1904)]	Barkley Sound	10 Topsent 200	Thickly encrusting; surface smooth. Colour in life yellow-grey.	Ectosome: thin membrane. Choanosome: loose unispicular network w/ small amount of spongin at intersects.	Thick oxeas: slightly curved, sharp points 435 x 16 µm. Slender oxeas: 435 x 3-5 µm.
<i>Haliclona</i> (<i>Gellius</i>) <i>laubenfelsi</i> Van Soest & Hooper, 2020 [formerly <i>Haliclona</i> (<i>Gellius</i>) <i>violacea</i> (de Laubenfels, 1950)]	Hawaii	1	Encrusting; oscula raised, sometimes on fistulae, 3 mm diameter. Ostia abundant, 30 µm diameter. Smooth surface. Translucent dermis over subdermal cavities. Colour in life violet.	Not recorded.	Oxeas: 120–140 x 4–7 µm. Toxas: 60 µm.
<i>Haliclona</i> (<i>Gellius</i>) <i>microxea</i> (Li, 1986)	China, Yulin	No data	The sponge is encrusting, attached on the shell of bivalves. No colour in life.	The skeleton consists of rather close-meshed reticulation of unispicule, the meshes are triangular or quadrilateral, the sides 100–150 µm long.	Oxea: two kinds, slightly curved, 154–196 x 3–7 µm; straight and finely echinated, slender raphides, 92–103 x 2–3 µm. Toxas: 70–86 x 2–3 µm. Sigmas: 14–22 x 1–2 µm. Microxeas: echinated, 33–36 x 2 µm.

Species	Location	Depth (m)	External	Skeleton	Spicules
<i>Haliclona (Gellius) primitiva</i> (Lundbeck, 1902) of Koltun (1958)	Southern Kuril Islands, western coast of S. Sakhalin Island, Sea of Okhotsk, Bering Sea	27–40	From Lundbeck: Encrusting, May be tubular. Dried yellowish.	From Lundbeck: Regular network, partly unispicular, but also polyspicular tracts, especially running in the direction towards the surface. The skeletal meshes are more or less rectangular. Especially the tracts running towards the surface (the primary ones) are distinct, while the tracts running vertically are less conspicuous. In the nodes of the skeleton the spicules are united by a distinct and rather copious mass of spongin.	Koltun Oxeas: curved, sharp points, 140–184 x 6–13 µm. Sigmas: C, 28–170 x 1–4 µm.
<i>Haliclona (Gellius) toxia</i> (Topsent, 1897) of Li (1986)	China, Beibu Gulf	No data	The sponge is irregularly massive, with some oscular tubes on the surface, the oscula opening several millimeters under the tip of the tube, 3–5 mm in diameter. No colour in life.	The dermal skeleton consists only of scattered oxea placed tangentially, the choanosome is a very close and pretty uniform reticulation of single oxeas.	Oxeas: slender, slightly curved, 175–180 x 7–9 µm. Toxas: two sizes, 28–35 µm. 65–115 x 3–5 µm.
<i>Haliclona (Gellius) varia</i> (Bowerbank, 1875) of Li (1986)	Hong Kong	No data	The sponge is attached below by an encrusting base, and forms an erect, leaf like plate branched, 1–2 mm thick. Oscula not visible.	The dermal skeleton consists of scattered area, typical of Halichondria, The choanosome is a loose, rather irregular reticulation.	Oxeas: slightly curved, end of some spicules variously shape, pointed, 212–215 x 5–11 µm. Sigmas: C, 22–31 x 2 µm.
<i>Haliclona (Gellius) vladimirkoltuni</i> Van Soest & Hooper, 2020 [formerly <i>H. (G.) digitata</i> (Koltun, 1958)	Sea of Okhotsk	285–287	The sponge is elongated, thin-leaf-shaped, rolled up and fused in such a way that it forms an irregularly shaped body, hollow inside and narrowed toward the base with hollow finger-like outgrowths. Sponge up to 7 cm high. Color in life light yellow.	Skeleton consists of branched tracts cross-connected by individual spicules.	Oxeas: slightly curved, moderately short, sharp points, 320–370 x 15–18 µm. Sigmas: C, 18–23 x 1–2 µm.

Species	Location	Depth (m)	External	Skeleton	Spicules
<i>Haliclona (Gellius)</i> cf. sp. of Hartman, 1975	Toba Inlet, Horseshoe Bay Hartman: central Cal, intertidal/subtidal	HB: 50	From Lee, et al. 2007 Encrusting to 12 mm thick. Colour in life rose lavender.	From Lee, et al. 2007 Ectosome: some oxeas at surface of dermal layer; others, stand on end and pierce the surface. Sigmas and spongin abundant in surface layer. Subdermal cavities present. Vertical unispicular and paucispicular tracts descend into the choanosome with horizontal and diagonal cross- spicules. Deeper in the choanosome a greater number of confused spicules occur, but a basic isodictyal pattern remains.	From Lee, et al. 2007 Oxeas: means, 170–190 x 7.0– 9.0 µm. Sigmas: C-shaped 24– 36 µm.
<i>Haliclona liber</i> (Hoshino, 1981)	Japan	12–13	Very thin encrusting. Surface smooth, even. Colour in life grey.	No ectosome. Choanosome loose, irregular reticulation. Primary tracts 30–50 µm thick. Secondary tracts 10–20 µm thick. Sigmas near tracts or in flesh.	Oxeas: slightly arched or bent in middle, tapering to apices, 150–175 x 6–8 µm. Sigmas: C, thin, 15 µm.
<i>Haliclona uwaensis</i> (Hoshino, 1981)	Japan	Subtidal	Very thin encrusting. Oscula not visible. Ivory buff dry.	No ectosome. Choanosome irregular coarse network of spiculo-fibre from 1–10 rows of spicules, 30 µm diameter. Numerous toxas and sigmas scattered in flesh.	Oxeas: slightly arched, hastate, tapering to apices, 150–185 x 6–10 µm. Toxas: thin, 28 µm. Sigmas: C, 10–22 µm.

183 *Haliclona (Gellius) hartmani* n. sp. (Figure 3)

184 Zoobank [yyyy](#)

185

186 **Diagnosis** Encrusting, porous sponge with no ectosome and a halichondrid choanosome.

187 **Etymology**

188 The sponge is named after Dr. Willard Hartman, who identified a similar sponge to genus from
189 central California.

190

191 **Material Examined**

192 Holotype RBCM 014-00223-008, station KML 241/82, Toba Inlet, BC, S side approximately 10
193 km from the entrance, 50° 24.671' N / 124° 30.531' W 15 m depth, 5 Dec 1982, collector W.C.

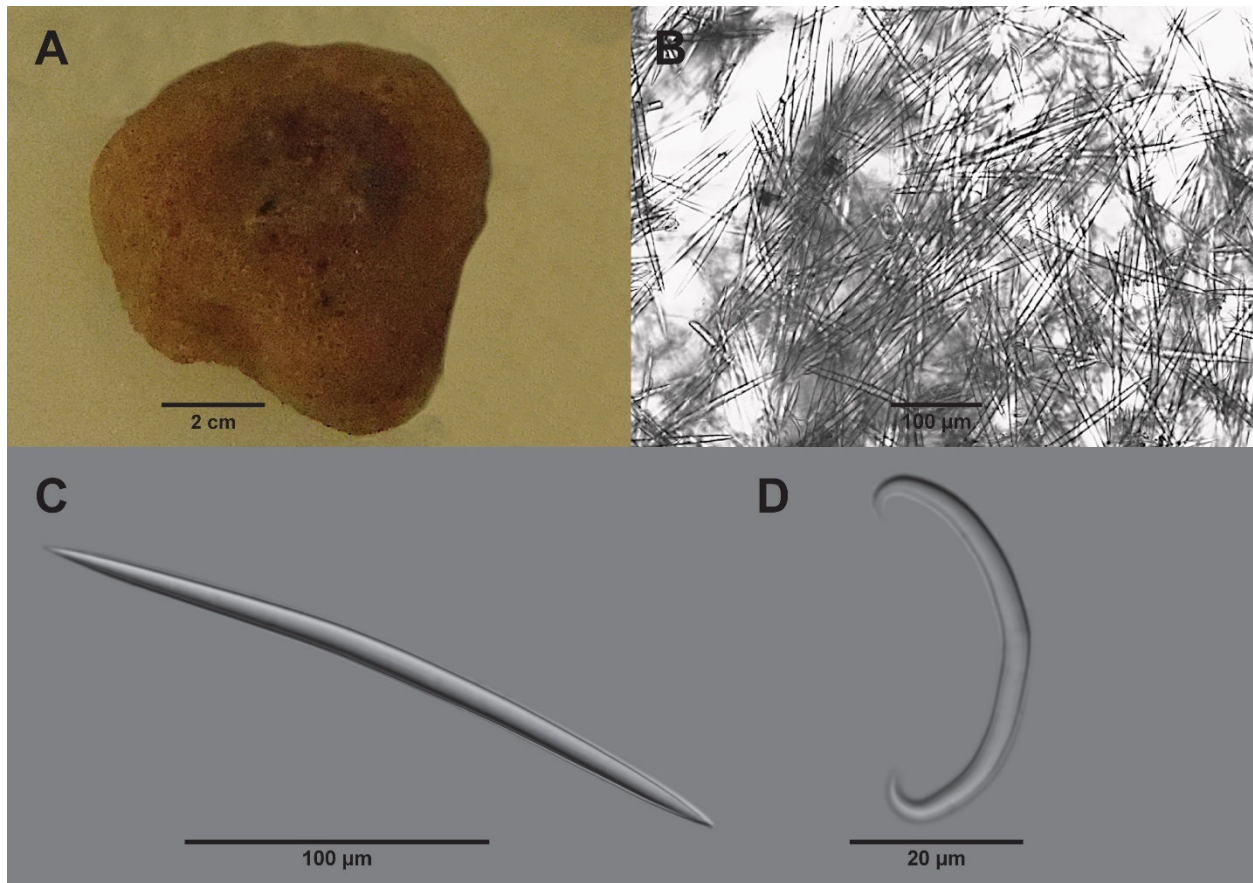
194 Austin, 1 specimen.

195

196 **Description**

197 **External** Described from an alcohol-preserved specimen. Sponge irregularly massive, 3
198 cm on a side. Oscula scattered, slightly raised on shallow conules 2–3 mm diameter. Surface
199 rough to touch. Colour light brown in alcohol. Consistency firm, not easily compressed (Figure
200 3A).

201



202

203 Figure 3 *Haliclona (Gellius) hartmani* n. sp. A-D: Holotype, RBCM 014-00223-008, A Sponge
204 top view. B Skeleton cross section. C Oxea. D Normal sigma.

205

206 **Skeleton** No specialized ectosome. Skeleton a confused arrangement of oxeas with vague
207 multispicular tracts. Sigmas scattered throughout (Figure 3B).

208 **Spicules** Spicules include oxeas and Normal sigmas. Oxeas are usually curved with
209 moderately long slightly mucronate apices, occasionally straight, 192 (225) 255 x 7.8 (10.1) 13.0
210 μm , abundant (Figure 3C). Immature oxeas common. Sigmas C-shape, 33.8 (45.1) 62.4 μm ,
211 abundant (Figure 2D).

212

213 **Distribution** Found only at the type locality, approximately 10 km from the entrance to Toba
214 Inlet, BC in 15 m of water; may be conspecific with Hartman's *Haliclona (Gellius)* species from
215 central California.

216

217 **Remarks**

218 The sponge was originally labeled by Austin in 1982 as *Sigmatocia* species of Hartman 1975
219 (based on the station label with the specimen). Based on the description of Hartman's sponge by
220 Lee, et al. (2007, p. 228), the BC sponge has a similar habitus (except Hartman's sponge is rose-
221 lavender and our BC specimen is white), skeletal structure and spicule types, but larger spicules
222 (BC oxeas to 255 μm vs California oxeas to 190 μm ; BC sigmas to 62 μm vs California sigmas
223 to 36 μm). There are no published records of Hartman's sponge from Oregon or Washington.

224

225 Comparisons with the brief descriptions in Table 2, none of the other listed species is sufficiently
226 similar to *H. (G.) hartmani* n. sp. to be considered conspecific.

227

228 ***Haliclona (Gellius) shishalhensis* n. sp.** (Figure 4)

229 Zoobank [yyyy](#)

230 **Diagnosis** Very open porous structure with a rigid unseparable ectosome and a ridged surface.
231 No ectosome, choanosome a vague anisotropic reticulation around large, numerous aquiferous
232 canals.

233 **Etymology** The species name means from Shishálh (English: Sechelt) home of the Shishálh
234 People, the location of the specimens described herein. Per the International Code of Zoologic
235 Nomenclature (4th Ed., 1999, Article 27) diacritical marks have been dropped from the species
236 name.

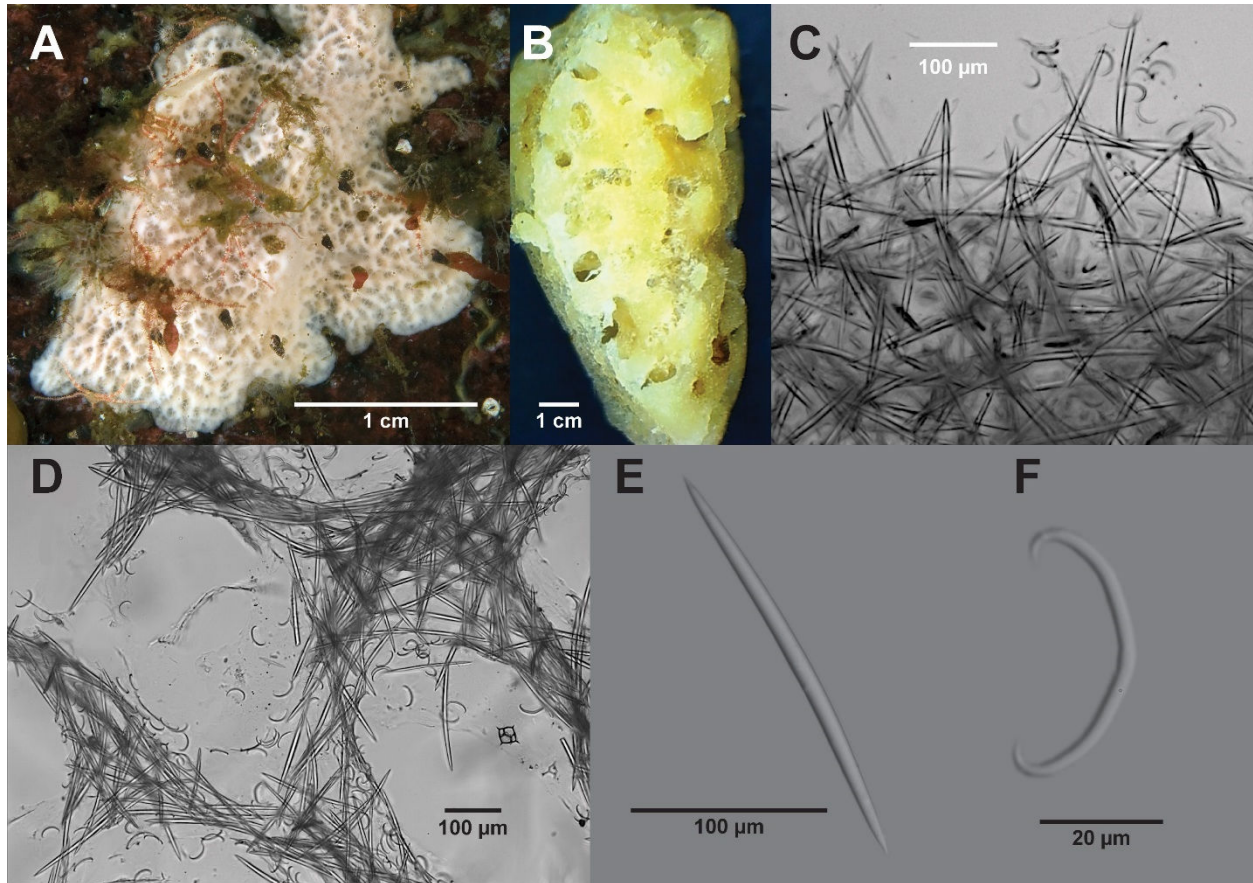
237 **Material Examined** Holotype RBCM 018-00383-001, station NM 341, Sakinaw Rock, Sechelt
238 Inlet, BC, 49° 33.947' N / 123° 48.222' W, 15 m, 26 July 2016, collector N. McDaniel, 1
239 specimen. Paratype RBCM 018-00152-006, station NM 240, Nine Mile Point, Sechelt Inlet, BC,
240 49° 36.293' N / 123° 47.139' W, 23 m depth, 12 May 2011, collector N. McDaniel, 1 specimen.

241

242 **Description**

243 **External** (Figure 4A) Sponge thickly encrusting 4 x 2 x 1.5 cm. Very porous, open
244 structure; ectosome 1 mm thick, fairly rigid, not detachable. Pores 100–300 μm diameter
245 (preserved). Area around pores slightly raised resulting in a network of ridges. Oscula are not
246 evident (separable from pores). In several places the sponge is completely hollow from the surface
247 to the substrate. Surface microhispid; spicules project 100 μm . White in life. Fairly easily torn.

248



249

250 Figure 4 *Haliclona (Gellius) shishalhensis* n. sp. A-F Holotype, RBCM 018-00383-001. A
251 Holotype in-situ. B Cross section showing cortex-like surface with large lacunae beneath. C
252 Skeleton cross section at surface. D Skeleton cross section in open part of choanosome. E Oxea.
253 F Normal sigma.

254

255 **Skeleton** There is no specialized ectosome structure but macroscopically a more dense
256 cortex-like layer is formed in the upper 1 mm. Subdermal lacunae 0.3 to 1.5 mm wide connect to
257 surface pores (Figure 4B). Single, or one to two oxeas on a side form an irregular anisotropic
258 reticulation with single oxeas slightly penetrating the surface up to 100 µm (Figure 4C). The
259 choanosome consists of short, multispicular tracts or compressed anisotropic reticulations around
260 large aquiferous canals (Figure 4D). In areas away from aquiferous canals an anisotropic
261 reticulation or occasional short multispicular tracts are formed. Aquiferous canals deeper in the
262 sponge average 400 µm diameter. Sigmas are located throughout the sponge. Spongin at nodes
263 scarce to absent.

264 **Spicules** Megascleres are oxeas, gently curved with sharp apices, 177–226 x 6.5–13 µm
265 (Figure 4E). Microscleres are C sigmas, uniformly curved or slightly bent at the centre, 16.9–
266 33.8 µm (Figure 4F). Dimensions of the two specimens examined are listed in Table 3.

267

268 Table 3: *Haliclona (Gellius) shishalhensis* n. sp. Spicule Dimensions (μm)

Station	Spicule	Length	Width
NM 341 RBCM 018-00383-001	Oxeas	182 (206) 226	6.5 (8.7) 13.0
	Sigmas	16.9 (22.7) 33.8	
NM 240 RBCM 018-00152-006	Oxeas	177 (197) 216	7.8 (8.7) 10.4
	Sigmas	20.3 (22.5) 27.0	

269

270 **Distribution** Found at two locations in Sechelt Inlet, BC about 5 km apart and at 15 and 23 m
271 depths.

272

273 **Remarks**

274 Two *Haliclona (Gellius)* species were reported by W.C. Austin (unpublished northeast Pacific
275 sponge list) for BC: a species similar to *H. (G.) foraminosa* Topsent, 1904 (now *H. (G.)*
276 *emiletopsenti* Van Soest & Hooper, 2020) in Jervis Inlet and a species similar to a sponge from
277 central California identified by Hartman (1975) as *Sigmatocia = Haliclona (Gellius)* per De
278 Weerdt (2002 [2004]) at Horseshoe Bay (since lost) and Toba Inlet. Topsent's sponge has two
279 sizes of oxeas and no sigmas (see Table 2) and was from the Azores, 200 m depth. Based on the
280 description of Hartman's sponge provided by Lee et al. (2007, p. 228) Hartman's sponge does
281 not have a cortex-like ectosome.

282

283 *Haliclona (Haliclona)* Grant, 1836

284

285 *Haliclona (Haliclona) mollis* n. sgen. (Lambe, 1893 [1894]) (Figures 5, 6)

286 Zoobank [yyyy](#)

287

288 We propose the reclassification of Lambe's *Haliclona mollis* (originally *Reniera mollis*) as
289 *Haliclona (Haliclona) mollis* (Lambe, 1893 [1894]) based on a reexamination of Lambe's slides
290 of his large and small specimens provided courtesy of the Canadian Museum of Nature (CMN).

291

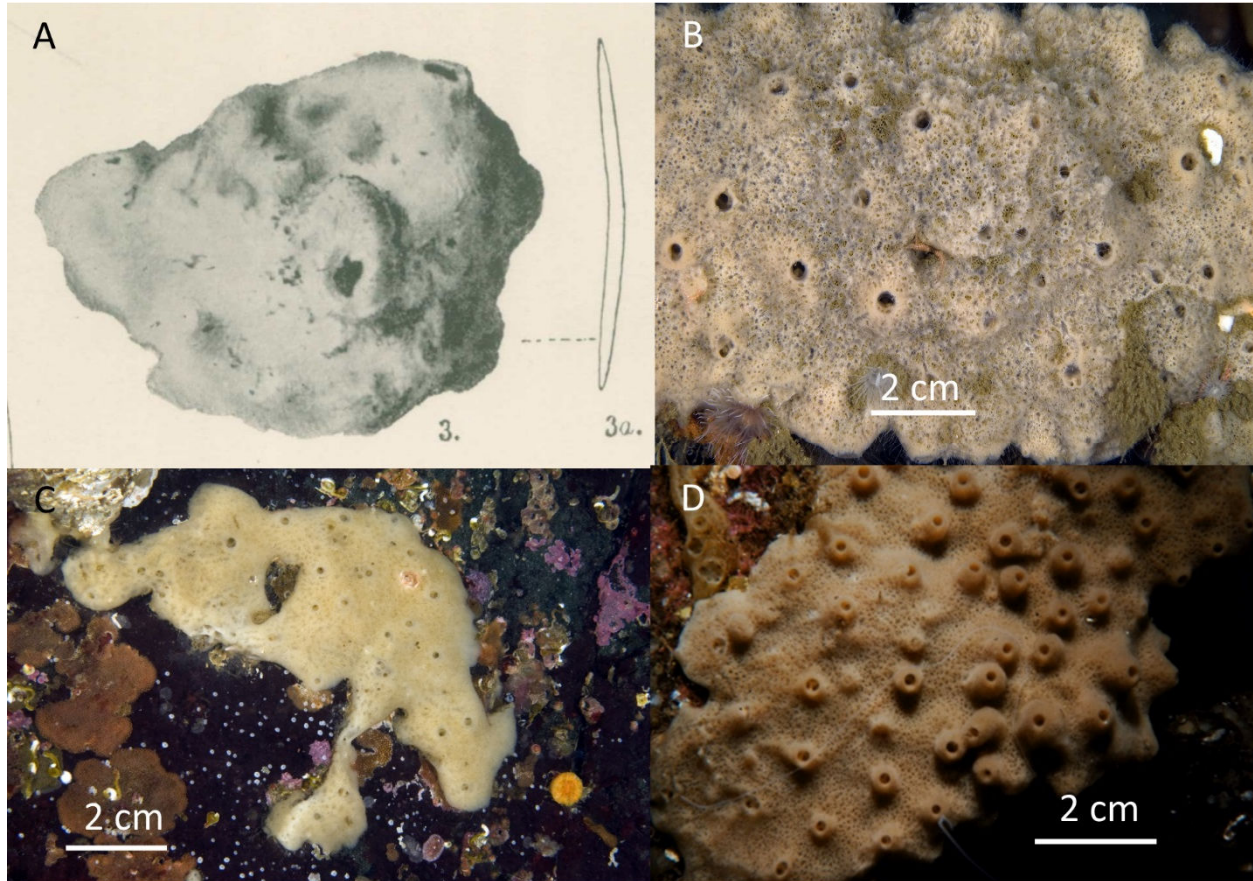
292 **Material Examined** Six syntype slides made by Lambe and labelled *Reniera mollis* (either
293 larger or small specimen), Labels indicate Elk Bay, Dis. Passage [Discovery Passage], 20–25
294 fath[oms] [40–50 m], GMD [G.M. Dawson], 23rd Jul/85 [23 July 1885]. CMN Cat. No. CMNI
295 1900-2875.

296

297 **Description**

298 **External** (from Lambe's paper, p. 26, pl. II, f. 3, 3a) *Sponge massive, sessile, growing in*
299 *sublobate masses. Represented in the collection by two specimens, one 90 mm. long, 55 mm. high*
300 *and 33 mm. thick, the other (Plate II, fig. 3) much smaller, 50 mm. long, 33 mm. broad and 30*
301 *mm. high. Colour in spirit, dull brownish-yellow. Texture soft and fragile. Surface uneven,*
302 *hispid. Dermal membrane thin, aspiculous. Oscula large, prominent, attaining a diameter of 5*
303 *mm; in the larger specimen the oscula form an indistinct uniserial row along the sides, but in the*
304 *smaller specimen they are irregularly disposed. Pores, appearing as circular or oval openings in*
305 *the dermal membrane over large subdermal cavities. They are about 0.065 mm. in width and less*
306 *than their width apart. Lambe's figure is reproduced here as Figure 5A. Habitus of specimens*
307 *photographed in-situ in BC vary and are discussed below.*

308



309

310 Figure 5 *Haliclona (Haliclona) mollis* A Lambe's holotype, CMN Cat. No. CMNI 1900-2875.

311 B–D In-situ representative BC specimens

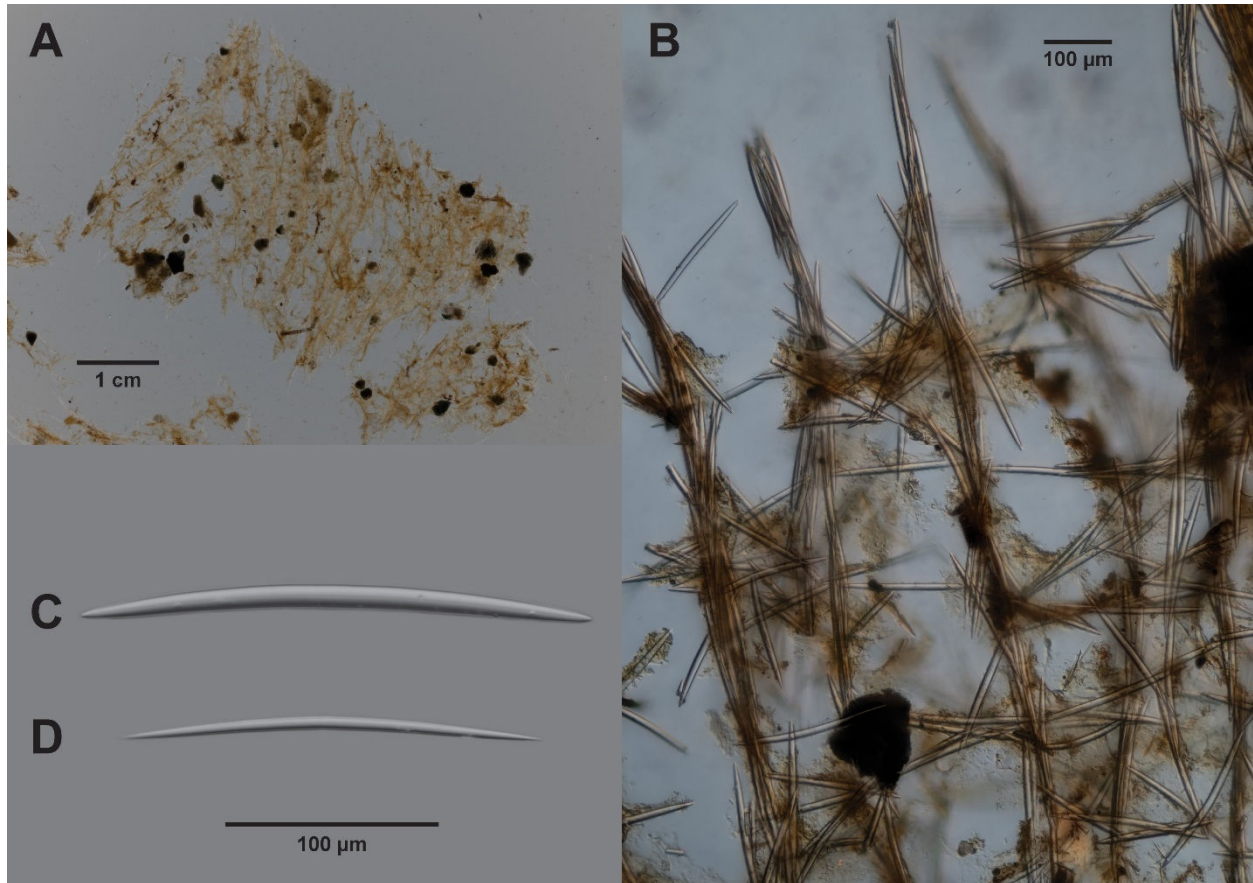
312

313 Lambe's specimens were massive whereas BC specimens shown (and reviewed) are thickly
314 encrusting, but otherwise identical to Lambe's sponge. In thinner specimens (Figure 5C) oscula
315 are not collared but approximately the same size. Colour in life varies from yellow to beige to
316 light brown. Consistency live is soft, easily torn.

317

Skeleton (described from the syntype slides)

318



319
320 Figure 6 *Haliclona (Haliclona) mollis*. A–D, CMNI 1900-2875. A Skeleton cross section;
321 surface upper right. B Skeleton close up near surface. C Oxea. D Immature oxea.

322

323 The skeleton consists of multispicular tracts running vertically from the base to the surface and
324 projecting slightly beyond the surface 200–300 µm (Figure 6A). The aspicious dermal
325 membrane mentioned by Lambe is not visible in the slides. Tracts are composed of 3 to 7
326 spicules, crossed at regular intervals by single spicules (occasionally up to 3), forming a
327 rectangular reticulation (Figure 6B). The distance between the principal vertical tracts is 127 to
328 297 µm (mean 208 µm) and the distance between horizontal cross spicules is 97 to 273 µm
329 (mean 176 µm). Disposed among the tracts are numerous aquiferous canals, 71 (161) 238 x 95
330 (312) 714 µm, n=20.

331 **Spicules** (described from the syntype slides). Spicules are exclusively oxeas, curved with
332 sharp hastate apices (Figure 6C). Immature oxeas are relatively abundant and differ only in being
333 thinner and (usually) shorter (Figure 6D). Our measurements are consistent with Lambe's as are
334 the other specimens included as examples of Southwest BC specimens (Table 4).

335 Table 4 Comparison of Lambe's and This Paper Measurements (μm)

336

Measurement Source	Length	Width	Number
Lambe Original	196–262	13	
Lambe Syntype CMNI 1900-2875	206 (242) 260	7 (11.1) 13	50
<i>Other BC H. (H.) mollis</i>			
PEI 04	208 (236) 265	5.2 (10.5) 13.3	50
NM 337	190 (225) 252	7.8 (10.3) 12.5	50
NM 371	221 (239) 263	10.4 (12.2) 13.0	50
Miles 2010.10.25	200 (237) 273	10.4 (12.0) 13.3	50
KML 110/75	179 (212) 239	9.9 (12.7) 15.6	50

337

338 **Distribution**

339 Based on examined specimens: southern BC, +0.6 m to 50 m.

340

341 ***Haliclona (Reniera) Schmidt, 1862***

342

343 ***Haliclona (Reniera) gesteta n. sp.*** (Figure 7)

344 Zoobank [yyyy](#)

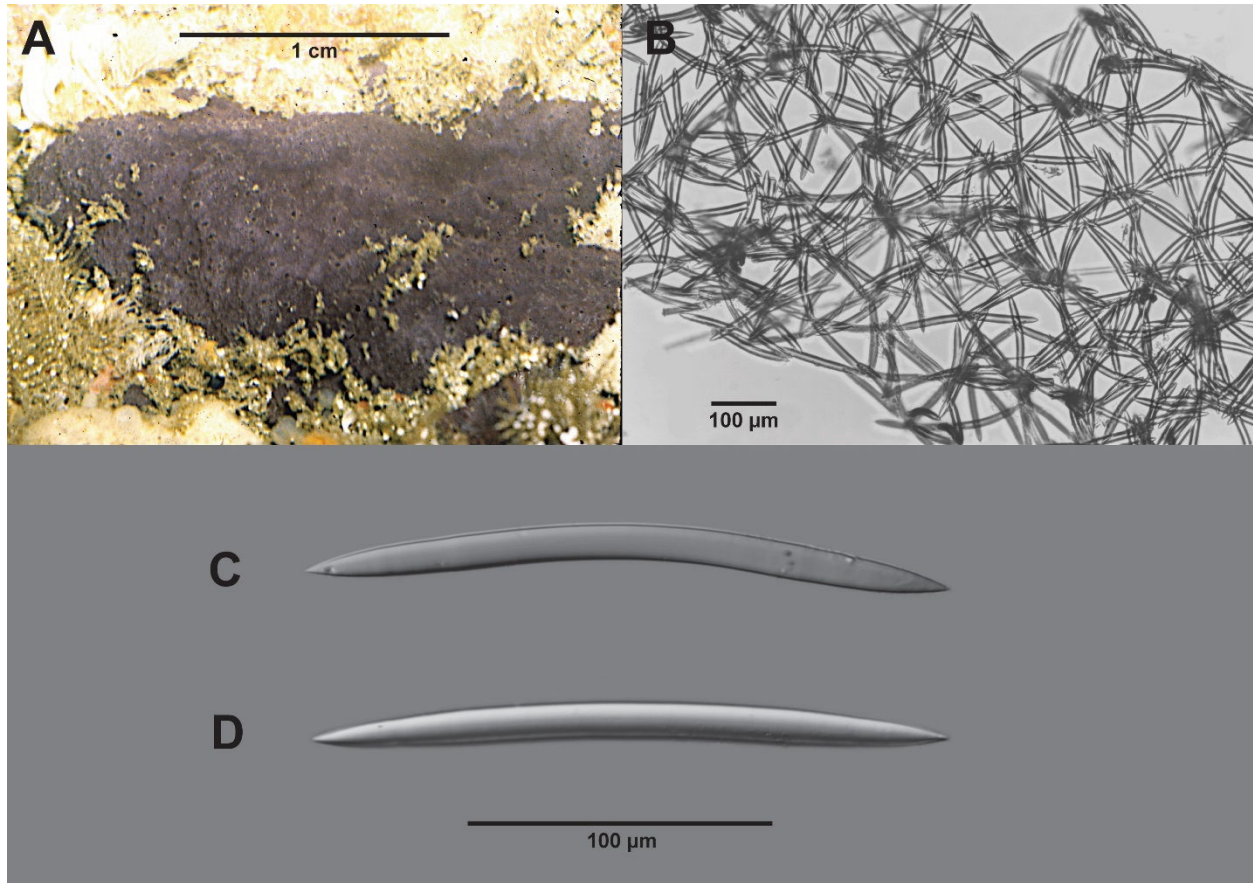
345 **Etymology** The species name refers to its mauve colour.

346 **Diagnosis** Thin encrusting purple sponge with a micropapillate surface and small flush scattered
347 oscula.

348 **Material Examined** Holotype RBCM 018-00272-001, station KML 80A/73, Execution Rock
349 Cave, Barkley Sound, BC, 48° 49.9' N / 125° 10.7' W, littoral, 5 Aug 1973, collector W.C.
350 Austin, 1 specimen.

351 **Description**

352 **External** (Figure 7A) Thin encrusting, sponge 1.8 by 1.4 cm, base 0.8 mm thick.
353 Micropapillae 2 mm high by 1 mm diameter, scattered. Oscula scattered about 3 mm diameter on
354 live sponge. Base of sponge slightly rough. Colour mauve. Consistency soft, easily torn.



355
356 Figure 7 *Haliclona (Reniera) gesteta* n. sp. A–D, Holotype, RBCM 018-00272-001. A in-situ
357 (photo W.C. Austin). B Skeleton cross section. C, D Oxeas.

358

359 **Skeleton** The skeleton is typical renierid forming a subisotropic reticulation one spicule
360 on a side with numerous loose spicules in the choanosome (Figure 7B). Spongin confined to
361 some nodes. No evidence of spicule tracts. No specialized ectosome. Aquiferous canals 150 x
362 250 µm, oval, well-formed, not numerous [not figured].

363 **Spicules** (Figure 7C, D) Oxeas curved, hastate apices, few immature, rarely straight; rare styles,
364 140 (152) 164 x 10.4 (13.7) 15.9 µm.

365 **Distribution**

366 Known from the type locality only, Execution Rock Cave, Barkley Sound, littoral.

367 **Remarks**

368 The oxeas are typical of the subgenus as is the skeletal architecture. Austin (unpublished NE
369 Pacific sponge list) identified two California species identified by Hartman (1975) as *Reniera* sp.
370 A & B as occurring in BC. However, Lee et al. (2007) reclassified Hartman's *Reniera* sponges as
371 *Haliclona (Rhizoniera)* species. There are six accepted *H. (Reniera)* species described for the
372 North Pacific (de Voogd, et al. 2024): *H. (R.) enormismacula* Hoshino, 1981 and *H. (R.) negro*
373 (Tanita, 1965) from Japan; and *H. (R.) hongdoensis* Kang & Sim, 2007, *H. (R.) juckdoensis* Kim
374 & Kang, 2020, *H. (R.) oceanus* Kim & Kang, 2020, and *H. (R.) sinyeoensis* Kang, Lee & Sim,
375 2013 from Korea. None are thin encrusting. *Haliclona (R.) sinyeoensis* is purple or pink but is
376 cushion-shaped with oscula on chimneys.

377

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378 There are 32 *Haliclona* no subgenera species reported for the North Pacific (de Voogd, et al.
379 2024). Ten are thin encrusting (listed in Table 5). *Haliclona liber* has sigmas, *H. uwaensis* has
380 toxas and sigmas, *H. takaharui* has two sizes of oxeas. Skeletons of *H. hydroida*, *H. liber*, *H.*
381 *offerospicula*, *H. tachibanaensis* and *H. takaharui* skeletons have spicule tracts. Of the remaining
382 species, *H. densaspicula* is hard with visible oscula and colour is brown, *H. robustaspicula* has
383 oscula up to 1 mm, cinammon pink colour and a skeleton with occasional tracts, *H. sataensis* is
384 hard, old rose colour and a skeleton with occasional tracts, *H. scabrita* has a puntate smooth
385 surface, light pinkish beige in colour, a skeleton with occasional tracts and oxeas smaller than *H.*
386 *gesteta* **n. sp.** (130–170 x 8–9 μ m).
387

388 Table 5 *Haliclona* No Subgenus North Pacific Species Similar to *H. (R.) gesteta* n. sp.

<i>Haliclona</i> Species	Loc	Depth (m)	External	Skeleton	Spicules
<i>Haliclona densaspicula</i> Hoshino, 1981	Japan	Intertidal	Sponge 3x3x<0.5 cm. thick. Smooth, even. Oscules 0.2-0.5 cm diameter. Colour in life brown. Consistency hard, fragile.	No ectosome. Choanosome: isodictyal or subisodictyal reticulation. Numerous free oxeas.	Oxeas: hastate, straight or gently curved, 185–250 x 3–15 µm.
<i>Haliclona hydroida</i> Tanita & Hoshino, 1989	Japan	20–25	Encrusting, 1–2 mm. Surface smooth, punctiform, uneven. Oscula not visible. Colour (alcohol) ivory buff. Consistency compressible, not tough.	No ectosome. Choanosome regular network of primary and secondary tracts. Primary tracts 20 µm diameter, multispicular, ascending 100–200 µm apart. Secondary few rows of oxea between primaries at 500–100 µm. Primaries form surface brushes.	Oxeas: stout, hastate, 120–145 x 7–12 µm.
<i>Haliclona liber</i> (Hoshino, 1981)	Japan	12–13	Very thin encrusting. Surface smooth, even. Colour grey. Consistency soft.	No ectosome. Choanosome: loose, irregular reticulation. Primary tracts 30–50 µm thick. Secondary tracts 10–20 µm thick. Sigmas near tracts or in flesh.	Oxeas: slightly arched or bent in middle, tapering to points, 150–175 x 6–8 µm. Sigmas: C, thin, 15 µm.
<i>Haliclona offerospicula</i> Hoshino, 1981	Japan	Intertidal	Small, irregular, thin. Smooth to touch. A few oscules, 2 mm diameter. Colour in life ivory buff. Consistency slightly compressible, fragile.	No ectosome. Choanosome: unispicular tracts 40–50 µm apart ascend to surface. Irregularly connected with oxeas.	Oxeas: straight to slightly curved with sharp points, 75–90 x 2–3 µm.
<i>Haliclona robustaspicula</i> Hoshino, 1981	Japan	Subtidal	Thin encrusting other sponges. Surface smooth or undulating. Oscules up to 1 mm loosely spaced. Colour in life cinammon pink. Consistency incompressible	No ectosome. Choanosome: irregular isodictyal reticulation w/ occasional irregular reticulation of bi and tri-spicule tracts.	Oxeas: hastate, gently curved or arched by bending twice at 1/3 spicule length, 265–295 x 11–13 µm.
<i>Haliclona sataensis</i> Hoshino, 1981	Japan	Subtidal	Irregular, thin, to 2 cm thick. Surface smooth, oscules not visible. Colour in life old rose. Consistency hard, incompressible.	No ectosome. Choanosome: isodictyal reticulation; occasional irregular reticulation or tracts.	Oxeas: hastate, nearly straight, sharp points, 140–155 x 6–7 µm.
<i>Haliclona scabritia</i> Tanita & Hoshino, 1989	Japan	62–72	Thin, encrusting on stone, 50 x 35 mm x 1–2 mm thick. Surface punctate, smooth, almost even. Oscula not visible. Light pinkish beige in alcohol Consistency soft, fragile.	No ectosome. Endosome subisodictyal reticulation or occasionally irregular reticulation of oxeas.	Oxeas: uneven, straight to gently arched, rounded points, 130–170 x 8–9 µm.
<i>Haliclona tachibanaensis</i> Hoshino, 1981	Japan	Intertidal to subtidal	Irregular, thin to 1.5 cm with several swellings. Surface minutely hispid, uneven. Oscules 2–2.5 mm diameter, 0.8–1 cm apart on collars <1 mm high. Colour warm grey. Consistency slightly compressible, not tough.	No ectosome. Choanosome: reticulation of primary tracts and subisodictyal network. Primary tracts bi and trispicular, 15 µm diameter and ascending 50–120 µm apart. Primary tracts connected with subisodictyal reticulation. No tracts in deep part of sponge.	Oxeas: fusiform to hastate, straight to weakly bent in middle tapering to sharp points, 100–125 x 2–6 µm.

<i>Haliclona</i> Species	Loc	Depth (m)	External	Skeleton	Spicules
<i>Haliclona uwaensis</i> (Hoshino, 1981)	Japan	Subtidal	Very thin encrusting. Oscula not visible. Colour ivory buff dry. Consistency very soft.	No ectosome. Choanosome: irregular coarse network of spiculo-fibre from 1–10 rows of spicules, 30 µm diameter. Numerous toxas and sigmas scattered in flesh	Oxeas: slightly arched, hastate, tapering to points, 150–185 x 610 µm. Toxas: thin, 28 µm. Sigmas: C, 10–22 µm.
<i>Haliclona takaharui</i> Van Soest & Hooper, 2020 [<i>Haliclona viola</i> Hoshino, 1981]	Japan	Intertidal, low subtidal	Thin, 0.2–7 cm thick. surface smooth, uneven. Oscules 23 mm diameter, scattered over surface 0.7–1 cm apart. Oscula areas slightly swollen, 1–2 mm high. Colour in life deep purple. Consistency soft.	No ectosome. Choanosome: vague tracts 10–30 µm diameter, 2–17 oxeas, ascending from substratum 50–100 µm apart. Cross connected with irregular reticulated oxeas.	Oxeas: hastate, straight or slightly bent at middle and sharp points, 130–155 x 5–8 µm. Oxeas: thin, fusiform, gently curved, tapering to points, 100–145 x 1–5 µm.

Based on the comparisons discussed above *H. (R.) gesteta* is a new species and the only one recorded from BC which has not been reclassified from an original designation as *Reniera*.

***Haliclona (Rhizoniera)* Griessinger, 1971**

Haliclona (Rhizoniera) is defined as *Chalinidae* with a regular anisotropic, ladder-like choanosomal skeleton consisting of pauci- to multispicular ascending primary lines, connected by unispicular secondary lines. Ectosomal skeleton usually absent, if present, consisting only of some vaguely strewn tangentially orientated oxeas. Spongin scarce or absent (de Weerd 2002 [2004]). Primary spicular tracts are typically somewhat wavy in BC specimens.

There are six species of *H. (Rhizoniera)* described for the North Pacific listed in Table 6; two of these are to subgenus only and two were misapplied to a Northeast Atlantic *Haliclona (Reniera) cinerea* (Grant, 1826).

Table 6 North Pacific *Haliclona (Rhizoniera)*

Species	Location/Depth (m)	External	Skeleton	Spicules
<i>Haliclona (Rhizoniera) enamela</i> Laubenfels, 1930	Central California, intertidal	Encrusting to 2 mm thick with oscula on raised collars to 1.5 mm diameter. Colour in life is “drab”, i.e. light beige.	No ectosome; the choanosome has a reticulation of primary (6 to 8 spicules) and secondary (1 to 2 spicules) tracts.	Oscula 120–157 x 4.0–7.0 µm.
<i>Haliclona (Rhizoniera) rufescens</i> (Lambe, 1892 [1893]) Austin specimen: RBCM Cat. # 018-00370-001.	Lambe: Bering Sea, beach wash; Austin: Alaska, 0.13 m	Lobate subramose to nearly massive. Surface slightly rough to the touch. Oscula circular, each at the summit of a branchlet and with an average diameter of 2 mm.	Renierid in arrangement, a uniserial, moderately regular reticulation.	Oxeas: small, stout, rather sharply pointed, slightly curved, smooth; average size 144 x 13 µm.
<i>Haliclona (Rhizoniera)</i> sp. A (Hartman, 1975) (of Lee, et al. 2007)	Central California, intertidal and subtidal	Encrusting to 2 cm thick. Surface irregular. Oscules 2–7 mm in diameter, flush with surface or with raised rims to 10 mm high. Rose lavender	Vertical multispicular tracts, with cross spicules horizontal, diagonal, or irregular.	Oxeas: 130–188 x 3.0–11 µm.
<i>Haliclona (Rhizoniera)</i> sp. B (Hartman, 1975) (of Lee, et al. 2007)	Central California, intertidal	Encrusting to 5 mm thick. Surface smooth. Oscules less than 1–2 mm across, barely raised above surface. Grey-blue.	Vertical multispicular tracts; cross spicules horizontal, diagonal, or irregular.	Oxeas: 120–174 x 4.0–10 µm.
<i>Haliclona (Rhizoniera)</i> sp. (formerly- <i>Haliclona (Reniera) cinerea</i> (Grant, 1826) [of de Laubenfels, 1932])	Central California, intertidal	Encrusting to 3 cm. Oscules conspicuous with raised, crater-like rims, 2-5 mm diameter. Surface, superficially very porous, crowded with depressions about 200 µm diameter. Lavender to drab brown.	Ectosome: inconspicuous. Fleishy dermal membrane. Choanosome: isodictyal reticulation with a few vague spicular tracts.	Oxeas: 135–169 x 4.0–9.7 µm.

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Species	Location/Depth (m)	External	Skeleton	Spicules
<i>Haliclona cinerea</i> [of Lambe, 1893 [1894]]	BC, intertidal	Encrusting to 2 mm. 3 oscula 1 mm diameter. Dull yellow.	Not described.	Oxeas: 98–111 x 6 µm.

***Haliclona (Rhizoniera) arborescens* n. sp.** (Figure 8)

Zoobank [yyyy](#)

Etymology The name refers to the thin branching habitus of the sponge.

Material Examined Holotype RBCM 018-00385-001, station NM 415, 9 Mile Point, Sechelt Inlet, BC, 49° 36.304' N / 123° 47.131' W, 10 m depth, 8 May 2020, collector N. McDaniel, one specimen. Paratype RBCM 018-00133-001, station NM 317, Indian Arm, BC, 49° 25.134' N / 122° 51.647' W, 20 m depth, 14 Oct 2015, collector N. McDaniel, 1 specimen.

Description

External (Figure 8A) Sponge flattened blind tubular branches that irregularly anastomose, spreading indefinitely; individual branches 6 x 0.3 cm on average. Surface microhispid (Figures 8B, C); spicules project individually up to 200 µm. Oscula not visible; ostia minute (preserved), densely covering sponge branches. Colour pale light brown to nearly white. Consistency: soft, easily compressed and fairly easily torn.

Skeleton (Figures 8D, E) No specialized ectosome. Skeleton composed of approximately parallel primary spicule tracts becoming vague in much of the sponge. Primary tracts are separated approximately 150 µm and are composed of 2 to 4 spicules varying in number along their lengths. Primary tracts are cross connected by single to double spicules predominantly approximately at right angles spaced at approximately 150 µm, forming a roughly isodictyal reticulation. Some meshes may be polygonal and the reticulation is not constant throughout the sponge body. Spongin absent.

Spicules (Figures 8F) Oxeas: gently curved, occasionally nearly straight; apices sharp, hastate, slightly mucronate, occasionally rounded. Rarely stylote. Immature oxeas fairly common, typically obtaining fully developed length before fully developed width rendering the apices acerate. Table 7 lists spicule dimensions of specimens examined (immature spicules excluded).

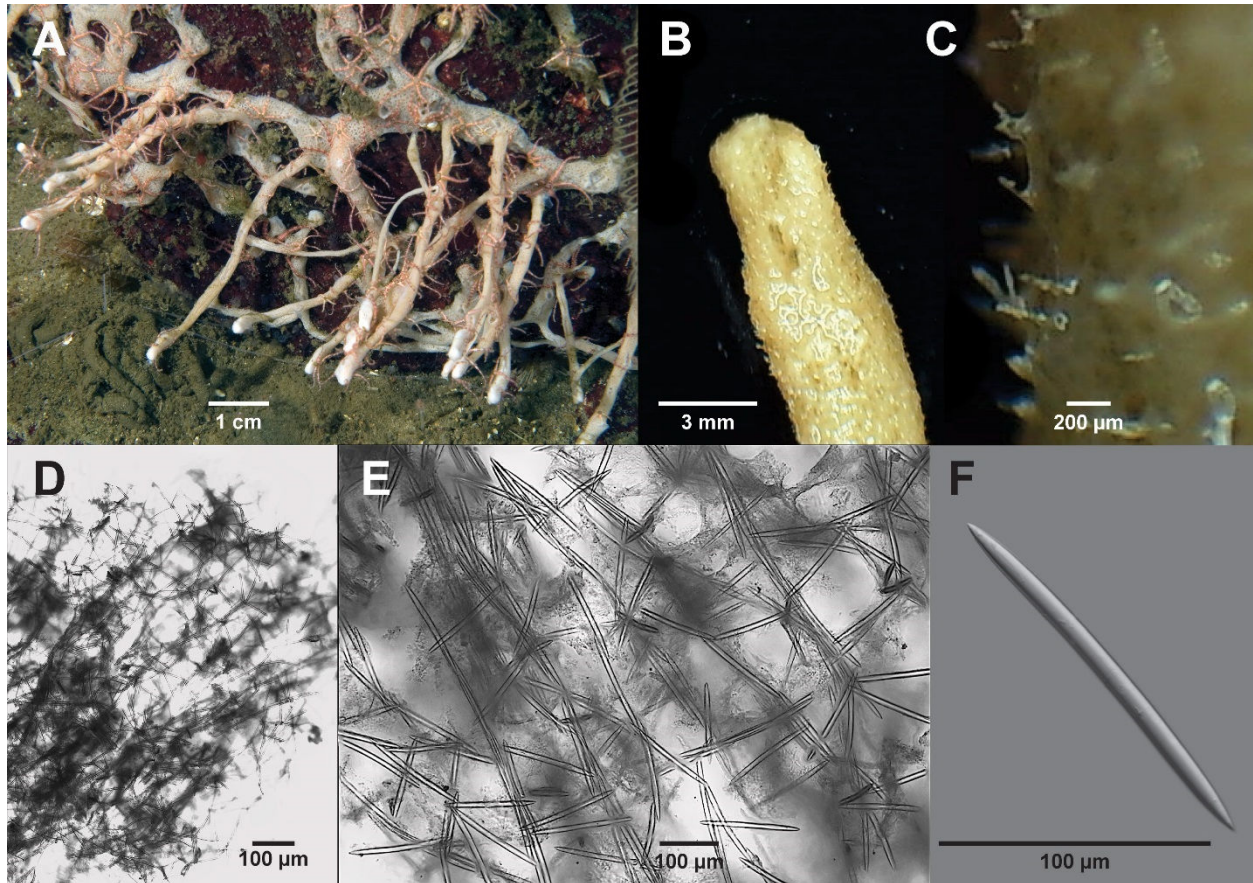


Figure 8: *Haliclona (Rhizoniera) arborescens* n. sp. A–F, Holotype, RBCM 018-00385-001. A in-situ. B Branch close up. C Branch surface. D Skeleton cross section. E Spicule tracts. F Oxea.

Table 7 *Haliclona (Rhizoniera) arborescens* n. sp. Oxea Dimensions (μm)

Specimen	Length	Width
NM 415 RBCM 018-00385-001	168 (204) 229	10.1 (11.4) 13.0
NM 317 RBCM 018-00133-001	161 (198) 221	7.8 (10.4) 13.5

Distribution Two specimens have been found, widely separated: Sechelt Inlet (10 m depth) and Indian Arm of Burrard Inlet (20 m depth).

Remarks

This sponge fits the subgenus *Haliclona (Rhizoniera)* due to the lack of spongin and lack of a specialized ectosome. Otherwise the skeletal architecture is more typical of subgenus *Haliclona*. See De Weerd (2002 [2004]) for additional discussion. *Haliclona (R.) arborescens* n. sp. is branched unlike the other *H. (Rhizoniera)* species described in this report. There are currently 22 accepted species in the subgenus *Rhizoniera* (de Voogd, et al. 2024) with two reported for the North Pacific (Table 6). Referring to Table 6, none of the *H. (Rhizoniera)* species are branched except *H. (R.) rufescens* which has lobate branches but differs from *H. (R.) arborescens* n. sp. in having oscula on raised collars and smaller oxeas.

There are two *Haliclona* no subgenus reported for the North Pacific with a branching habitus: one from Japan, one from South Korea and one from the Pacific coast of Panama. *Haliclona daepoensis* (Sim & Lee, 1997) from South Korea has toxas as well as oxeas, *H. frondosa* Hoshino, 1981 from Japan has two sizes of oxeas. Based on these comparisons *H. (R.) arborescens* n. sp. is a previously undescribed species.

***Haliclona (Rhizoniera) blanca* n. sp.** (Figure 9)

Zoobank [yyyyy](#).

Etymology The name refers to the colour of the living sponge.

Material Examined Holotype RBCM 018-00152-008, station NM 237, 9 Mile Point, Sechelt Inlet, BC, 49° 36.216' N / 123° 47.396' W, 23 m depth, 12 May 2011, collector N. McDaniel, G. Grognet, 1 specimen.

Description

External (Figure 9A) Thin encrusting following contours of substrate, 3 cm diameter by 1.5 mm thick. Surface punctate with visible subdermal canals radiating from oscula. Oscula and pores both about 1 mm diameter. Colour in life white. Consistency soft, easily torn.

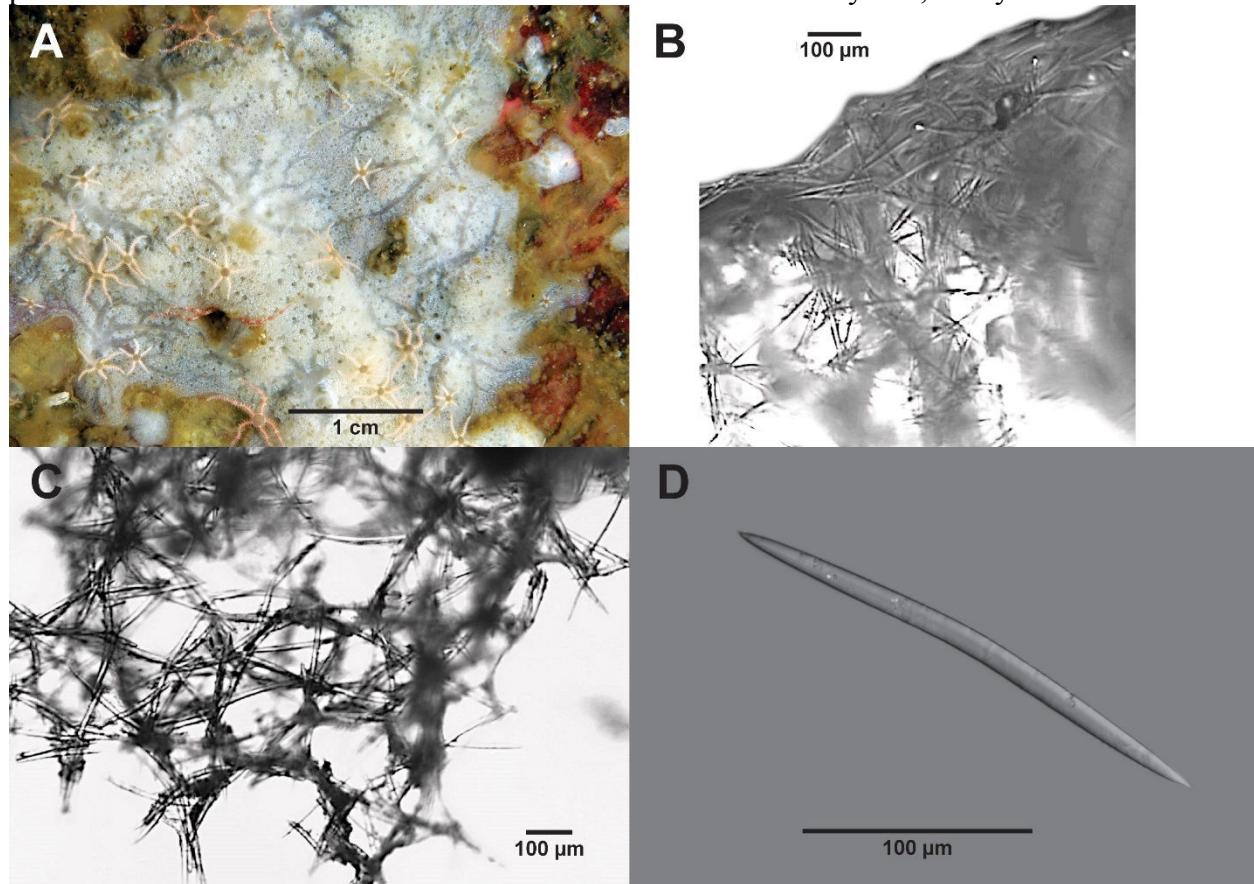


Figure 9 *Haliclona (Rhizoniera) blanca* n. sp. Holotype, RBCM 018-00152-008. A in-situ, B oblique view of ectosome, C choanosome, D Oxea.

Skeleton Ectosome (Figure 9B) roughly tangential multilayer of oxeas 100 to 200 µm apart, 50 to 100 µm thick, penetrated in places by choanosome principal spicule tracts which

project 50 to 100 μm . Choanosome (Figure 9C) fairly regular isodictyal reticulation 200 to 250 μm apart; principal multispicular tracts composed of two or more bundles cross connected by single spicules at approximately one spicule intervals.

Spicules (Figure 9D) Exclusively oxeas, most uniformly curved; some straight; most with moderately short apices: 208 (247) 268 x 9.1 (12.1) 14.3 μm . Styles rare and likely modified oxeas.

Distribution Known only from the type location: Sechelt Inlet, BC, 23 m depth.

Remarks

The presence of a specialized ectosome sets this sponge apart from other northeast Pacific *Haliclona* species described in this report. None of the reported North Pacific *H. (Rhizoniera)* have a specialized ectosome (Table 6). *Haliclona cylindrica* (Tanita, 1961) accepted as *Haliclona tanitai* Van Soest & Hooper, 2020 from Japan is a cylindrical tube with a separate ectosome but spicules include toxas as well as oxeas. *Haliclona daepoensis* (Sim & Lee, 1997) from South Korea is an erect branching sponge with an ectosome of tangential oxeas and toxas. There are no other North Pacific *Haliclona* no subgenus with a specialized ectosome. Based on comparisons, *H. (R.) blanca* is a new species for the North Pacific.

***Haliclona (Rhizoniera) boothiensis* n. sp.** (Figure 10)

Zoobank [yyyyy](#).

Etymology The name refers to the holotype location, Booth Inlet, Salt Spring Island, BC

Material Examined Holotype RBCM 019-00136-002, station RH 2019-09-13-04, Booth Inlet, Salt Spring Island, BC, 48° 51.868' N / 123° 32.400' W, intertidal, 13 Sep 2019, collector R. Harbo, 1 specimen.

Paratypes: RBCM 024-00003-001, station RH 2019-08-18-04, Booth Inlet, Salt Spring Island, BC, 48° 51.868' N/123° 32.400' W, intertidal, 18 Aug 2019, collector R. Harbo, 2 specimens. RBCM 024-00002-001, station RH 2019.09.13-01, Booth Canal Road, Salt Spring Island, BC, 48° 51.714' N/ 123° 31.739' W, intertidal, 13 Sep 2019, collector R. Harbo, 1 specimen. RBCM 024-00002-002, station RH 2019.09.13-02, Booth Canal Road, Salt Spring Island, BC, 48° 51.714' N/ 123° 31.739' W, intertidal, 13 Sep 2019, collector R. Harbo, 1 specimen. RBCM 018-00386-001, station RH 2000, Chain Point, Graham Is., Haida Gwai, BC, 53° 43' N/132° 43' W, intertidal, 28 Aug 2000, collector R. Harbo, 1 specimen. RBCM 024-00004-001, station RH 200725, Ayum Creek, Sooke Basin, BC, 48°23.433' N/123°39.500' W, intertidal, 25 Jul 2020, collector R. Harbo, 1 specimen. Station BO 18-08, Page Point, BC, 49° 0.664' N/ 123° 49.241' W, mid intertidal, 10 Sep 2018, collector R. Harbo, 1 non voucher specimen.

Description

External (Figures 10A, B, C) Sponge encrusting, 7 x 12 cm x 5 mm thick (including chimneys). Surface densely packed with conical chimneys, 3 mm at base, 3 mm high with 1 mm diameter apical oscula. Some specimens have bent conical fistulae, blind or terminated by an osculum (Figure 10C). The area between chimneys is finely papillate. Colour in life pink to redish pink. Consistency spongy, easily torn.

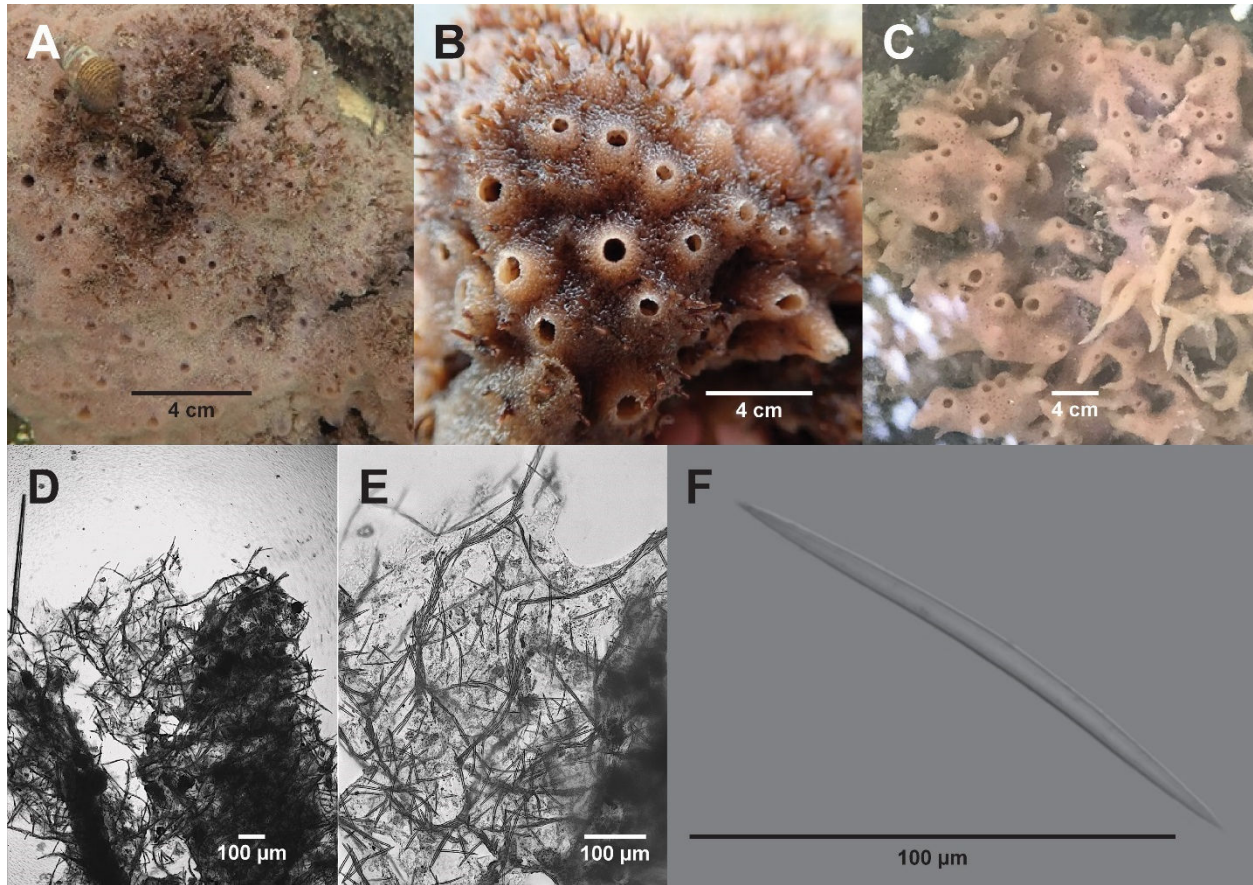


Figure 10 *Haliclona (Rhizoniera) boothiensis* n. sp. A, B, D–F Holotype, RBCM 019-00136-002. A in-situ. B close up in-situ. C variable habitus (photo P. Menning, DFO). D skeleton cross section at osculum. E Close up skeleton. F Oxea.

Skeleton (Figures 10D, E) Branching and anastomosing multispicular tracts cross connected by single or multiple spicules at various angles forming a very irregular reticulation. Primary tracts are 1 spicule apart (about 100 μm) and 3–6 spicules wide. No specialized ectosome. Choanosome tracts carry to the surface and penetrate a few microns as single oxeas. Aquiferous canals numerous and elliptical (small forms) to elongate with curved sides (larger forms), 50 to 250 μm long axes.

Spicules (Figures 10E) Oxeas: curved, or straight, tapering from centre to acerate apices; a few immature; uncommonly centrotylote in some specimens. Oxeas 83–153 x 2.6–8.1 μm . Table 9 provides oxea dimensions for specimens examined.

Table 9 *Haliclona (Rhizoniera) boothiensis* n. sp. Oxea Dimensions (μm)

Specimen	Length	Width
RH 2019-09-13-04 RBCM 019-00136-002	104 (116) 143	4.4 (5.5) 7.5
RH 2019-08-18-04 RBCM 024-00003-001	83 (100) 117	2.6 (4.7) 5.5

Ott, McDaniel, Harbo, MacIntosh
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Specimen	Length	Width
RH 2019-09-13-01 RBCM 024-00002-001	101 (115) 130	5.2 (6.0) 7.8
RH 2019-09-13-02 RBCM 024-00002-002	104 (119) 138	4.9 (5.8) 7.8
RH 2000 RBCM 018-00386-001	78 (93) 104	5.2 (6.7) 8.1
RH 200725 RBCM 024-00004-001	68 (96) 120	3.1 (6.3) 8.1
BO 18-08	91 (104) 114	2.9 (5.4) 7.8

Distribution Haida Gwaii, Salt Spring Island, Ladysmith Harbour, Hammond Bay and Sooke Basin (Aryn Creek), Vancouver Island, intertidal.

Remarks

is similar to *Haliclona permollisimilis* Hoshino, 1981 in habitat (littoral), colour, oxeas and skeletal organization but differs in having oscula on chimneys. *Haliclona (Rhizoniera) boothensis* **n. sp.** is a fairly common intertidal *Haliclona* in BC waters. It is usually anchored to bedrock or large boulders and growing in association with green or red algae.

***Haliclona (Rhizoniera) filix* n.sp.** (Figure 11)

Zoobank [yyyy](#)

Etymology the species name is Latin for fern in reference to the fern-like appearance of longitudinal sections of the sponge tubes

Material examined Holotype RBCM 014-00161-03, station VT-81, Stuart Channel between Saltspring Island and Crofton, 48.865° N / 123.596° W, 34 m depth, 20 January 1981, collector V. Tunnicliffe, 1 specimen.

Description

External (Figure 11A) Short tubes arising from a base. Tubes about 5–8 mm long x 2–3 mm diameter. Multiple tubes on a 2 x 3 cm base about 3 mm thick. Surface micropapillate. Colour in alcohol beige. Consistency in alcohol, soft, compressible, easily torn.

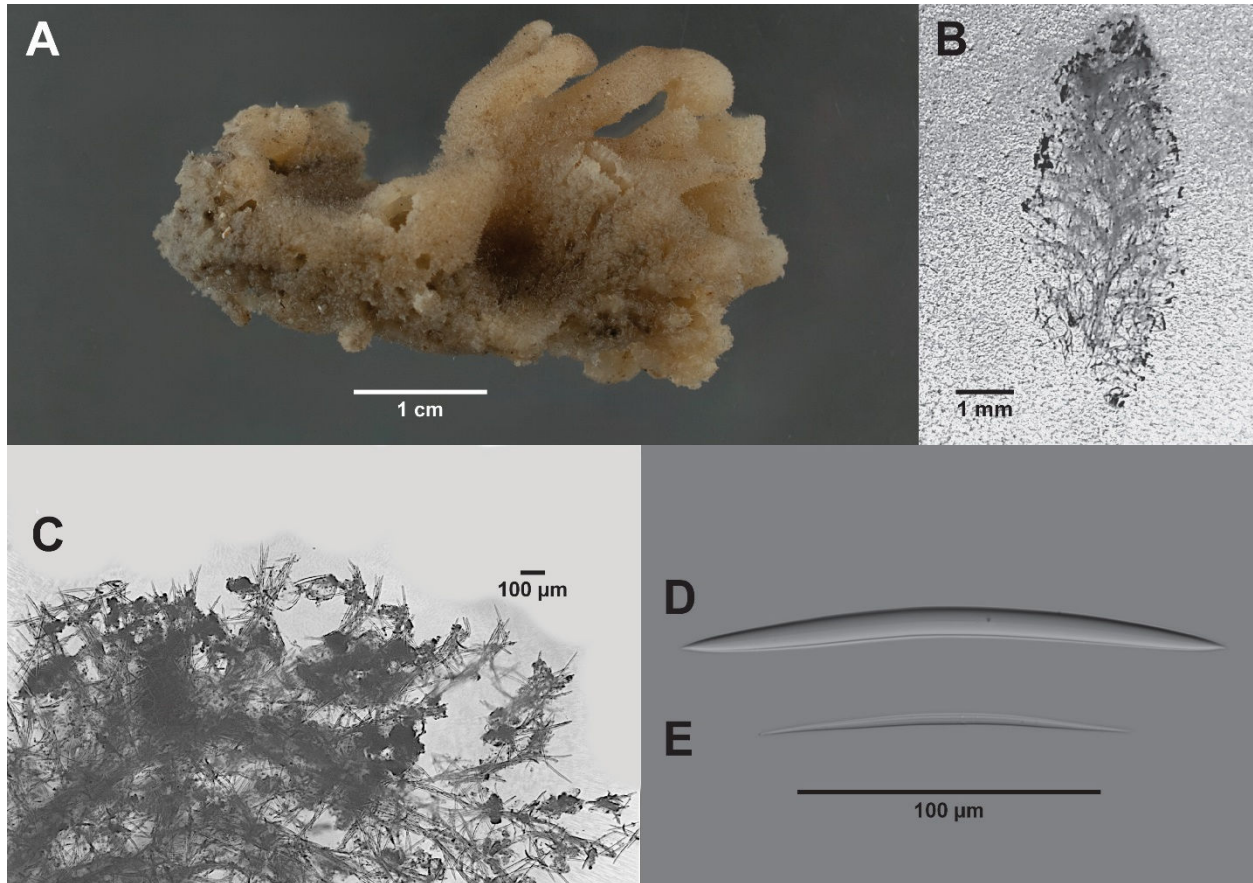


Figure 11 *Haliclona (Rhizoniera) filix* n. sp. Holotype RBCM 014-00161-03. A Preserved specimen. B Whole tube skeleton. C Close up near surface. D Fully developed oxea. E Immature oxea.

Skeleton (Figures 11B, C) Skeleton of tubes forms a branching structure of principal tracts with a central tract and branches arching upward and outward to the surface where narrow brushes or plumes are formed about 2 spicules in length from the ends of the tracts. The stem tract and branches are 50–80 μm thick composed of 4 to 10 or more spicules across and spaced 100–200 μm apart except where aquiferous canals occur. At such locations, branches may be 300–400 μm apart. Single to sometimes multiple spicules cross connect the main tracts at irregular intervals from 50–200 μm forming a very irregular anisotropic reticulation. Spicule tracts in the base form an irregular reticulation similar to the tubes and carry up into the tubes. No spongin.

Spicules (Figure 11D, E) Spicules are exclusive oxeas, curved, slightly bent in the middle or straight; with acerate apices. The central canal of the oxeas is generally visible. Oxeas are 78 (93) 104 x 2.6 (5.7) 7.8 μm.

Distribution Known only from the Holotype location: Stuart Channel BC, 34 m depth.

Remarks

The skeletal arrangement is peculiar for *Haliclona (Rhizoniera)* and sets this species apart from most of its congeners. Referring to Table 6, none of the North Pacific *Haliclona (Rhizoniera)*

have oxeas as short as *H. (R.) filix n. sp.* and none form multiple thick tubes *H. (R.) rufescens* is lobate. However, *H. (R.) rufescens* has a renierid skeleton unlike that of *H. (R.) filix n. sp.*

The two *Haliclona* no subgenus species with sigmas are listed in Table 2; thin encrusting species are listed in Table 5. Branched species are discussed in the above section. *Haliclona daepoensis* (Sim & Lee, 1997), *H. shimoebuensis* (Hoshino, 1981), and *H. uwaensis* (Hoshino, 1981) have toxas; *H. liber* (Hoshino, 1981) has sigmas. *Haliclona cylindrica* (Tanita, 1961), *H. frondosa* Hoshino, 1981, *H. hoshinoi* Ise, 2017 [*H. punctata* Hoshino 1981 as *H. (Renaclona) punctata*], *H. sasajimensis* Hoshino, 1981, *H. ulreungia* Sim & Byeon, 1989, and *H. takaharui* Van Soest & Hooper, 2020 [*H. viola* Hoshino, 1981] have two sizes of oxeas. *Haliclona hydroida* Tanita & Hoshino, 1989, *H. robustaspicula* Hoshino, 1981, *H. sataensis* Hoshino, 1981, and *H. tachibanaensis* Hoshino, 1981 are thinly encrusting.

Of the remaining species *Haliclona bucina* Tanita & Hoshino, 1989 is infundibulaform and oxeas are larger than *H. (R.) filix n. sp.* (120–155 x 6–8 µm), *H. digitata* Tanita & Hoshino, 1989 is cylindrical and oxeas are larger than *H. (R.) filix n. sp.* (140–170 x 4–10 µm), *H. lentus* Hoshino, 1981 has a renierid skeleton without tracts, *H. permollisimilis* Hoshino, 1981, has only vague tracts in the skeleton and oxeas are larger than *H. (R.) filix n. sp.* (110–180 x 5–8 µm), and *H. sortitio* Hoshino, 1981 has oxeas larger than *H. (R.) filix n. sp.* (148–170 x 5–8 µm).

Haliclona ellipsis from Japan intertidal to shallow subtidal has oxeas slightly larger than *H. (R.) filix n. sp.* (90–120 x 4–6 µm) but has a renierid skeletal organization with only a few vague tracts. *Haliclona offerospicula* has small oxeas in the same size range as *H. (R.) filix n. sp.* (75–90 x 2–3 µm) but is thin encrusting and has unispicular tracts. *Haliclona tenuis* has oxeas in the same size range as *H. (R.) filix n. sp.* (83–100 x 5–8 µm) but is very thin encrusting and has spicule tracts of two to three spicules wide, or thinner than *H. (R.) filix n. sp.*

Haliclona (Rhizoniera) kunechina n. sp. (Figure 12).

Zoobank [yyyyy](#)

Etymology Named for Kunechin Point, Sechelt, BC where the sponge was collected.

Material Examined Holotype RBCM 018-00182-002, station NM 279, Kunechin Point reef, Sechelt Inlet, 49° 37.060' N / 123° 48.229' W, 15 m depth, 8 Mar 2012, collector N. McDaniel, 1 specimen.

Description

External (Figure 12A) Irregular, thickly encrusting 6 x 12 x 1 cm, very porous; numerous oscula slightly raised, approximately 2–3 mm diameter. Colour white. Soft, compressible, easily torn.

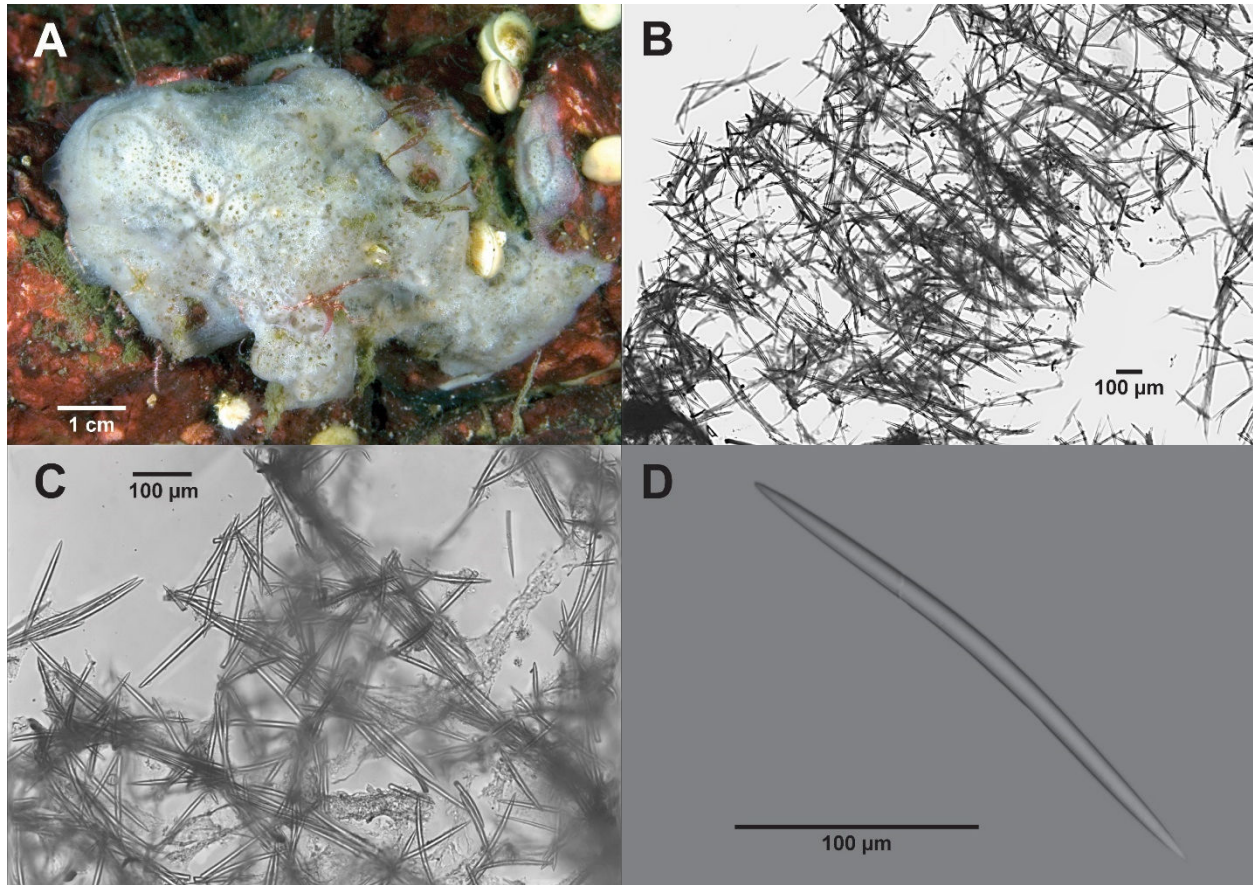


Figure 12 *Haliclona (Rhizoniera) kunechina* n. sp., Holotype RBCM 018-00182-002. A in-situ. B Skeleton cross section. C Spicule tracts. D Oxea.

Skeleton (Figure 12B, C) No specialized ectosome. Multispicular tract cross connected by unispicular to a small number of spicules in an irregular reticulation. Multispicular primary tracts are 100 to 300 μm apart and may anastomose. Primary tracts are 20–30 μm thick. Secondary spicules cross at right angles and are single or less commonly multispicular. Spongin only at some nodes. Many loose oxeas are disbursed among tracts.

Spicules (Figure 12D) Spicules are exclusive oxeas, slightly curved; occasionally straight. Apices variable, tending to hastate, slightly muconate, 216 (234) 260 x 7.8 (10.6) 13.3 μm .

Distribution Known only from the type locality, Kunchin Pt. reef, Sechelt Inlet, BC at 15 m depth.

Remarks

Haliclona (Rhizoniera) kunechina n. sp. was full of diatoms and other micro phytoplankton and encrusting around green algal stems (green in the photo of the live sponge) but generally on bedrock. *Haliclona (Rhizoniera) kunechina* n. sp. oxeas at 216–260 μm are longer than reported North Pacific *Haliclona (Rhizoniera)* (Table 6). *Haliclona cylindrica*, *H. densaspicula*, *H. robustaspicula*, *H. shimoebuensis* and *H. violapurpura* have oxeas in about the same size range. *Haliclona cylindrica* has toxas as well as oxeas, *H. shimoebuensis* has two sizes of oxeas, *H. densaspicula* is very thin and has a hard texture, *H. robustaspicula* is thin encrusting and has an

isodictyal reticulation, not spicule tracts, and *H. violapurpura* is a ramose sponge with a skeleton of subsodictyal reticulation and very vague tracts.

Haliclona (Rhizoniera) meandrina n. sp. (Figure 13).

Zoobank ****

Etymology The species name refers to the meandering habitus.

Material Examined Holotype RBCM 018-00171-003, station NM 259, Defence Islets, Howe Sound, 49° 34.544' N / 123° 16.632' W, 19 m depth, 19 May 2011, collector N. McDaniel, 1 specimen.

Paratypes: RBCM 018-00171-004, station NM 238, 9 Mile Point, Sechelt Inlet, 49° 36.216' N / 123° 47.396' W, 23.5 m depth, 2011-05-12, collectors N. McDaniel, G. Grognet, 1 specimen.

RBCM 018-00171-005, station NM 251, Christie Islet, Howe Sound, 49° 29.919' N / 123° 17.985' W, 16 m depth, 2011.05.19, collectors N. McDaniel, D. Swanston, 1 specimen.

Description

External (Figure 13 A) Branching and anastomosing; branches with conical tubes with oscula at the tips 1 mm diameter. Tubes 0.3 to 1 cm high by 0.3 cm diameter. Sponge spreading indefinitely, about 4 cm across. Surface microhispid (oxea project to 300 µm). Colour in life cream white. Consistency compressible, easily torn.

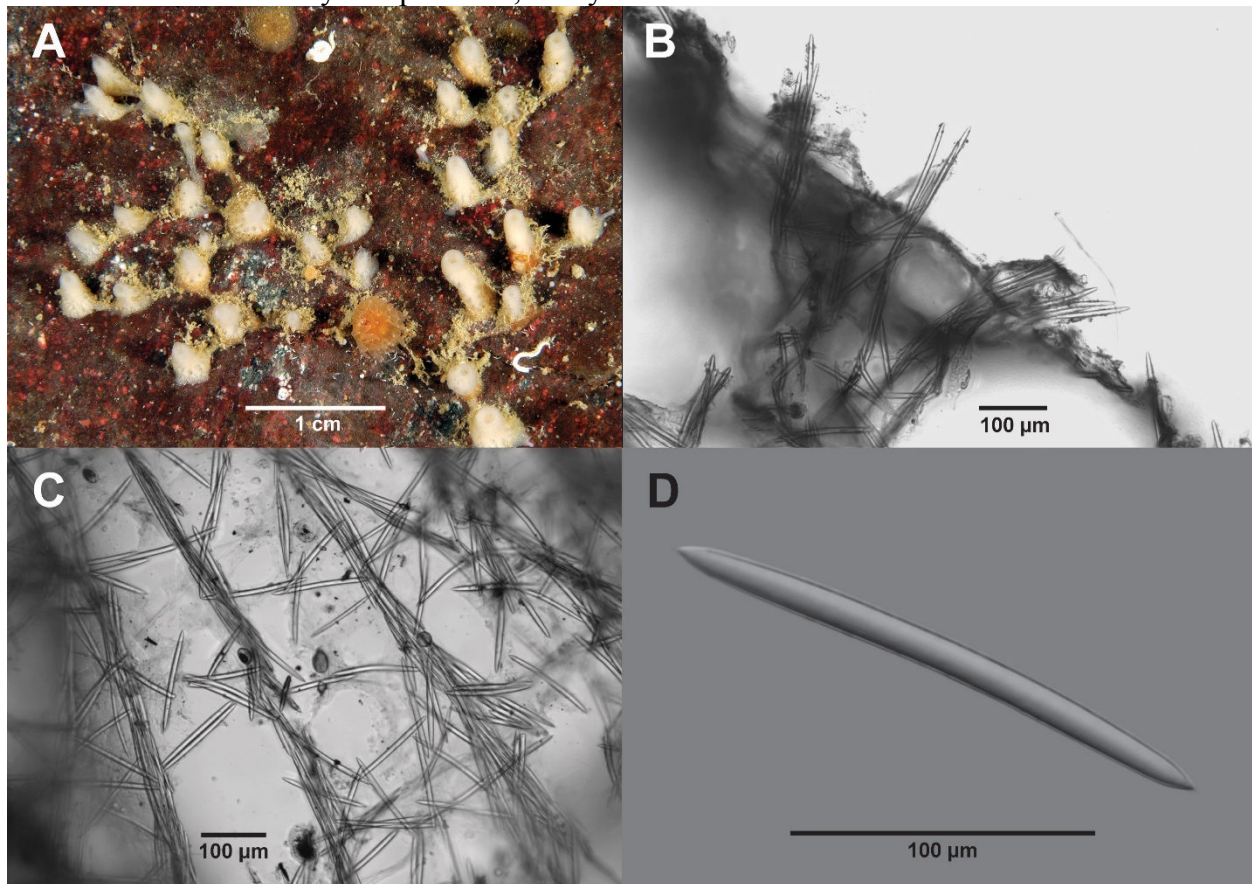


Figure 13. *Haliclona (Rhizoniera) meandrina* n. sp. A–D, Holotype RBCM 018-00171-003. A In-situ. B Ectosome. C Choanosome. D Oxea.

Skeleton Ectosome (Figure 13B) Strong primary ascending multispicular lines connected at irregular intervals by single or multiple spicules parallel tube long axis. Primary lines 1 to 2 spicule lengths apart; secondary lines 1 to 2 spicules long. Ascending and cross connecting tracts end at the surface in bouquets of a few oxeas more or less at right angles and penetrating the surface up to 300 μm ; average about 100 μm . Exopinacoderm (dermal membrane) aspicular or with scattered oxeas tangential to the surface. Large subdermal cavities beneath the exopinacoderm and between the bouquets. Choanosome (Figure 13C) anisotropic multispicular reticulation of oxeas. 1 to 5 spicules thick. Reticulation mostly quadrangular meshes. Length on side 1 spicule. Free spicules among the spicule tracts. Small amount of spongin at some nodes. Central aquiferous canal leads to osculum at the apex of the cone. Choanosome fairly open with small to large aquiferous canals.

Spicules (Figure 13 D) Oxeas slightly curved, slightly mucronate hastate apices, 143–184 x 9.1–13.5 μm . Table 11 provides dimensions for the specimens examined.

Table 11 *Haliclona (Rhizoniera) meandrina* n. sp. Oxea Dimensions (μm)

Station	Length	Width
NM 259 RBCM 018-00171-003	143 (180) 226	9.1 (11.8) 13.5
NM 238 RBCM 018-00171-004	176 (213) 235	8.1 (11.4) 13.5
NM 251 RBCM 018-00171-005	154 (169) 184	10.3 (12.0) 13.5

Distribution Occurs in Sechelt Inlet and Howe Sound, BC.

Remarks

None of the California *Haliclona* described by Lee et al. (2007) match *H. (R.) meandrina* n. sp. as detailed below:

- *Haliclona* sp. A & B of Hartman (1975) were not fully described by Hartman and placed in the subgenus *Rhizoniera* by Lee et al. (2007). None are conulose. *Haliclona (Rhizoniera)* sp., [formerly *Haliclona cineria* of de Laubenfels, 1932] has oscula with crater-like rims and a choanosome skeleton with few spicule tracts.
- *Haliclona (Haliclona) ambrosia* Dickinson, 1945 [of Sim & Bakus 1986] has cylindrical branches and a tangential skeleton.
- Other *Haliclona* identified only to genus, thus not fully characterized.
- *Haliclona (Haliclona)* sp. of Klontz 1989 as *Adocia* based on genus placement has a specialized ectosome. Oscula are on chimneys, not cones. Oxeas are shorter than those of NM 259 (120–140 μm vs. 143–235 μm).
- *Haliclona* cf. *permollis* (Bowerbank, 1866) [of Bakus & Green 1987] has sparsely spaced elevated oscula and oxeas 110–140 x 4–7 μm or at the lower range of NM 259. The sponge is purple, not white and oscula more scattered than NM 259.

Haclona (Rhizoniera) rufescens has lobate branches but a renierid not tracted skeletal architecture. *Haliclona (Rhizoniera) enamela* is encrusting and has a choanosome with spicule tracts. However, oscula are raised on collars and oxeas are generally shorter and thinner than *H.*

(*R.*) *meandrina* **n. sp.** The habitus of *H. (R.) meandrina* **n. sp.** is different from all of the *Haliclona* no subgenus species previously discussed.

Haliclona (Rhizoniera) penelakuta **n. sp.** (Figure 14)

Zoobank [yyyyy](#)

Etymology The name refers to the Holotype location, near Penelakut Island, BC.

Material Examined Holotype RBCM 018-00387-001, station NM 375, Penelakut Is., BC, 48° 58.957' N / 123° 40.083' W, intertidal + 2 m, 10 August 2018, collector N. McDaniel, 1 specimen.

Paratypes RBCM 018-00387-002, station NM 376, Penelakut Is., BC, 48° 58.957' N / 123° 40.083' W, intertidal + 2 m, 10 August 2018, collector N. McDaniel, 1 specimen. RBCM 018-00387-003, station NM 377, Penelakut Is. BC, 48° 58.957' N / 123° 40.083' W, + 2 m intertidal, 10 August 2018, collector N. McDaniel, 1 specimen. RBCM 018-00387-004, station NM 378, Penelakut Is. BC, 48° 58.957' N / 123° 40.083' W, + 2 m intertidal, 10 Aug 2018, collector N. McDaniel, 1 specimen. RBCM 018-00388-001, station NM 382, Boundary Bay, BC, 49° 02.30' N / 123° 06.80' W, +2-3 m, 23 August 2018, collector D. Swanston, 1 specimen; RBCM 024-00006-001, station Big Beach 2, Ucluelet BC, 48° 56.204' N / 125° 33.124' W, intertidal, 16 May 2022, collector R. Harbo, 1 specimen.

Description

External (Figure 14A, B) Meandering to spreading laterally irregularly, encrusting oyster shells and bedrock to 2 mm. Surface micropapillate. Oscula raised on small cones 3 mm diameter at base and up to 3 mm high. Oscula 1–2 mm diameter. Encrustations 2–3 mm thick; 4–5 mm thick at conulae. Colour flesh pink to yellowish brown. Consistency spongy, easily torn.

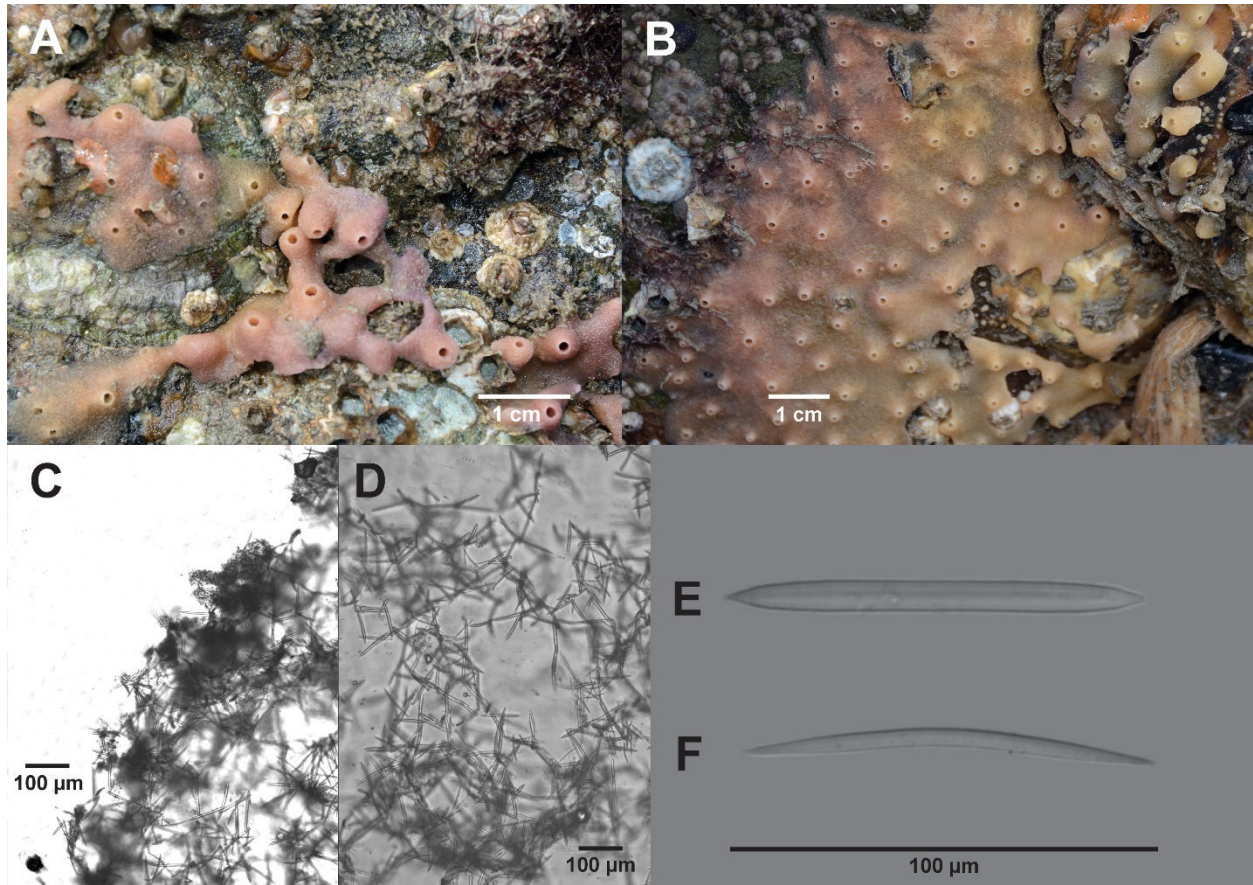


Figure 14 *Haliclona (Rhizoniera) penelakuta* n. sp. A, C–F, Holotype RBCM 018-00387-001. A meandering form. B spreading form. C skeleton near surface. D choanosome reticulation with large aquiferous canals. E thick oxea. F thin oxea.

Skeleton (Figures 14C, D) No specialized ectosome. Subdermal spaces and somewhat more densely arranged spicules suggest an ectosome but spicule arrangement is as below the surface. At the surface spicules penetrate up to 100 μm at various angles singly, or in small clusters composed of up to 5 oxeas. Skeleton is an irregular anisotropic reticulation with vague wavy bi- and tri-spicular tracts, mostly in the lower parts of the sponge. Tracts 60–100 μm apart and 30–50 μm thick. The interior of the sponge is crossed by aqueous canals, the smaller roughly circular and 100 μm diameter. Larger canals are oblong and from 100 x 200 μm to 300 x 800 μm . The choanosome reticulation varies from triangular to rectangular to hexagonal. Loose spicules tend to obscure the reticulation. Spongin is sparse and only occurs at some reticulation nodes.

Spicules (Figures 14E, F) Oxeas: slightly curved or straight, long sharp (acerate) apices. Thicker oxeas (ratio L:W>22.4) less common than thinner oxeas (ratio L:W<22.4). These “thick” oxeas are straight or slightly curved and have hastate mucronate apices. Stylote forms uncommon; immature forms fairly common in Holotype, but range in other specimens examined to uncommon. Table 10 provides spicule dimensions of specimens examined.

Table 10 *Haliclona (Rhizoniera) penelakuta* n. sp. Oxea Dimensions (µm)

Specimen	Length	Width
NM 375 n=60 RBCM 018-00387-001	83 (100) 114	3.1 (5.5) 8.3
NM 376 RBCM 018-00387-002	104 (123) 143	4.4 (6.1) 8.3
NM 377 RBCM 018-00387-003	83 (104) 117	4.7 (6.9) 9.4
NM 378 RBCM 018-00387-004	70 (90) 104	2.6 (4.1) 5.5
NM 382 RBCM 018-00388-001	65 (101) 114	3.6 (6.6) 8.3
Big Beach 2 RBCM 024-00006-001	83 (97) 107	4.9 (7.4) 10.1

Distribution Between Thetis and Penelakut islands, in Boundary Bay, BC. and Ucluelet, BC. The sponge inhabits the high intertidal (+2–3 m depth) on both the inner and outer coasts of British Columbia.

Remarks

Another Big Beach specimen (Big Beach 1) habitus and skeleton architecture are similar to the spreading form of *H. (R.) penelakuta* but the colour is mauve and the “thick” oxeas are absent. Referring to Table 6 none of the *H. (Rhizoniera)* species listed for the North Pacific has spicules as short as *H. (Rhizoniera) penelakuta* n. sp. except Lambe’s *H. cinera*. Lambe’s specimen had 1 mm diameter oscula and is possibly a close match. Lambe did not provide any details on the skeletal architecture of his specimen thus a further comparison is not possible. Referring to Table 5, *H. offerospicula* has spicules in the same size range but oscula are not on chimneys, the skeleton of *H. offerospicula* has unispicular tracts and the surface is smooth not microhispid as in *H. (Rhizoniera) penelakuta* n. sp.

***Haliclona (Rhizoniera) vulcana* n. sp.** (Figure 15)

Zoobank [yyyyy](#)

Etymology Named for the volcano-like chimneys on the sponge.

Material Examined Holotype RBCM 018-00389-001, station NM 374, Escape Reef, Stuart Channel, BC, 48° 56.235’ N / 123° 39.430’ W, 15 m depth, 8 August 2018, collector N. McDaniel, 1 specimen. Paratype RBCM 018-00390-001, station NM 384, Grant Island, Welcome Pass, BC, 49° 30.662’ N / 123° 58.232’ W, 15 m depth, 2 March 2019, collector N. McDaniel, 1 specimen.

Description

External (Figure 15A) Sponge 7 x 10 cm x 1.5 mm thick base. Chimneys 3 mm diameter at base x 3 mm high. Oscula 1.8 mm diameter. Ostia densely cover area between chimneys, 0.2

mm diameter. Surface rugose, microhispid; ridges radiate from some chimneys. Colour beige. Consistency easily torn.

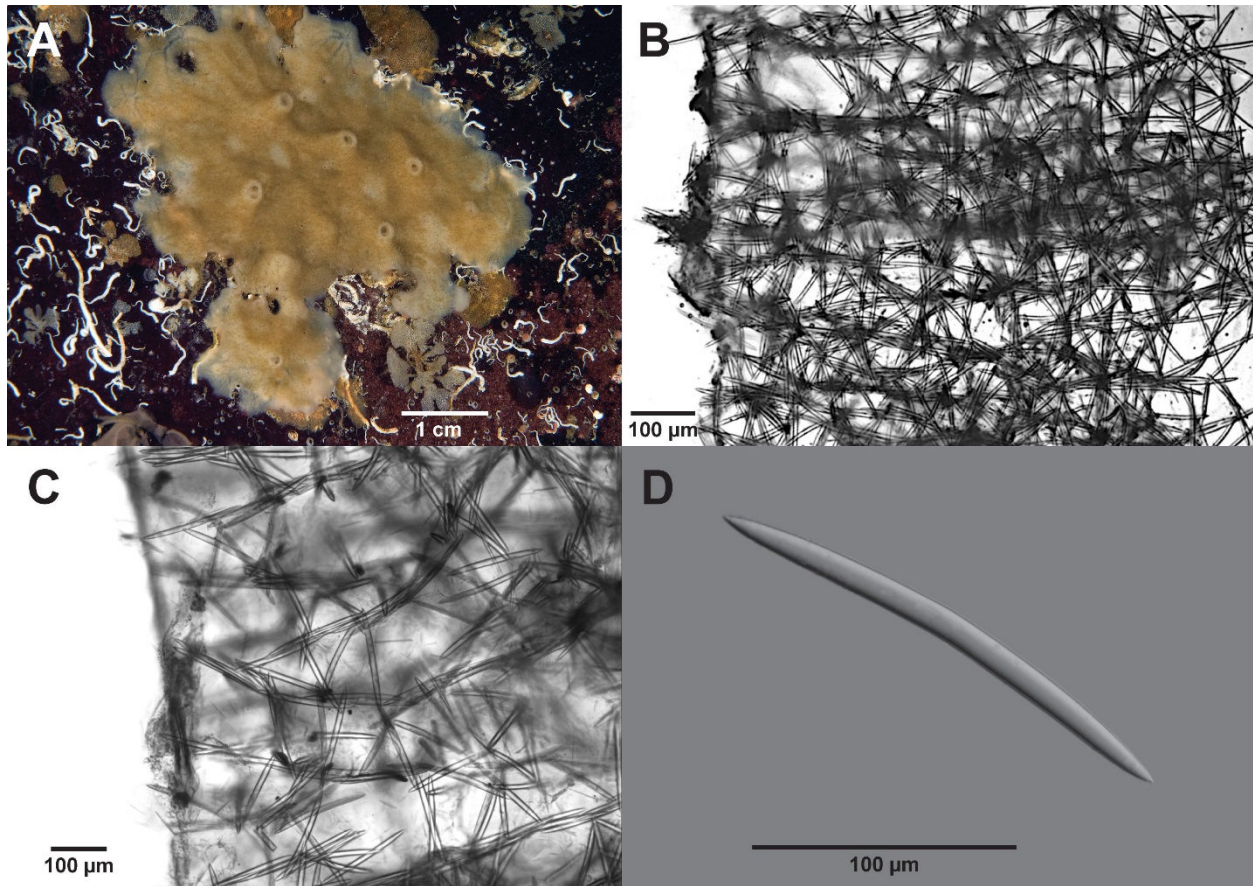


Figure 15 *Haliclona (Rhizoniera) vulcana* n. sp. A-D, Holotype RBCM 018-00389-001. A in-situ. B Skeleton cross section. C Cross section near surface. D Oxea.

Skeleton (Figure 15B, C) No specialized ectosome. Central part of choanosome with large (up to 0.8 mm diameter) aquiferous canals. Skeleton consists of approximately parallel bi- and tri-spicular primary tracts running vertically from the base to the surface. At the surface single spicules project up to 100 µm (Figure 15C). Primary tracts may branch and anastomose occasionally. Single spicules cross connect at right or random angles forming an irregular polygonal reticulation. Primary tracts 150–200 µm apart. Secondary spicules cross at 100 to 200 µm intervals. Spongin confined to nodes.

Spicules (Figure 15D) Oxeas: slightly curved or occasionally straight, sharp, hastate, slightly mucronate apices, A few thin immature oxeas present. Table 11 lists oxea dimensions of specimens examined.

Table 11 Oxea Dimensions of *Haliclona (Rhizoniera) vulcana* n. sp. (µm)

Station	Length	Width
NM 374 RBCM 018-00389-001	169 (187) 200	9.6 (11.4) 13.3
NM 384 RBCM 018-00390-001	161 (179) 198	10.1 (11.1) 13.0

Distribution Known from only two locations in southwestern BC: Stuart Channel and Grant Island, B.C. 15 m depth.

Remarks

Haliclona (Rhizoniera) enamela habitus is similar to *H. (R.) vulcana* n. sp. but oxeas are shorter as are those of Lambe's *H. cinerea*. The surface of *H. (R.) enamela* is smooth and not microhispid. *Haliclona (Rhizoniera) rufescens* is lobate branched and the skeleton is renierid. Hartman's *H. (Rhizoniera)* species have flush oscula and oxeas are a bit shorter than *H. (R.) vulcana* n. sp. De Laubenfels' (1932) *H. cinerea* oxeas are within the same size range as *H. (R.) vulcana* n. sp. Skeletal architecture is isodictal reticulation and not tracted. Comparing North Pacific *Haliclona* no subgenus species listed in Table 5, *H. densaspicula*, *H. liber*, *H. scabritia*, and *H. uwaensis* have oxeas approximately in the same size range as *H. (R.) vulcana* n. sp. *Haliclona (R.) densaspicula*, *H. liber* and *H. scabritia* have smooth surfaces not hispid and skeletons are renierid, not tracted; *H. uwaensis* has toxas in addition to oxeas.

Discussion

Haliclona is a very successful genus. Worldwide there are over 470 species (de Voogd, et al. 2024) including subgenera and species not classified to subgenus. This is an increase of over 300 species in the genus *Haliclona* alone from the 150 extant species in the entire family Chalinidae (noted by de Weerdt in 2000 [2004]) in a bit over 20 years enabled in part by creation of the World Porifera Database (www.marinespecies.org/porifera) and publication of Systema Porifera in 2002 [2004].

In some areas of the world where *Haliclona* occurs it is one of the most common sponges in the intertidal (de Weerdt 2002 [2004]) and this is the case in southwestern BC and California (de Laubenfels (1932), Lee et al. (2007)). Hoshino (1981) reports a similar abundance in Japan. Species abundance and diversity in the Atlantic were detailed by Van Soest (1980) (southern Caribbean) and de Weerdt (1987, 1989, 2000 [2004]). This report places species names on a few of the more abundant *Haliclona* genera in southern BC waters and is a modest contribution to world *Haliclona* biodiversity.

Some *Haliclona* species are variable in colour and habitus as illustrated by the BC specimens examined. Colour variations occur in *Haliclona (Rhizoniera) penelakuta* n. sp. (Figure 14) and *Haliclona (Haliclona) mollis* (Lambe, 1893 [1894]) (Figure 5), a lavender –purple color to beige-brown. A number of BC *Haliclona* may also be brownish white to cream, e.g. *H. (Rhizoniera) arborescens* n. sp. (Figure 8), *H. (Rhizoniera) blanca* n. sp. (Figure 9), *H. (Rhizoniera) kunechina* n. sp. (Figure 12), *H. (Rhizoniera) meandrina* n. sp., (Figure 13), *H. (Rhizoniera) vulcana* n. sp. (Figure 15). Within-species habitus variations occur but are less

frequent. It is well known the amount of current energy benthic invertebrates are exposed to effects habitus but some BC *Haliclona* species discussed vary within the same habitat. *Haliclona* (*Rhizoniera*) *penelakuta* n. sp. (Figure 14), from meandering ridges to spreading plates. *Haliclona* (*Haliclona*) *mollis* (Lambe, 1893 [1894]) (Figure 5), from massive to various thickness encrusting. Because of their potential variability in colour and growth forms, they are difficult to identify in the field and microscopically as discussed below.

All subgenera of *Haliclona* were and are based on morphology (de Weerd 2002 [2004], Van Soest 2017). The selection of subgenera of *Haliclona* is somewhat arbitrary since it depends (except for the subgenus *Gellius* with sigmas and the subgenus *Flagellia* with flagellosigmas) on skeletal architecture which often departs somewhat from the strict definition of the subgenus. The subgenus *Haliclona* should always has spongin present (de Weerd 1989, 2002 [2004]) but presence is variable and can also occur in other subgenera. Depending on the requirements for adherence to these definitions, specimens may be placed differently or not placed in a subgenus at all. The latter case appears to be particularly true of legacy species that are regarded as intermediate between subgenera or not described completely enough for subgenus placement. The genus has been shown by mitochondrial DNA and r-DNA analyses to be polyphyletic but at present morphology is generally relied upon to separate the subgenera (Bispo & Hajdu 2023), although some workers have reported success with sequencing of *Haliclona* (e.g. Muricy et al. 2015; Knapp, et al. 2015). We have chosen the subgenera for our new species which most closely fit the accepted skeletal architecture of the subgenera (de Weerd 2002 [2004]) rather than adding to the list of *Haliclona* species not classified to subgenus. We have not attempted DNA analyses for this report.

References

- Austin, W.C.; Ott, B.S.; Reisdig, H.M.; Romagosa, P.; McDaniel, N.G. (2014). Taxonomic review of Hadromerida (Porifera, Demospongiae) from British Columbia, Canada, and adjacent waters, with the description of nine new species. *Zootaxa* 3823 (1): 1–84. doi.org/10.11646/zootaxa.3823.1.1
- Bakus, G.J. & Green, K.D. (1987). The distribution of marine sponges collected from the 1976-1978 Bureau of Land Management Southern California Bight Program. *Bull. South. Calif. Acad. Sci.* 86:57–88.
- Bispo, A.; Hajdu, E. (2023). Two new species of *Haliclona* (Demospongiae: Haplosclerida: Chalinidae) from north-eastern Brazilian coastal waters and oceanic islands. *Journal of the Marine Biological Association of the United Kingdom*. 103 (e27): 1–11.
- Bowerbank, J.S. (1866). A Monograph of the British Spongiadae. Volume 2. (Ray Society: London): i-xx, 1–388.
- Bowerbank, J.S. (1875). Contributions to a General History of the Spongiadae. Part VII. *Proceedings of the Zoological Society of London*. 1875: 281–296.
- de Voogd, N.J.; Alvarez, B.; Boury-Esnault, N.; Cárdenas, P.; Díaz, M.-C.; Dohrmann, M.; Downey, R.; Goodwin, C.; Hajdu, E.; Hooper, J.N.A.; Kelly, M.; Klautau, M.; Lim, S.C.; Manconi, R.; Morrow, C.; Pinheiro, U.; Pisera, A.B.; Ríos, P.; Rützler, K.; Schönberg, C.; Turner, T.; Vacelet, J.; van Soest, R.W.M.; Xavier, J. (2024). World Porifera Database. Accessed at <https://www.marinespecies.org/porifera> on 2024-01-02. doi:10.14284/359.

- Dickinson, M.G. (1945). Sponges of the Gulf of California. Pp. 1–55, pls 1–97. In: Reports on the collections obtained by Alan Hancock Pacific Expeditions of Velero III off the coast of Mexico, Central America, South America, and Galapagos Islands in 1932, in 1933, in 1934, in 1935, in 1936, in 1937, in 1939, and 1940. The University of Southern California Press, Los Angeles.
- Esper, E.J.C. (1806). Fortsetzungen der Pflanzenthiere in Abbildungen nach der Natur mit Farben erleuchtet nebst Beschreibungen. Zweyter Theil. (Raspe: Nürnberg): 25–48, pls LXV–LXX
- Fristedt, K. (1887). Sponges from the Atlantic and Arctic Oceans and the Behring Sea. Vega-Expeditionens Vetenskap. Iakttagelser (Nordenskiöld) 4. 401–471, pls 22–31.
- Grant, R.E. (1826). Notice of two new species of British Sponges. Edinburgh New Philosophical Journal. 2: 203–204.
- Grant, R.E. (1836). Animal Kingdom. Pp. 107–118. In: Todd, R.B. (Ed.), The Cyclopaedia of Anatomy and Physiology. Volume 1. (Sherwood, Gilbert, and Piper: London): 1–813.
- Grant, R.E. (1841). Porifera. Pp. 5–9, 310–313, pls II–IV. In: H. Bailliere (Ed.), Outlines of comparative anatomy. 1. London. 1–656.
- Gray, J.E. (1867). Notes on the Arrangement of Sponges, with the Descriptions of some New Genera. Proceedings of the Zoological Society of London. 1867(2): 492–558, pls XXVII–XXVIII.
- Griessinger, J. M. (1971). Etude des Réniérides de Méditerranée (Demosponges Haplosclérides). Bulletin du Muséum National d'Histoire Naturelle (Zoologie). 3(3): 97–182.
- Hartman, W.D. (1975). Phylum Porifera. Pp. 32–54. In: Smith, R.I. and J.T. Carlton (eds), Light's Manual: Intertidal Invertebrates of the Central California Coast. Third edition, University of California Press, Berkeley
- Hoshino, T. (1981). Shallow-Water Demosponges of Western Japan, 1. Journal of Science of the Hiroshima University (B). 29 (1): 47–205.
- International Commission on Zoological Nomenclature. (1999) International Code of Zoological Nomenclature, 4th Ed. International Trust for Zoological Nomenclature, London, 306 pp.
- Ise, Y. (2017). Taxonomic review of Japanese sponges (Porifera). pp. 343–382, in: Motokawa, M.; Kajihara, H. (Eds.) Species diversity of animals in Japan. Springer Verlag Japan. xiii, 721 pp., <http://www.springer.com/la/book/9784431564300#>.
- Kang, D.W.; Sim, C.J. (2007). Two New Sponges of the Genus *Haliclona* (Demospongiae: Haplosclerida: Chalinidae) from Korea. Korean Journal of Systematics and Zoology. 23(2): 169–173.
- Kang, D.W.; Lee, K.J.; Sim, C.J. (2013). Two New Marine Sponges of the Genus *Haliclona* (Haplosclerida: Chalinidae) from Korea. Animal Systematics, Evolution and Diversity. 29(1): 51–55. <https://doi.org/10.5635/ased.2013.29.1.51>.
- Kim, H. J.; Kang, D. W. (2020). Two New Species of the Genus *Haliclona* from Korea. Zootaxa. 4890(2): 289–295. <https://doi.org/10.11646/zootaxa.4890.2.10>.
- Klontz, S.W. (1989). Ecology and systematics of the intertidal sponges of Southeast Farallon Island. MA Dissertation. 144 pp. San Francisco State University, San Francisco, California.
- Knapp, I.S., Forman, Z.H., Williams, G. J., Toonen, R.J., and Bell, J.J. (2015). Cryptic species obscure introduction pathway of the blue Caribbean sponge (*Haliclona* (*Soestella*) *caerulea*), (order: Haplosclerida) to Palmyra Atoll, Central Pacific. PeerJ 3:e1170; DOI 10.7717/peerj.1170

- Koltun, V.M. (1958). [Cornacuspongia of sea waters washing the South Sakhalin and the South Kurile Island region.]. *Issledovaniya dal'nevostochnykh morei SSR*. 5: 42–77, figs 1–25.
- Lambe, L.M. (1892 [1893]). On some Sponges from the Pacific Coast of Canada and Behring Sea. *Transactions of the Royal Society of Canada*. 10 (4): 67–78, pls III–VI.
- Lambe, L.M. (1893 [1894]). Sponges from the Pacific coast of Canada. *Transactions of the Royal Society of Canada*. 11 (4): 25–43, pls II–IV.
- Laubenfels, M.W. de. (1930). The Sponges of California. (Abstracts of dissertations for the degree of doctor of philosophy. *Stanford University Bulletin*. 5(98): 24–29.
- Laubenfels, M.W. de. (1932). The marine and fresh-water sponges of California. *Proceedings of the United States National Museum*. 81 (2927):1–140.
- Laubenfels, M.W. de. (1954). The Sponges of the West-Central Pacific. *Oregon State Monographs. Studies in Zoology*. 7: i-x, 1–306, pls I–XII.
- Laubenfels, M.W. de. (1950). The Sponges of Kaneohe Bay, Oahu. *Pacific Science*. 4 (1): 3–36.
- Laubenfels, M.W. de. (1961). Porifera of Friday Harbour and vicinity. *Pacific Science*. 15: 192–202.
- Lee, W.L, D.W. Elvin, H.M. Reising & N. Burnett. (2007). *The Sponges of California: A Guide and Key to the Marine Sponges of California*. Monterey, CA, USA. Monterey Bay Sanctuary Foundation. U. of Cal. Press.
- Li, J. (1986). Sponges as marine fouling organisms in China waters. I. *Studia Marina Sinica*. 26 (2): 76–116.
- Lundbeck, W. (1902). Porifera. (Part I.) Homorrhaphidae and Heterorrhaphidae. In: *The Danish Ingolf-Expedition*. 6(1). (Bianco Luno: Copenhagen). Pp. 1-108, pls I-XIX, 1 map.
- Lundbeck, W. (1909). The Porifera of East Greenland. *Meddelelser om Grønland*. 29: 423–464.
- Morrow, C.; Cárdenas, P. (2015). Proposal for a revised classification of the Demospongiae (Porifera). *Frontiers in Zoology*. 12: 7.
- Muricy, G.; Esteves, E.L.; Monteiro, L.; Rodrigues, B.R.; Albano, R.M. (2015). A new species of *Haliclona* (Demospongiae: Haplosclerida: Chalinidae) from southeastern Brazil and the first record of *Haliclona vansoesti* from the Brazilian coast. *Zootaxa*. 3925(4): 536–550. [dx.doi.org/10.11646/zootaxa.3925.4.3](https://doi.org/10.11646/zootaxa.3925.4.3)
- Schmidt, O. (1862). *Die Spongien des adriatischen Meeres*. (Wilhelm Engelmann: Leipzig): i-viii, 1–88, pls 1–7.
- Sim, C.J. and J.G. Bakus (1986). Marine sponges of Santa Catalina Island, California. *Allan Hancock Foundation Occasional Paper, New Series* 5:1–23.
- Sim, C.J.; Byeon, H.S. (1989). A systematic study on the marine sponges in Korea. 9. Ceractinomorpha. *The Korean Journal of Systematic Zoology* 5 (1): 33–57.
- Sim, C.J.; Lee, K.J. (1997). Two species of Haplosclerida (Demospongiae) from Kôjedo, Korea. *The Korean Journal of Systematic Zoology* 13 (1): 55–60.
- Sollas, W.J. (1885). A Classification of the Sponges. *Annals and Magazine of Natural History*. (5) 16(95): 395.
- Tanita, S. (1961). Report on the non-calcareous sponges in the museum of the biological institute of the Tôhoku University, Part 1. *Scientific Reports of the Tôhoku University, Ser IV (Biology)*. 27: 131–140.
- Tanita, S. (1965). Report on the sponges obtained from the adjacent waters of the Sado Island, Japan Sea. *Bulletin Japan Sea Regional Fisheries Research Laboratory*. 14: 43–66.

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- Tanita, S.; Hoshino, T. (1989). The Demospongiae of Sagami Bay. Biological Laboratory, Imperial Household: Japan. i-xiii, 1–197 [in English], pls 1–19; 1–166 [in Japanese], 1 map.
- Topsent, E. (1892). Diagnoses d'éponges nouvelles de la Méditerranée et plus particulièrement de Banyuls. Archives de Zoologie expérimentale et générale. (2) 10 (Notes et Revue 6) xvii–xxviii.
- Topsent, E. (1897). Spongiaires de la Baie d'Amboine. (Voyage de MM. M. Bedot et C. Pictet dans l'Archipel Malais). Revue suisse de Zoologie. 4: 421–487, pls 18–21.
- Topsent, E. (1904). Spongiaires des Açores. Résultats des campagnes scientifiques accomplies par le Prince Albert I. Monaco. 25: 1–280, pls 1–18.
- Topsent, E. (1928). Spongiaires de l'Atlantique et de la Méditerranée provenant des croisières du Prince Albert Ier de Monaco. Résultats des campagnes scientifiques accomplies par le Prince Albert I. Monaco. 74:1–376, pls I–XI.
- University of British Columbia. (no date). On line British Columbia sponge database. <http://ibis.geog.ubc.ca/biodiversity/efauna/documents/SpongesofBC.pdf>.
- Van Soest, R.W.M. (1980). Marine sponges from Curaçao and other Caribbean localities. Part II. Haplosclerida. In: Hummelinck, P.W. & Van der Steen, L.J. (Eds), Uitgaven van de Natuurwetenschappelijke Studiekring voor Suriname en de Nederlandse Antillen. No. 104. Studies on the Fauna of Curaçao and other Caribbean Islands. 62 (191): 1–173.
- Van Soest, R.W.M. (2017). *Flagellia*, a new subgenus of *Haliclona* (Porifera, Haplosclerida). European Journal of Taxonomy 351: 1–48. doi.org/10.5852/ejt.2017.351.
- Van Soest, R. W. M.; Hooper, J. N. A.; Butler, P. J. (2020). Every sponge its own name: removing Porifera homonyms. Zootaxa. 4745(1): 1-93. doi.org/10.11646/zootaxa.4745.1.1.
- Weerdt, W.H. de. (1987). The marine shallow-water Chalinidae (Haplosclerida, Porifera) of the British Isles. In: Jones WC (ed) European contributions to the taxonomy of sponges. Publications of the Sherkin Island Marine Station. 1: 74–108.
- Weerdt, W.H. de. (1989). Phylogeny and vicariance biogeography of North Atlantic Chalinidae (Haplosclerida, Demospongiae). Beaufortia. 39 (3): 55–90.
- Weerdt, W.H. de. (2000). A monograph of the shallow-water Chalinidae (Porifera, Haplosclerida) of the Caribbean. Beaufortia. 50 (1): 1–67.
- Weerdt, W.H. de. (2002 [2004]). Family Chalinidae. In Systema Porifera: A Guide to the Classification of Sponges, Edited by Hooper, J.N.A. and Van Soest, R.W.M. Kluwer Academic/Plenum Publishers, New York, pp. 852–873. 2004 eBook electronic version ISBN 978-1-4615-0747-5]