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## Taxonomy of recent Adeonidae (Bryozoa, Cheilostomata) from Brazil, with the description of four new species

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### Abstract

Here we present the taxonomy of the cheilostome genera *Adeonellopsis* MacGillivray, 1886 and *Reptadeonella* Busk, 1884 in Brazil. Of the six species previously reported in Brazilian waters, we include redescriptions of *Adeonellopsis subsulcata* (Smitt, 1873), *Reptadeonella bipartita* (Canu & Bassler, 1928) and *Reptadeonella costulata* (Canu & Bassler, 1928). Four new species of *Reptadeonella* are described: *Reptadeonella aspera* n. sp., *Reptadeonella brasiliensis* n. sp. (previously misidentified as *Reptadeonella violacea*), *Reptadeonella cucullata* n. sp. and *Reptadeonella leilae* n. sp. *Reptadeonella aspera* n. sp., from Bahia State, is characterized by rugose frontal calcification, a tubular peristome, small suboral avicularium and elliptical spiramen. *Reptadeonella brasiliensis* n. sp. is the commonest intertidal species in NE Brazil; it is distinguished from other Brazilian *Reptadeonella* in having a nodular peristome, large subperistomial areolar pore and zooids with one or two frontal pores frequently replaced by a suboral avicularium and crescentic spiramen. *Reptadeonella cucullata* n. sp., from Espírito Santo and Bahia states, has a hood-like peristome, large subperistomial areolar pore, suboral avicularium with curved mandible and denticulate spiramen. *Reptadeonella leilae* n. sp., described from Bahia State, has a frontal shield with small granules, tubular peristome, semilunar to semicircular subperistomial areolar pore and circular spiramen. Diagnostic characters of *Reptadeonella* species are discussed.

**Key words:** Bryozoans, *Adeonellopsis*, *Reptadeonella*, Atlantic

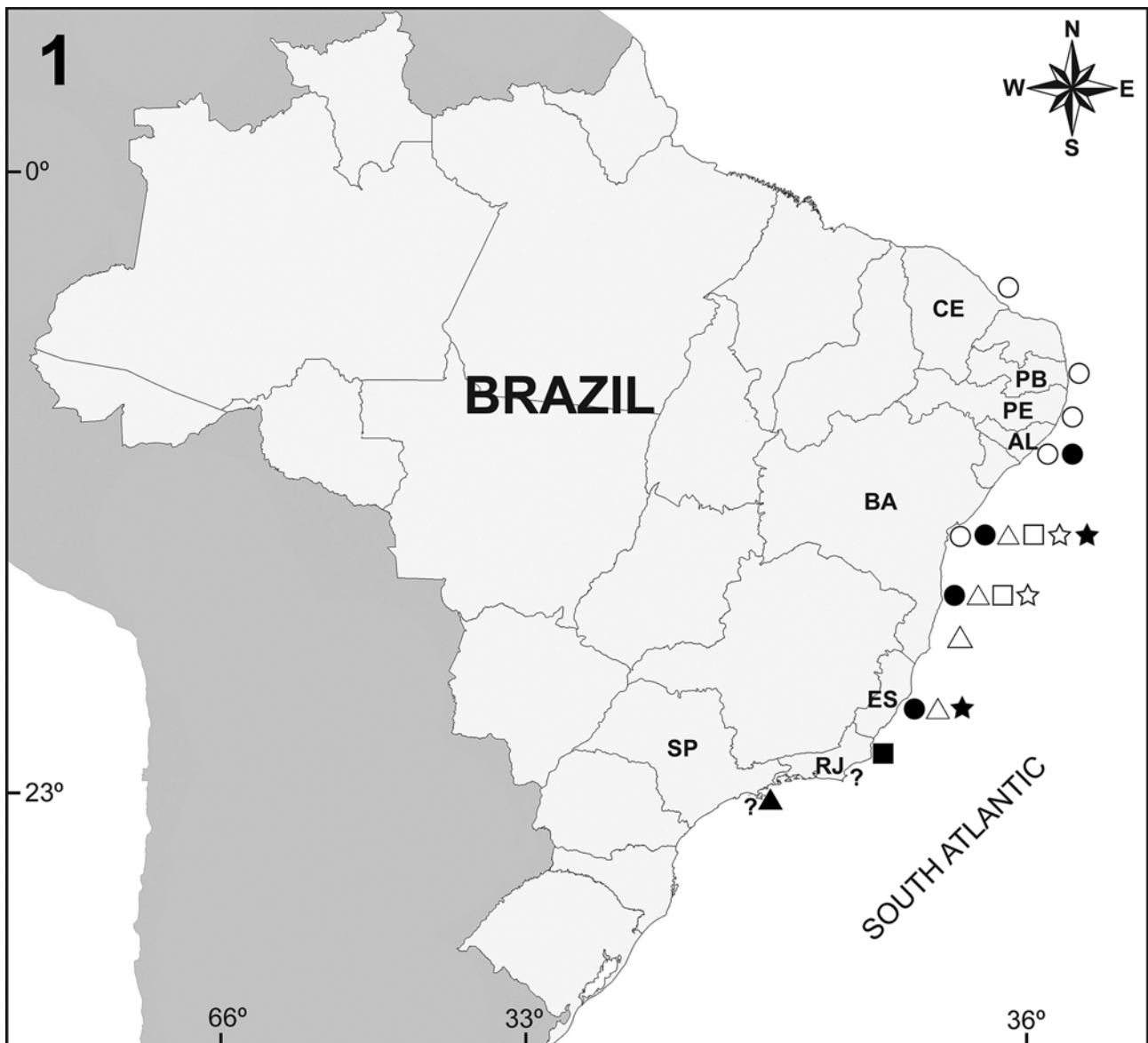
### Introduction

The family Adeonidae Busk, 1884 currently comprises ten genera (Bock & Gordon 2013) but only two, *Adeonellopsis* MacGillivray, 1886 and *Reptadeonella* Busk, 1884, are reported from Brazil. The actual number of adeonid species from the region, however, is difficult to estimate since many historical records of *Reptadeonella* have been attributed to *Reptadeonella violacea* (Johnston, 1847) (e.g. Smitt 1873; Marcus 1939, 1949; Souza 1989; Machado & Souza 1994), a species long considered widespread in warm to temperate waters but now recognized as restricted to the eastern Atlantic and Mediterranean (Winston 1986, 2005; Hayward & McKinney 2002; Cheetham *et al.* 2007). As pointed out by Winston (2005) and Vieira *et al.* (2008), records of *R. violacea* from the Western Atlantic, including those from Brazil, should be revised since, as we show in this paper, they represent undescribed species.

Recent *Adeonellopsis* and *Reptadeonella* currently comprise 17 species, distributed in the Atlantic, Indo-Pacific and Europe (Bock 2015). Vieira *et al.* (2008) listed five species of Adeonidae from Brazilian waters: *Adeonellopsis subsulcata* (Smitt, 1873), *Reptadeonella bipartita* (Canu & Bassler, 1928a), *Reptadeonella costulata* (Canu & Bassler, 1928a), *Reptadeonella tubulifera* (Canu & Bassler, 1930) and *R. violacea*. Recently Winston and Vieira (2013) described *Reptadeonella granulosa* from Southeast Brazil. The present paper includes redescriptions of *Adeonellopsis subsulcata* (Smitt, 1873) and the type specimens of *R. bipartita* and *R. costulata*, as well as descriptions of four new species of *Reptadeonella*.

## Material and methods

Specimens were collected by dredge or manually along the Brazilian coast (Fig. 1). All type and non-type specimens analyzed in this study are registered in the National Museum of Natural History (USNM), Smithsonian Institution, Washington D.C., USA; Museu de Zoologia da Universidade Federal da Bahia (UFBA), Salvador, Brazil; Museu de Zoologia da Universidade de São Paulo (MZUSP), São Paulo, Brazil; Coleção de Bryozoa da Universidade Federal de Alagoas (UFAL), Maceió, Brazil; and Coleção de Bryozoa da Universidade Federal de Pernambuco (UFPE), Recife, Brazil. The majority of specimens deposited at UFBA were collected by personnel at the Laboratório de Malacologia e Ecologia de Bentos (LAMEB), UFBA. Specimens were examined using scanning electron microscopy (JEOL JSM-6390LV and PhilipsXL30) and measurements were made from digital SEM images using ImageJ® software. Abbreviations (for skeletal characters) are: zooid length (Lz), zooid width (lz), diameter of pseudopores (Dp); orifice length (Lo), orifice width (lo), suboral avicularium length (Lavs), suboral avicularium width (lavs), gonozooid length (Lgz), gonozooid width (lgz), gonozooid orifice length (Logz), gonozooid orifice width (logz).



**FIGURE 1.** Distribution of adeonid species along the Brazilian coast. Symbols: black star, *Adeonellopsis subsulcata*; black circle *Reptadeonella bipartita*; black square *Reptadeonella costulata*; black triangle *Reptadeonella granulosa*; white star, *Reptadeonella aspera* n. sp.; white circle *Reptadeonella brasiliensis* n. sp.; white triangle, *Reptadeonella cucullata* n. sp.; white square, *Reptadeonella leilae* n. sp.; question mark, *Reptadeonella* specimens that still require revision. From Canu & Bassler (1928a), Marcus (1939, 1941, 1949) and Braga (1967, 1968).

## Systematic account

### Order Cheilostomata Busk, 1852

### Suborder Neocheilostomina d'Hondt, 1985

### Family Adeonidae Busk, 1884

### Genus *Adeonellopsis* MacGillivray, 1886

**Type species.** *Adeonellopsis foliacea* MacGillivray, 1886

**Diagnosis** (modified from Cheetham *et al.* 2007). Colony rigidly erect or rarely encrusting. Autozooidal frontal shields imperforate except for areolae extending entirely around periphery and centrally placed spiramen of varying complexity. Primary orifice almost semicircular, without distal shelf; secondary orifice similar in shape; condyles and spines absent. Suboral and commonly frontal and/or interzooidal avicularia all with short condyles. Frontal and interzooidal avicularia typically developed on lateral margins of colony branches. Gonozooids may be morphologically modified or not from autozooids, commonly swollen, with widened orifices and/or enlarged spiramina.

### *Adeonellopsis subsulcata* (Smitt, 1873)

(Figs 2–5; Table 1)

*Porina subsulcata* Smitt, 1873: 28, pl. 6, figs 136–140. [Florida]

*Adeonella distoma* var. *imperforata* Busk, 1884: 188, pl. 20, fig. 4. [Brazil]

*Bracebridgia subsulcata*: Osburn 1914: 199. [Tortugas Islands; Florida]

*Bracebridgia subsulcata*: Maturo 1968: 277. [New England, United States]

*Bracebridgia subsulcata*: Canu & Bassler 1928b: 127, pl. 23, figs 1–3, text-fig. 25. [Gulf of Mexico]

*Bracebridgia subsulcata*: Osburn 1940: 446. [Puerto Rico]

*Bracebridgia subsulcata*: Cook 1973: 253, pl. 2, figs 4–6. [Florida; Brazil]

*Bracebridgia subsulcata*: Lidgard 1996: 173, figs 5a–d. [No locality]

*Bracebridgia subsulcata*: Winston 2005: 44, figs 113–120. [W. of Tortugas; Gulf of Mexico]

*Adeonellopsis subsulcata*: Cheetham *et al.* 2007: 79, fig. 36. [Recent, Florida; Panama; Puerto Rico]

*Adeonellopsis subsulcata*: Vieira *et al.* 2008: 24. [Brazil; checklist]

*Adeonellopsis subsulcata*: Sosa-Yañez *et al.* 2014: 30, figs 2–3. [Cuba]

*Adeonellopsis subsulcata*: Almeida *et al.* 2015: 4. [Brazil: Bahia; checklist]

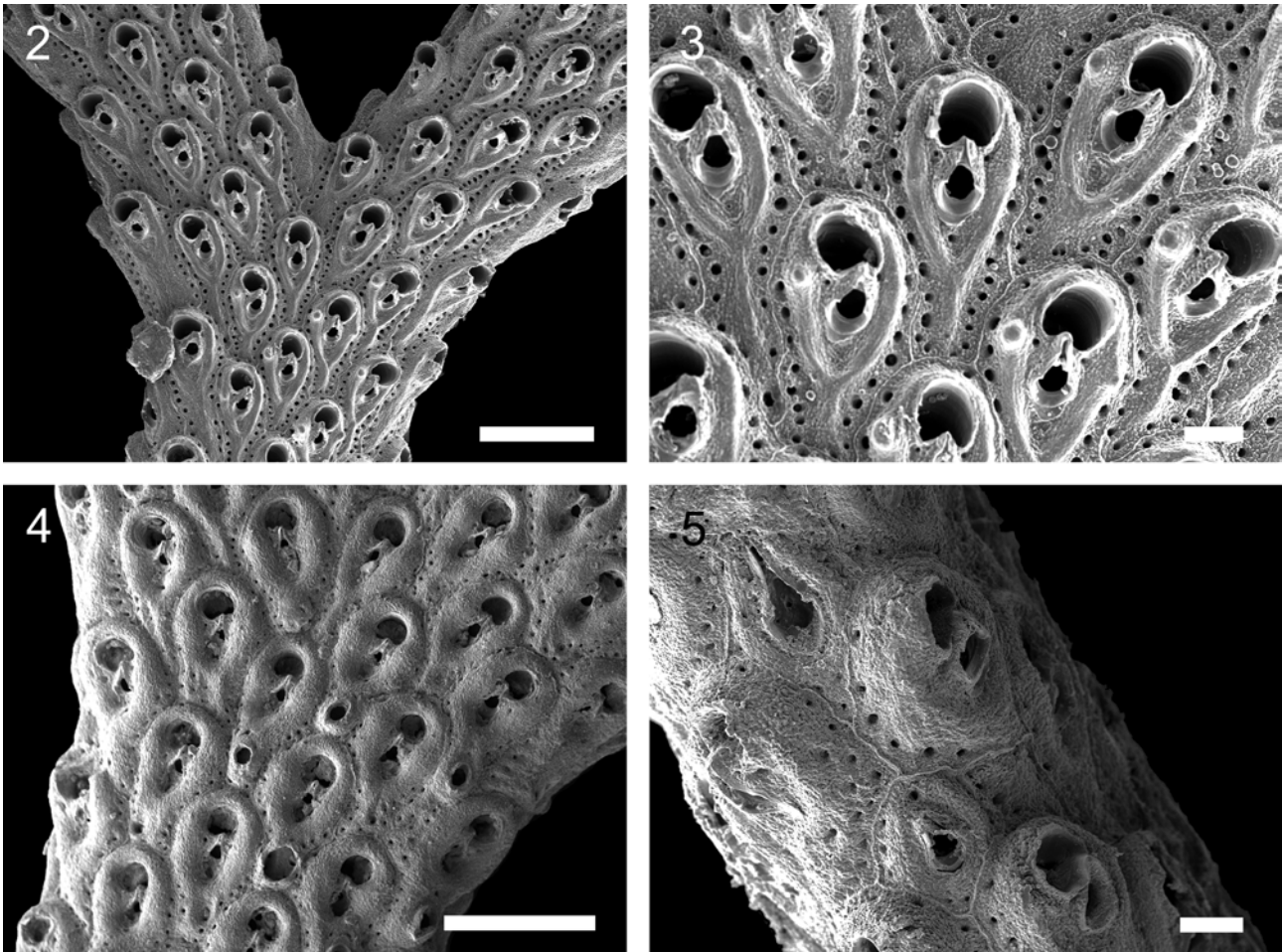
**Material examined.** UFBA 271, UFBA 1000, Camaçari, Bahia, Brazil, 11°21'–12°37' S, 37°17'–38°47' W, 23–28 m, coll. 2000–2002; UFBA 907, UFBA 910, Todos os Santos Bay, Bahia, Brazil, coll. 1976 by A. Bittencourt; UFBA 911, Espírito Santo, Brazil, coll. by V. Testa; UFBA 912, Jauá, Bahia, Brazil, 12°51' S, 38°11' W, 33 m; UFBA 914, Camamu, Barra Grande, Bahia, Brazil, 13°36' S, 38°46' W, 50 m, coll. January 2004.

**Description.** Colony erect, dichotomous, bilaminar. Zooids claviform, longer than wide, delimited by slightly raised lateral margins in the interzooidal furrows. Frontal shield heavily calcified, granular, marginally punctured by one row of 15–25 areolar pores. Sometimes calcification leaves a pair of latero-oral nodules. Two distinct pores separated by suboral avicularium commonly placed at proximal margin of orifice. Peristome well developed, sometimes obscuring distal marginal pores, high-arched, becoming thicker with secondary calcification, the proximal rim indented by the frontal suboral avicularian rostrum. This avicularium proportionally large (0.095–0.137 mm long), extending from spiramen to peristome, orientated distally or slightly obliquely, straight or weakly curving, the rostrum acute, elongate-triangular, delimited by a pair of minute condyles; opesial portion of avicularium smooth. Infrequent additional frontal avicularia borne proximally on margin, the chamber 0.107–0.132 mm long, 0.057–0.088 mm wide, of similar morphology to the suboral avicularium, directed proximally. Branch margins with vicarious to interzooidal avicularia, 0.244–0.388 mm long, 0.134–0.203 mm wide, having similar morphology to suboral and frontal avicularia. Spiramen single, depressed, semicircular, placed just proximal to suboral frontal avicularium, frequently obscured by frontal calcification. Gonozooids not recognized.

TABLE 1. Morphometric data for Adeoniidae species studied (in mm).

	<i>A. subsulcata</i> Bahia <sup>1</sup>	<i>R. bipartita</i> Bahia <sup>2</sup>	<i>R. costulata</i> Rio de Janeiro <sup>3</sup>	<i>R. aspera</i> n. sp. Bahia <sup>4</sup>	<i>R. brasiliensis</i> n. sp. Bahia <sup>5</sup>	<i>R. cucullata</i> n. sp. Bahia <sup>6</sup>	<i>R. leilae</i> n. sp. Bahia <sup>7</sup>
Lz (N)	15	15	15	25	25	25	25
Mean (SD)	0.489 (0.053)	0.551 (0.034)	0.572 (0.052)	0.445 (0.047)	0.482 (0.043)	0.568 (0.055)	0.496 (0.032)
Range	0.441–0.642	0.479–0.594	0.499–0.672	0.336–0.523	0.349–0.564	0.451–0.715	0.430–0.551
Lz (N)	15	15	15	25	25	25	25
Mean (SD)	0.224 (0.023)	0.384 (0.031)	0.298 (0.034)	0.260 (0.025)	0.283 (0.035)	0.339 (0.032)	0.275 (0.029)
Range	0.190–0.254	0.346–0.454	0.257–0.377	0.212–0.311	0.233–0.344	0.284–0.406	0.215–0.346
Dp (N)	15	15	15	25	25	25	25
Mean (SD)	0.011 (0.003)	0.014 (0.004)	0.019 (0.005)	0.009 (0.002)	0.024 (0.005)	0.014 (0.005)	0.010 (0.002)
Range	0.006–0.018	0.008–0.026	0.011–0.032	0.005–0.013	0.010–0.030	0.010–0.029	0.006–0.015
Lo (N)	15	15	15	25	25	25	25
Mean (SD)	0.091 (0.009)	0.087 (0.010)	0.091 (0.005)	0.064 (0.008)	0.072 (0.006)	0.084 (0.015)	0.069 (0.018)
Range	0.075–0.110	0.062–0.100	0.081–0.100	0.044–0.075	0.060–0.088	0.054–0.110	0.047–0.099
lo (N)	15	15	15	25	25	25	25
Mean (SD)	0.099 (0.006)	0.112 (0.008)	0.103 (0.007)	0.098 (0.010)	0.103 (0.005)	0.119 (0.016)	0.104 (0.020)
Range	0.092–0.117	0.092–0.123	0.093–0.120	0.079–0.117	0.088–0.111	0.087–0.150	0.083–0.148
Lavs (N)	15	15	15	25	25	25	-
Mean (SD)	0.121 (0.011)	0.199 (0.013)	0.205 (0.013)	0.089 (0.011)	0.061 (0.008)	0.176 (0.029)	-
Range	0.095–0.137	0.177–0.221	0.180–0.224	0.078–0.117	0.045–0.079	0.107–0.226	-
lavs (N)	15	15	15	25	25	25	-
Mean (SD)	0.069 (0.006)	0.087 (0.005)	0.074 (0.011)	0.050 (0.007)	0.042 (0.004)	0.078 (0.011)	-
Range	0.056–0.081	0.077–0.099	0.052–0.089	0.039–0.065	0.033–0.052	0.046–0.095	-
Lgz (N)	-	-	-	-	-	-	6
Mean (SD)	-	-	-	-	-	-	0.534 (0.041)
Range	-	-	-	-	-	-	0.480–0.585
lgz (N)	-	-	-	-	-	-	6
Mean (SD)	-	-	-	-	-	-	0.293 (0.032)
Range	-	-	-	-	-	-	0.250–0.332
Logz (N)	-	-	-	-	-	-	6
Mean (SD)	-	-	-	-	-	-	0.152 (0.041)
Range	-	-	-	-	-	-	0.118–0.220
logz (N)	-	-	-	-	-	-	6
Mean (SD)	-	-	-	-	-	-	0.187 (0.032)
Range	-	-	-	-	-	-	0.141–0.229

<sup>1</sup> UFBA 271 Bahia, Brazil. <sup>2</sup> USNM 8567 Bahia, Brazil. <sup>3</sup> USNM 8570 Rio de Janeiro, Brazil. <sup>4</sup> UFBA 1015 Bahia, Brazil. <sup>5</sup> UFBA 594 Bahia, Brazil. <sup>6</sup> UFBA 637 Bahia, Brazil. <sup>7</sup> UFBA 005 Bahia, Brazil.



**FIGURES 2–5.** *Adeonellopsis subsulcata*: **2**, part of erect colony at bifurcation; **3**, close-up of autozooids showing orifice, suboral avicularium and spiramen (mostly occluded) (Figs 2, 3, UFBA 271, Bahia State, Brazil). **4**, autozooids showing orifice, suboral avicularium and interzooidal avicularia; **5**, edge view of branch showing interzooidal and frontal avicularia (Figs 4, 5, UFBA 914, Bahia State, Brazil). Scale bars: 1, 4 = 500  $\mu\text{m}$ ; 3 = 200  $\mu\text{m}$ ; 5 = 100  $\mu\text{m}$ .

**Remarks.** Although frequently placed in *Bracebridgia* MacGillivray, 1886, the presence of a spiramen and adventitious avicularia and the absence of a lyrula in the primary orifice led Cheetham *et al.* (2007) to reassign *Porina subsulcata* Smitt, 1873 to *Adeonellopsis*. It is the only species of the genus recorded for the southwest Atlantic; it was first reported by Busk (1884) as a new species, *Adeonella distoma* var. *imperfurata*, based on specimens from Alagoas State, NE Brazil.

*Adeonellopsis subsulcata* is characterized by the small spiramen that frequently becomes obscured by frontal calcification, and suboral, frontal and interzooidal avicularia of similar morphology. Some specimens of *A. subsulcata* here analyzed lack adventitious frontal avicularia (UFBA 271; UFBA 1000) but, as noted by Cheetham *et al.* (2007), this type of avicularium may be present on scattered groups of autozooids, being frequently absent from autozooids at the growing edge (see Cheetham *et al.* 2007, figure 36.1).

**Distribution.** Atlantic: North Carolina to Brazil (Alagoas, Bahia and Espirito Santo); sublittoral.

### Genus *Reptadeonella* Busk, 1884

**Type species.** *Lepralia violacea* Johnston, 1847

**Diagnosis** (modified from Cheetham *et al.* 2007). Colony encrusting. Autozooidal frontal shield with areolae extending entirely around periphery, centrally imperforate or with 1–3 rows of accessory areolar pores, and centrally placed single or paired spiramen. Accessory smaller areolar pore(s) proximal to orifice. Orifice more or

less transversely elliptical to semicircular, the peristomial rim varying in height and thickness. Suboral avicularium present or absent, placed between spiramen and orifice, originating bilaterally from distolateral areolae, with rostrum distally directed and short condyles. Dimorphic avicularia sometimes present. Gonozooids, which may be morphological modified or not from autozooids, commonly swollen, with broader orifices than autozooids.

***Reptadeonella bipartita* (Canu & Bassler, 1928a)**

(Figs 6–9; 37, Table 1)

*Adeona bipartita* Canu & Bassler, 1928a: 37, pl. 8, fig. 2. [Brazil: Bahia]

*Adeona bipartita*: Marcus 1949: 25, figs 37–39. [Brazil: Espírito Santo]

*Reptadeonella bipartita*: Winston 1986: 24, fig. 50. [Puerto Rico; Jamaica]

Not *Reptadeonella bipartita*: Winston 2005: 46, figs 121–122. [W. of Tortugas and Florida]

*Reptadeonella bipartita*: Cheetham *et al.* 2007: 85 (?part), fig. 38.2. (?fig. 38.1) [Recent only: Jamaica; Puerto Rico and Brazil]

*Reptadeonella bipartita*: Vieira *et al.* 2008: 24. [Brazil; checklist]

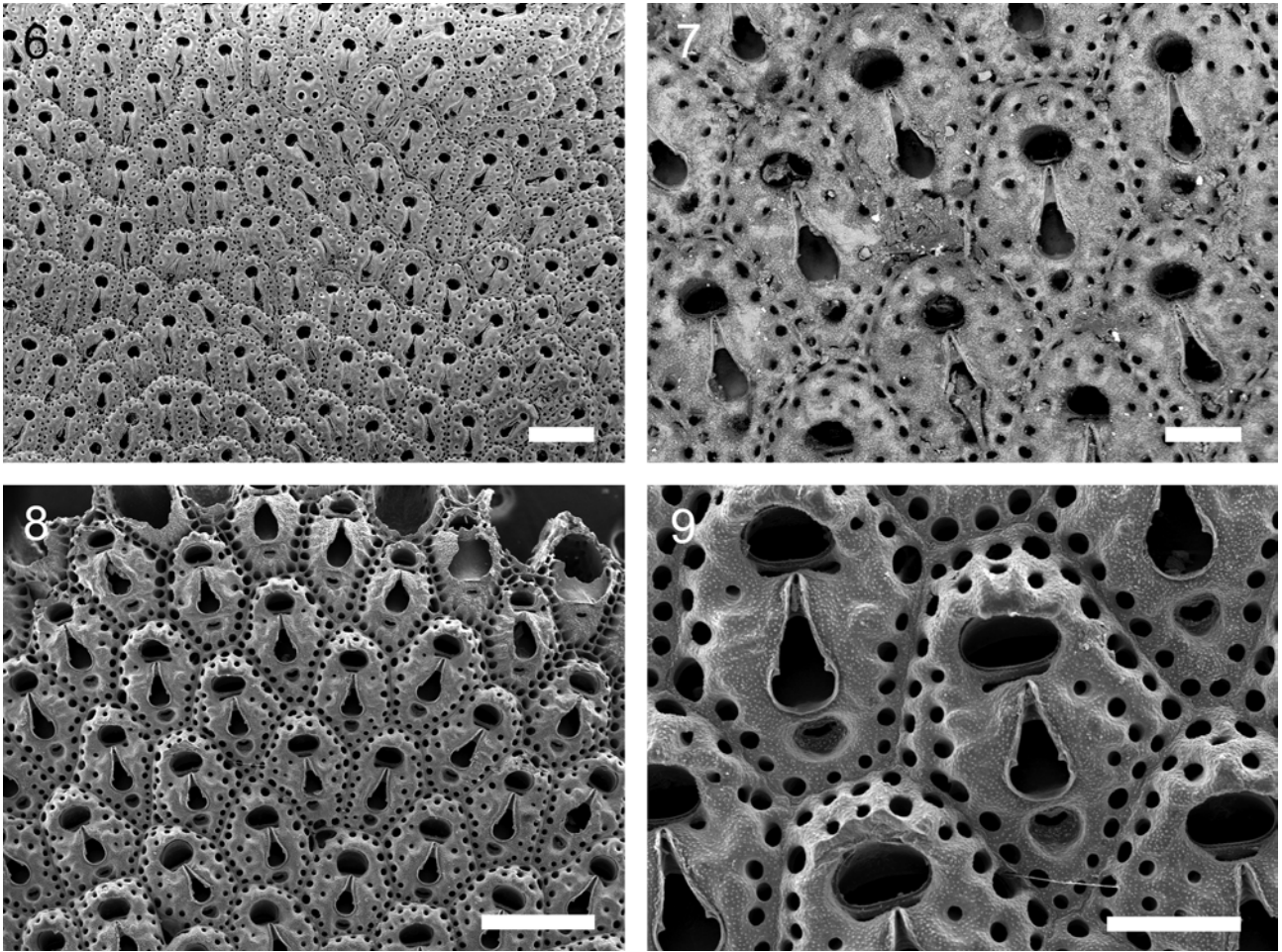
*Reptadeonella bipartita*: Almeida *et al.* 2015: 4. [Brazil: Bahia; checklist]

**Material examined.** *Holotype*: USNM 8567, *Adeona bipartita*, F. Canu & R. Bassler det., Bahia, Brazil, 49 m, coll. 1877 by Steamer *Norseman*. *Additional specimens*: MZUSP 1244–1246, *Adeona bipartita*, E. Marcus det., one dry and two balsam specimens, no locality on label, but presumably from Espírito Santo, Brazil [acc. Marcus (1949)]; UFBA 070, UFBA 266, UFBA 974, UFBA 977, UFBA 980, Camaçari, Bahia, Brazil, 11°21'–12°37'S, 37°17'–38°47'W, 22–26 m, coll. 2000–2008; UFBA 905–906, Todos os Santos Bay, Bahia, Brazil, 12°46'–13°02'S, 38°29'–38°33' W, 30–39 m, coll. 1997 by O. Alves; UFBA 991, Todos os Santos Bay, Bahia, Brazil, coll. 1976 by A. Bittencourt; UFPE 005, Jequiá da Praia, Alagoas, Brazil, 10°04' S, 36°02' W, coll. June 2002 by L.M. Vieira & M.D. Correia.

**Description.** Colony encrusting, multiserial, unilaminar, with dark cuticle. Zooids rhomboidal to polygonal, distally rounded, generally longer than wide, delimited by slightly raised lateral margins. Frontal shield heavily calcified, finely granular, marginally punctured by single (rarely double) row of 25–36 areolar pores; a pore frequently also on either side of rostral tip. Primary orifice approximately 15% of total length of frontal shield, transversely elliptical, sunken. Peristome not prominent, transversely elliptical and level with zooid surface, the margin slightly swollen, bordered by small nodules and distal marginal areolar pores. A thin transverse foramen, areolar in origin, between peristomial rim and avicularian rostral tip in neanic zooids, later becoming mostly or wholly concealed by secondary calcification. Suboral avicularium median on frontal shield, directed distally, longer than wide, extending from spiramen to peristome, the rostrum elongate-triangular, tiny condyles placed one-third length, no opesia cryptocrystal shelf. No other frontal avicularia. Spiramen crescentic, set in a depression between avicularium and proximal zooidal margin. Gonozooids not recognized.

**Remarks.** Since the original description of *R. bipartita*, based on specimens from NE Brazil (Canu & Bassler 1928a), there have been records of the species from the Caribbean and Florida (Winston 1986; Winston 2005; Cheetham *et al.* 2007), including fossil specimens from Panama and Dominican Republic (Cheetham *et al.* 1999) and SE Brazil (Marcus 1949). The fossil specimens figured by Cheetham *et al.* (2007, fig. 38.1) are distinguished from the Brazilian specimens in having shorter avicularia, with the spiramen placed at midlength in the zooid. Cheetham *et al.* (2007) noted that the specimens described by Smitt (1873) as *Porina violacea* and studied by Winston (2005) are distinct from *R. bipartita* in having a continuous double row of marginal areolar pores (often single in *R. bipartita*, but some zooids may have double row, see Fig. 13) and recognizable gonozooids (not seen in *R. bipartita*). Comparison of these specimens and Brazilian colonies also revealed differences in the size of avicularia (0.09–0.18 mm long in Floridan specimens vs 0.16–0.23 mm long in Brazilian specimens). All other records show a unique combination of characters—a single row of marginal areolar pores, suboral pores separated by the avicularian rostrum, straight (distally directed) avicularium and sunken crescentic spiramen.

**Distribution.** Caribbean: Jamaica and Puerto Rico; Atlantic: Brazil (Alagoas, Bahia and Espírito Santo); sublittoral.



**FIGURES 6–9.** *Reptadeonella bipartita*: 6, colony surface, general aspect; 7, group of autozooids showing paired subperistomial areolar pores, median avicularia and spiraminal openings (Figs 6, 7, USNM 8567, holotype, Bahia State, Brazil). 8, group of autozooids; 9, close-up of autozooids showing slit-like subperistomial areolar pores, avicularia and spiramina (Figs 8, 9, UFBA 266, Bahia State, Brazil). Scale bars: 6, 8 = 500  $\mu$ m; 7, 9 = 200  $\mu$ m.

***Reptadeonella costulata* (Canu & Bassler, 1928a)**

(Figs 10–12; Table 1)

*Adeona costulata* Canu & Bassler, 1928a: 37, pl. 8, figs 7–8. [Brazil: Rio de Janeiro]

*Reptadeonella costulata*: Vieira *et al.* 2008: 24. [Brazil; checklist]

**Material examined.** *Holotype*: USNM 8570, *Adeona costulata*, F. Canu & R. Bassler det., Rio de Janeiro, Brazil, 128 m, coll. 1877 by Steamer *Norseman*.

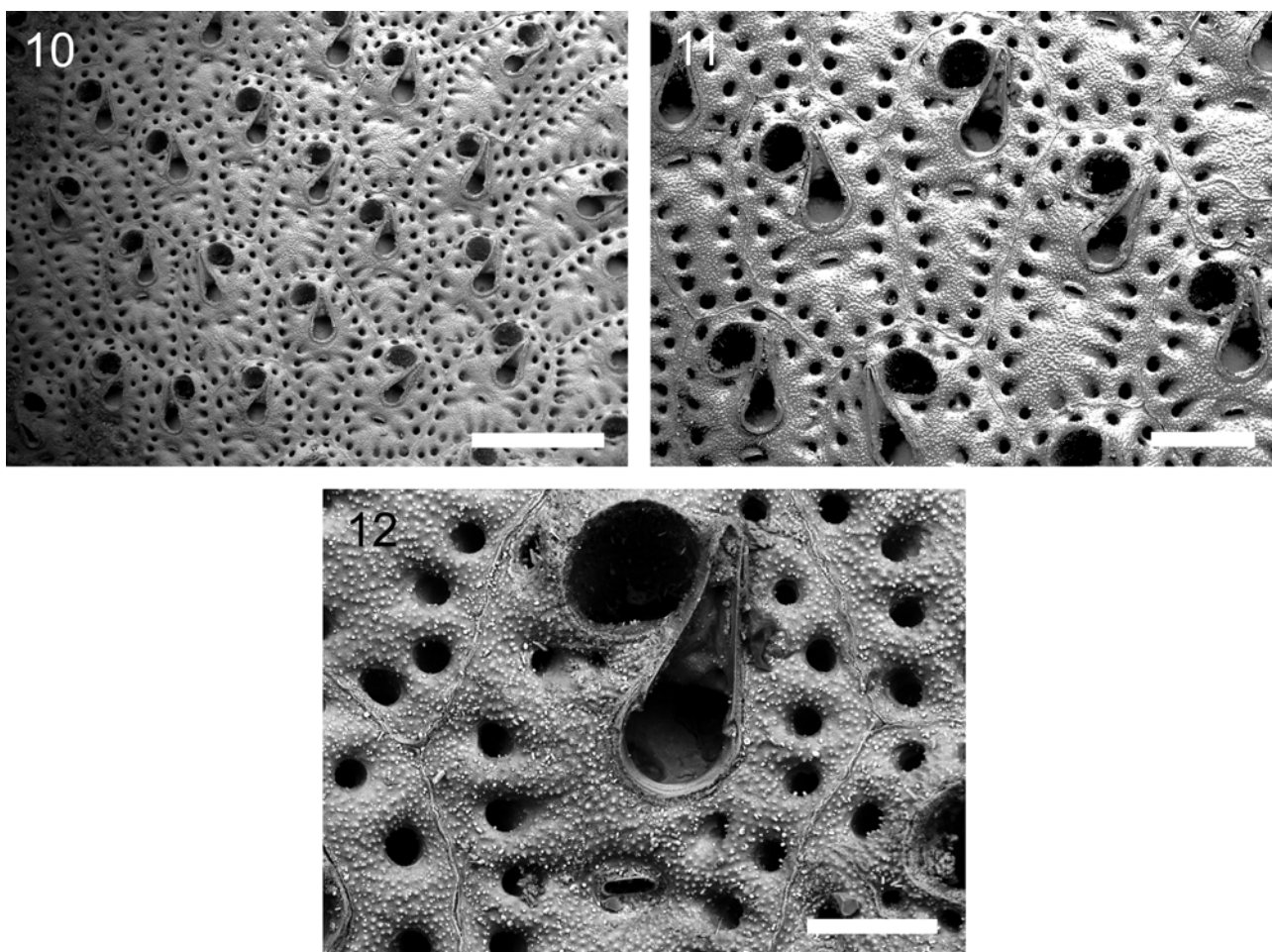
**Description.** Colony encrusting, multiserial, unilaminar. Zooids more or less elongate-hexagonal to polygonal, longer than wide, delimited by slightly raised margins. Frontal shield heavily calcified, finely granular, marginally punctured by a single row of 22–34 areolar pores. Orifice approximately 16% of total length of frontal shield, mostly slightly elliptical or subcircular, a little wider than long; peristome low, bordered by distal areolar pores. An additional areolar pore, rarely paired, proximal to orifice adjacent to suboral avicularium. Avicularium elongate, more or less latero-oral, placed on frontal shield such that it is directed obliquely past one side of the orifice, the rostral tip almost level with its distal margin; rostrum elongate-triangular, tiny condyles placed one-third length, no opesial cryptocystal shelf. No other frontal avicularia. Spiramen narrower than an areolar pore, transversely elliptical, placed at midlength of zooid. Gonozooids not recognized.

**Remarks.** *Reptadeonella costulata* can be distinguished from all congeners by the combination of characters—elongated autozooids with a single row of areolar pores, low peristome, and 1–2 smaller areolar pores

adjacent to suboral avicularium that is directed obliquely past the orifice, and tiny elliptical spiramen. *Reptadeonella costulata* is distinguished from *R. bipartita* by the proportionally smaller additional areolar pore (larger in *R. bipartita*), oblique suboral avicularium (straight in *R. bipartita*) and elliptical spiramen (crescentic in *R. bipartita*).

Since its original description, *R. costulata* has been reported from Jamaica and Belize (Best & Winston 1984; Winston 2005), but the specimens figured by Best & Winston (1984) have a relatively large additional areolar pore (rather than a small elliptical pore as in the holotype), a hood-like peristome (low in the type specimen) and circular spiramen (transversely elliptical in the *R. costulata* holotype). Winston (2005) measured autozooids in *R. costulata* from the Caribbean as having a mean length of 0.85 mm and mean width of 0.50 mm, much larger than in the type specimen (mean length 0.57 mm, mean width 0.29 mm), and pointed out that the avicularia sometimes extend beyond the distal margin of the orifice, whereas those in the holotype are level with distal margin. We conclude that the Caribbean specimens of *R. costulata* (sensu Best & Winston 1984) may comprise a distinct species.

**Distribution.** Atlantic: Brazil (Rio de Janeiro); sublittoral.



**FIGURES 10–12.** *Reptadeonella costulata*, USNM 8570, holotype, Rio de Janeiro State, Brazil: **10**, part of encrusting colony; **11**, **12**, autozooids showing avicularia, subperistomial areolar pores adjacent to avicularia and tiny transverse spiramina. Scale bars: 10 = 500  $\mu$ m; 11 = 200  $\mu$ m; 12 = 100  $\mu$ m.

### ***Reptadeonella granulosa* Winston & Vieira, 2013**

(Figs 13–14)

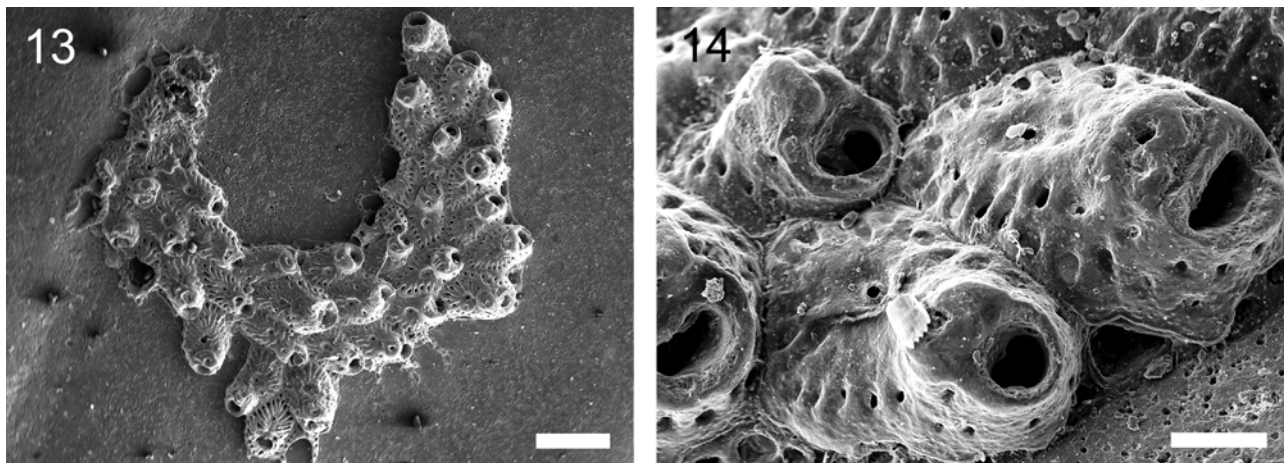
*Reptadeonella granulosa* Winston & Vieira, 2013: 126, fig. 17. [Brazil: São Paulo]

**Material examined.** *Holotype*: MZUSP 739, São Paulo, Brazil, 23°48' S, 45°06' W, 36 m, coll. November 2002 by BIOTA/FAPESP/Bentos Marinho Project.



**Remarks.** *Reptadeonella granulosa* is an interstitial bryozoan species with small white colonies readily distinguished from congeners by small zooid size, a robust frontal shield and lack of avicularia (Winston & Vieira 2013). As pointed by Winston & Vieira (2013), this species resembles *Adeona tubulifera* sensu Marcus (1939, p. 152, pl. 11, fig. 19A, B) from Paraná State, giving evidence that records of *R. tubulifera* from Brazil may represent a different species.

**Distribution.** Atlantic: Brazil (São Paulo); sublittoral.



**FIGURES 13–14.** *Reptadeonella granulosa*, MZUSP 739, holotype, São Paulo State, Brazil: **13**, pluriserial encrusting colony; **14**, close-up of autozooids and a gonozooid at the colony margin. Scale bars: 13 = 400  $\mu$ m; 14 = 100  $\mu$ m.

***Reptadeonella aspera* n. sp.**

(Figs 15–18; 38, Table 1)

**Material examined.** *Holotype*: UFBA 1015, Camaçari, Bahia, Brazil, 12°50' S, 38°10' W, 31 m, coll. February 2006. *Paratypes*: UFBA 976, UFBA 1003, Camaçari, Bahia, Brazil, 11°21'–12°37' S, 37°17'–38°47' W, 23–37 m, coll. 2007; UFBA 994, Salvador, Bahia, Brazil, 13°01' S, 38°28' W, 27 m, coll. January 2009; UFBA 1030, UFBA 1052, Camamu, Bahia, Brazil, 12°35'–13°07' S, 38°29'–38°48' W, 47–50 m, coll. August 2004. *Additional specimens*: UFBA 017, UFBA 045, UFBA 069, UFBA 098, UFBA 979, UFBA 981, UFBA 983, UFBA 987, UFBA 989, UFBA 992, UFBA 997, UFBA 999, UFBA 1001, UFBA 1005, UFBA 1007, UFBA 1009, UFBA 1011, UFBA 1013, Camaçari, Bahia, Brazil, 12°35'–13°07' S, 38°29'–38°48' W, 21–34 m, coll. 1995–2008.

**Diagnosis.** Multiserial *Reptadeonella* with rugose frontal calcification, tubular peristome, and elliptical suboral areolar pore visible only in zooids lacking avicularium; suboral avicularium relatively small, subtriangular, directed distally; spiramen transversely elliptical.

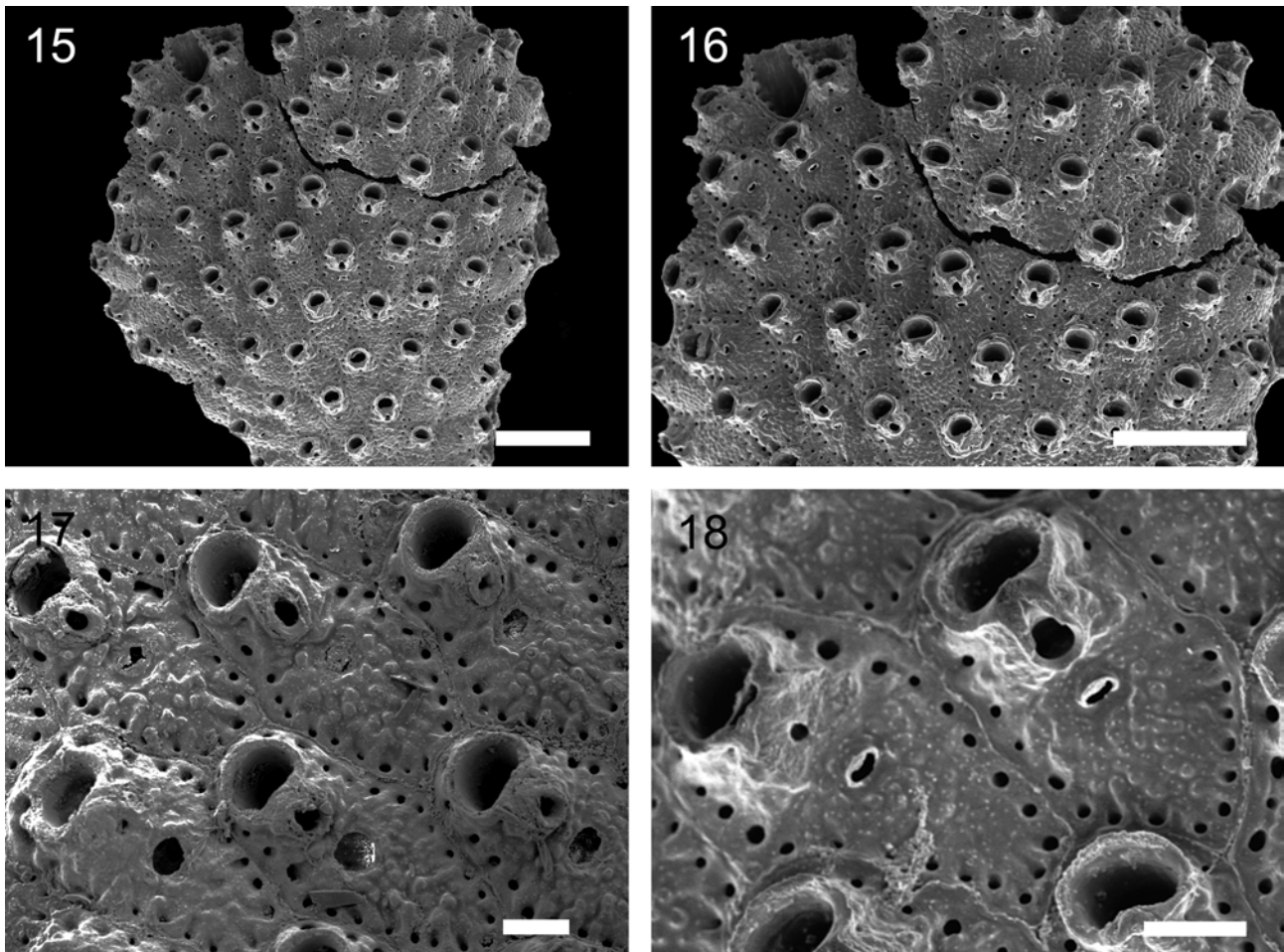
**Etymology.** From Latin *asper*, rough, alluding to frontal-shield calcification.

**Description.** Colony encrusting, unilaminar, multiserial. Skeleton glossy, colony white. Zooids more or less elongate-hexagonal to rectangular, longer than wide, delimited by slightly raised irregular lateral margins. Frontal shield heavily calcified, rugose and minutely granular, marginally punctured by a single row of 13–21 areolar pores. Orifice approximately 14% of total length of frontal shield, transversely elliptical, wider than long. Peristomial rim well developed, especially proximally in relation to suboral avicularian chamber; distal areolar pores partly concealed by peristomial rim; suboral areolar pore proportionally large and elliptical, visible only in zooids lacking avicularium. Suboral avicularium relatively small, 0.078–0.117 mm long, longer than wide, directed distally, straight, emplaced in heavily calcified area proximal to peristome, extending to one-third autozooid length; rostrum acute, opesial end with very thin, smooth cryptocystal rim, rounded, with a pair of minute condyles placed one-third length. Frontal avicularia absent. Spiramen transversely elliptical, placed at mid-length of zooid. Gonozooids not recognized.

**Remarks.** The tubular peristome of *Reptadeonella aspera* n. sp. resembles that in *Reptadeonella cellulanus* Tilbrook, Hayward & Gordon, 2001, *Reptadeonella falciformis* Tilbrook, 2006, *R. granulosa*, *Reptadeonella hystricosus* Tilbrook, 2006, *Reptadeonella levinseni* (Borg, 1940), *R. tubulifera* and *Reptadeonella leilae* n. sp.

(described below). *Reptadeonella aspera* n. sp. has rugose frontal calcification and an elliptical spiramen. Differences from *R. cellulanus* include the orientation of the suboral avicularium (distolateral in *R. cellulanus*, straight in *R. aspera* n. sp.). *Reptadeonella falciformis*, *R. hystricosus* and *R. levinseni* have orificial condyles (absent in *R. aspera* n. sp.). *Reptadeonella granulosa* and *R. leilae* n. sp. lack avicularia and have a depressed circular spiramen (non-depressed and elliptical in *R. aspera* n. sp.). *Reptadeonella aspera* n. sp. differs from *R. tubulifera* in its frontal calcification (rugose in *R. aspera* n. sp., smooth in *R. tubulifera*) and spiramen (non-depressed and elliptical in *R. aspera* n. sp. and depressed and crescentic in *R. tubulifera*). The proximal peristomial areolar pore is large and elliptical in *R. aspera* n. sp.; it was not seen in *R. tubulifera*.

**Distribution.** Atlantic: Brazil (Bahia); sublittoral.



**FIGURES 15–18.** *Reptadeonella aspera* n. sp., UFBA 1015, holotype, Bahia State, Brazil: **15, 16**, colony, general aspect; **17**, autozooids showing elevated peristomial rims, avicularia (somewhat eroded) and spiramina; **18**, close-up of autozooids showing subperistomial (slit-like, left zooid) and other areolar pores, avicularium (right zooid) and spiramina. Scale bars: 15 = 500  $\mu$ m; 16, 17, 18 = 100  $\mu$ m.

***Reptadeonella brasiliensis* n. sp.**

(Figs 19–28; 39, 40, Table 1)

- Microporella violacea*: Kirkpatrick 1890: 504. [Brazil: Fernando de Noronha]  
 Not *Lepralia violacea* Johnston, 1847: 325, pl. 57, fig. 9. [British Isles]  
*Adeona heckeli*: Canu & Bassler 1928a: 36 (in part), pl. 8, fig. 5, 6. [Brazil: Bahia]  
 Not *Cellepora heckeli* Reuss, 1847: 85, pl. 10, fig. 10 [Fossil: Austria]  
*Reptadeonella violacea*: Souza 1989: 499, pl. 1, fig. 5. [Brazil: Bahia]  
*Reptadeonella violacea*: Machado & Souza 1994: 259, fig. 10. [Brazil: Atol das Rocas]  
*Reptadeonella violacea*: Vieira *et al.* 2008: 24 (in part). [Brazil; checklist]  
 Not *Adeona violacea*: Marcus 1939: 147, pl. 10, fig. 18. [Brazil: São Paulo]

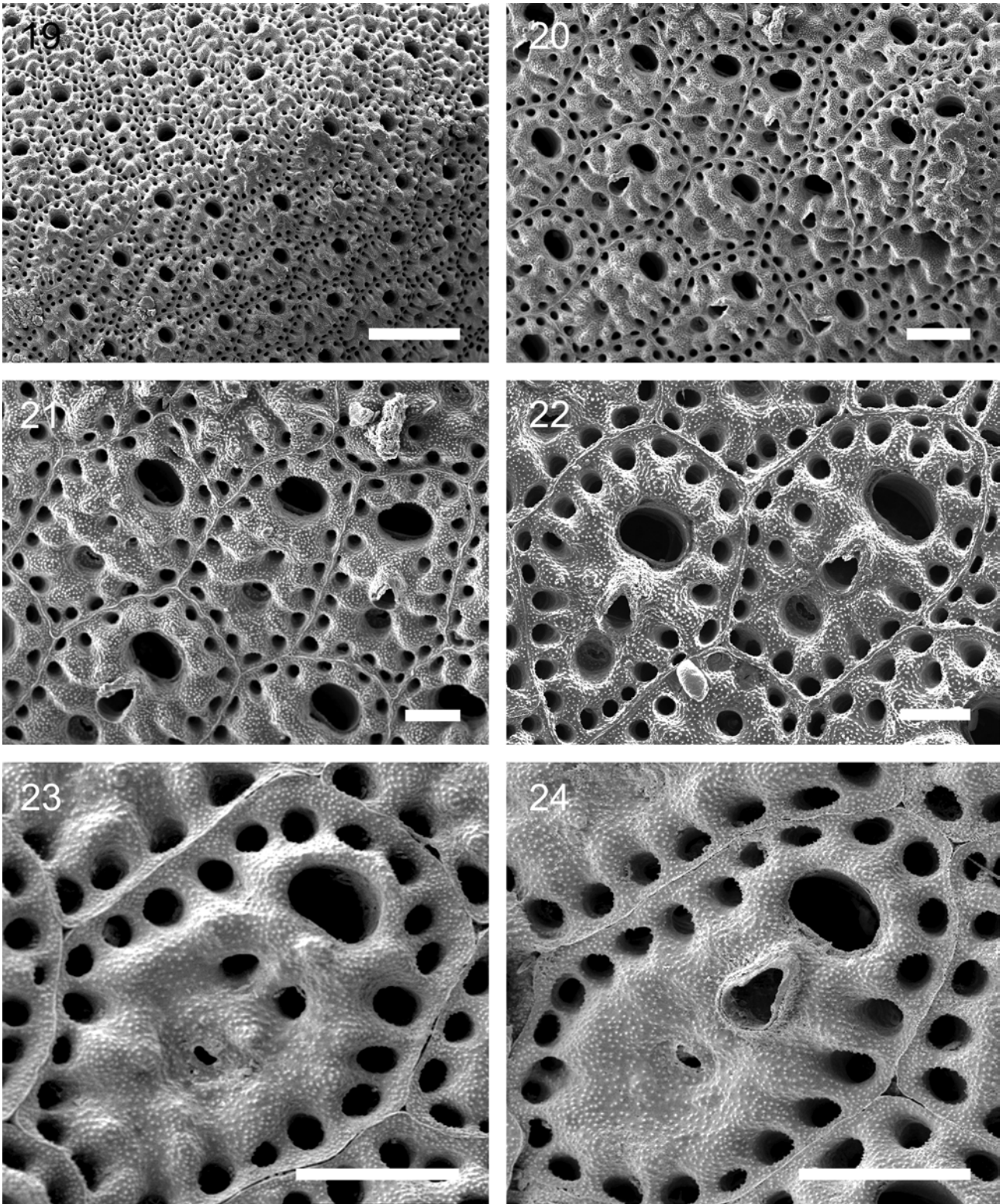
Not *Adeona violacea*: Marcus 1949: 24, figs 34–36. [Brazil: Espírito Santo; = *Reptadeonella cucullata* n. sp.]  
? *Adeona violacea*: Braga 1967: 11, fig. 6, photo 7. [Brazil: Rio de Janeiro]  
? *Adeona violacea*: Braga 1968: 13. [Brazil: Rio de Janeiro]  
*Reptadeonella* sp.: Almeida *et al.* 2015: 4 (in part) [Brazil: Bahia; checklist]

**Material examined.** *Holotype*: UFBA 363, Salvador, Bahia, Brazil, 12°57' S, 38°21' W, intertidal, coll. April 2012 by LABPOR-UFBA. *Paratypes*: UFBA 352–353, UFBA 357, UFBA 359, Salvador, Bahia, Brazil, 12°57' S, 38°21' W, intertidal, coll. March 2012 by LABPOR-UFBA; UFBA 594, Camaçari, Bahia, Brazil, 12°43' S, 38°02' W, 24 m, coll. July 2000; USNM 8569, *Adeona heckeli*, F. Canu & R. Bassler det., Bahia, Brazil, coll. 1877 by Steamer *Norseman*; UFPE 001, Jatiúca, Alagoas, Brazil, 9°39'10" S, 35°41'40" W, intertidal, coll. 13 January 2006 by L.M. Vieira; UFPE 002, Saco da Pedra, Marechal Deodoro, Alagoas, Brazil, 9°44'41" S, 35°49'10" W, intertidal, coll. 20 March 2003 by L.M. Vieira & M.D. Correia. *Additional specimens*: MZUSP 220, Pacheco, Caucaia, Ceará, Brazil, 3°31.14' S, 38°28.1' W, intertidal, coll. 20 August 2009 by L.M. Vieira (PROCAD); MZUSP 221, Fleixeiras, Trairi, Ceará, Brazil, 3°13.33' S, 39°15.02' W, intertidal, coll. 22 August 2009 by L.M. Vieira (PROCAD); NHMUK 1888.4.16.17, *Reptadeonella violacea*, H.N. Ridley det., San Antonio Bay, Fernando de Noronha, Brazil; UFAL 001, UFAL 261, Sereia, Maceió, Alagoas, Brazil, 9°33'55" S, 35°38'40" W, intertidal, coll. 2011 and 2007 by L.M. Vieira & M.D. Correia; UFAL 012, Garça Torta, Maceió, Alagoas, Brazil, 9°35'10" S, 35°39'41" W, intertidal, coll. 06 March 2000 by M.D. Correia; UFAL 006, UFAL 011, UFAL 013, Ponta Verde, Maceió, Alagoas, Brazil, 9°40'05" S, 35°41'30" W, intertidal, coll. 2002 and 2003 by L.M. Vieira & M.D. Correia; UFAL 014, Jatiúca, Maceió, Alagoas, Brazil, 9°39'10" S, 35°41'40" W, intertidal, coll. 2002–2007 by L.M. Vieira & M.D. Correia; UFAL 027, UFAL 042, Francês, Marechal Deodoro, Alagoas, Brazil, 9°46'33" S, 35°50'06" W, intertidal, coll. 2003, L.M. Vieira & M.D. Correia; UFAL 053, Saco da Pedra, Marechal Deodoro, Alagoas, Brazil, 9°44'41" S, 35°49'10" W, intertidal, coll. 12 September 2003 by L.M. Vieira & M.D. Correia; UFAL 060–061; UFAL 087, UFAL 112, UFAL 192, UFAL 201, UFAL 235, UFPE 003, Pajuçara, Maceió, Alagoas, Brazil, 9°40'49" S, 35°43'05" W, intertidal, coll. 2004–2007 by L.M. Vieira & M.D. Correia; UFAL 068–069, UFAL 243, UFAL 279, UFPE 008, Riacho Doce, Maceió, Alagoas, Brazil, 9°34'42" S, 35°39'19" W, intertidal, coll. 2006–2008 by L.M. Vieira & M.D. Correia; UFAL 095, UFAL 106, UFAL 185–186, UFAL 230, UFPE 007, Amores, Maceió, Alagoas, Brazil, 9°40'40" S, 35°42'10" W, intertidal, coll. 2006 and 2007 by L.M. Vieira & M.D. Correia; UFAL 240, Ponta do Prego, Maceió, Alagoas, Brazil, 9°31'30" S, 35°35'10" W, intertidal, coll. 06 April 2007 by M.D. Correia; UFAL 292, UFAL 306–308, Ponta do Meirim, Maceió, Alagoas, Brazil, 9°32'33" S, 35°36'48" W, intertidal, coll. 2008 and 2009 by L.M. Vieira & M.D. Correia; UFBA 368, Salvador, Bahia, Brazil, 12°57' S, 38°21' W, intertidal, coll. April 2012 by LABPOR-UFBA; UFBA 903–904, UFBA 913, UFBA 975, Todos os Santos Bay, Bahia, Brazil, 12°35' S to 13°07' S and 38°29' W to 38°48' W, coll. 1997 and 2007 by O. Alves & C. Sampaio; UFBA 1101, João Pessoa, Paraíba, Brazil, 7°08' S, 34°47' W, intertidal, coll. January 2015 by V.A. Gomes; UFPE 014–015, Ponta de Pedras, Goiana, Pernambuco, Brazil, 7°37' S, 38°48'51" W, intertidal, coll. 2014 and 2015 by A.C.S. Almeida and T.E. Cavalcanti.

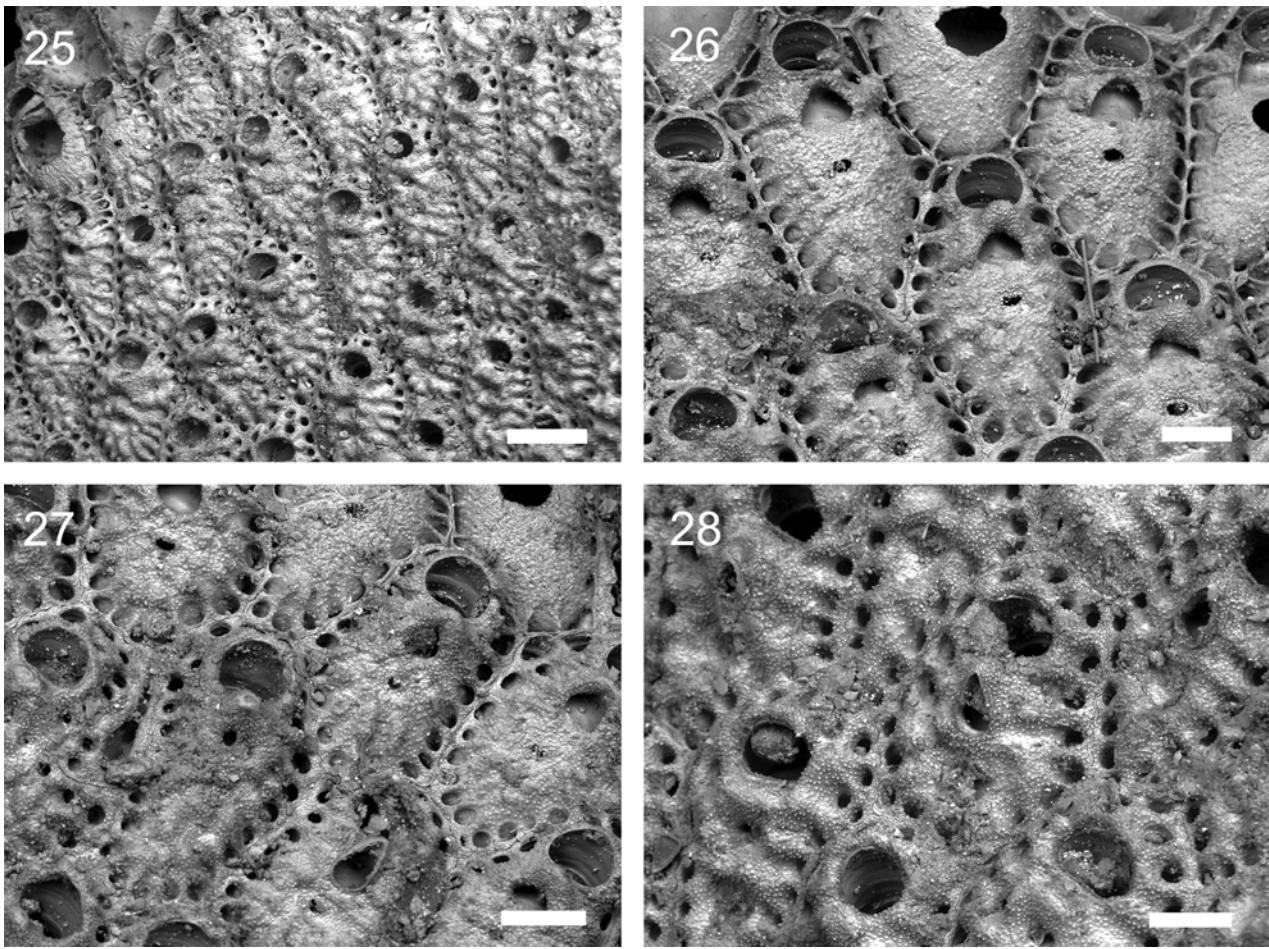
**Diagnosis.** *Reptadeonella* with peristome surrounded by small nodules, suboral areolar pore large and elliptical, zooids with 1–2 frontal areolar pores frequently replaced by suboral avicularium and crescentic spiramen.

**Etymology.** The epithet alludes to the Brazilian type locality.

**Description.** Colony encrusting, multiserial, uni- to multilaminar, forming extensive crusts, with deep-purple-colored cuticle. Zooids hexagonal to rhomboidal, longer than wide, delimited by slightly raised lateral margins. Frontal shield heavily calcified, finely granular, marginally punctured by a single row of 18–26 relatively large areolar pores; rarely an additional row of pores may be present with increasing calcification. Primary orifice approximately 15% of total length of frontal shield, transversely elliptical, wider than long. Peristomial rim transversely oval to semicircular, with areolar pores around distal margin and sometimes with small nodules. A transversely narrow areolar pore immediately proximal to peristomial rim, visible in many zooids. 1–2 frontal areolar pores, frequently replaced by avicularium. Suboral avicularium median, not large, 0.045–0.079 mm long, straight, or directed slightly obliquely, in heavily calcified area at proximal margin of peristome and extending to one-third zooid length; rostrum acutely triangular, opesial end with thin, steeply sloping granular cryptocyst; a pair of minute condyles placed one-third length. Spiramen depressed, small, crescentic, proximal to avicularium. Gonozooids not recognized.



**FIGURES 19–24.** *Reptadeonella brasiliensis* n. sp.: 19, general aspect of colony surface; 20, group of autozooids; 21, autozooids with 1–2 subperistomial areolar pores, two frontal avicularia, and spiramina; 22, autozooids showing nodular peristomial rims, avicularia and spiramina (Figs 19–22, UFBA 363, holotype, Bahia State, Brazil). 23, autozooid with a pair of frontal areolar pores; 24, autozooid, with avicularium and spiramen (Figs 23, 24, UFPE 001, paratype, Alagoas State, Brazil). Scale bars: 19 = 500  $\mu$ m; 20 = 200  $\mu$ m; 21, 22 = 100  $\mu$ m; 23, 24 = 150  $\mu$ m.



**FIGURES 25–28.** *Reptadeonella brasiliensis* n. sp., USNM 8569, paratype, Bahia State, Brazil: **25**, colony surface; **26**, zooids at growing edge showing differentiating avicularian chambers; **27**, **28**, autozooids showing avicularia and spiramina (occluded in many zooids). Scale bars: 25 = 250  $\mu$ m; 26–28 = 100  $\mu$ m.

**Remarks.** *Reptadeonella brasiliensis* n. sp. was first reported from Brazil (Fernando de Noronha) as *Microporella violacea* (Johnston) (Kirkpatrick 1890). Canu & Bassler (1928a) recorded it from the coast of Bahia, but misidentified it as *Adeona heckeli* Reuss, 1847, a fossil species recognized to be a junior synonym of *Reptadeonella violacea* (David & Pouyet 1974). Canu & Bassler (1928a) also attributed the name *Adeona heckeli* to specimens from Rio de Janeiro State. We cannot locate these specimens so only specimens from Bahia are now assigned to *R. brasiliensis* n. sp. (Figs 25–28).

Over the years, specimens of *R. brasiliensis* n. sp. have continued to be misassigned to *R. violacea* (Souza 1989; Machado & Souza 1994). However, according to most recent studies (Winston 1986, 2005; Hayward & McKinney 2002; Cheetham *et al.* 2007; Vieira *et al.* 2008), *R. violacea* is a warm-temperate species and records from the tropical western Atlantic may represent more than one species. *Reptadeonella brasiliensis* n. sp. differs from *R. violacea* in having a single row of marginal areolar pores (*R. violacea* frequently has double row; see Hayward & McKinney 2002, fig. 19D; Souto *et al.* 2015, fig. 12), one or two frontal such pores placed proximal to the orifice that are frequently replaced by the suboral avicularium (not recognized in *R. violacea*), and a crescentic spiramen (rounded in *R. violacea*; see Hayward & McKinney 2002, fig. 19E; Souto *et al.* 2015, fig. 12).

Brazilian specimens reported by Marcus (1939, 1949) as *Adeona violacea* refer to two distinct species. Specimens from São Paulo (specimen missing from Ernst Marcus collection at MZUSP) are distinguished from *R. brasiliensis* n. sp. in having larger suboral avicularia and an oval spiramen; these specimens may belong to an undescribed species. Specimens from Espírito Santo (MZUSP 1246–1248; MZUSP 1256) designated as form *plagiopora* (Marcus 1949, figs 35–36), have zooids with a double row of areolar pores, and suboral avicularia curving laterally; these specimens are here reassigned to *R. cucullata* n. sp. (see below). Braga (1967, 1968) reported *Adeona violacea* from Rio de Janeiro but these specimens differ from *R. brasiliensis* n. sp. in having larger suboral avicularia; they require further examination in order to elucidate their real identity.

*Reptadeonella brasiliensis* **n. sp.** is the only *Reptadeonella* species that sometimes has one or two frontal suboral pores in lieu of the suboral avicularium. The species is one of the commonest intertidal cheilostomes from NE Brazil, where it is often found encrusting other bryozoans and rocks. Colonies can form extensive crusts and have deep-purple pigmentation when alive (Figs 39–40).

**Distribution.** Atlantic: Brazil (Ceará to Bahia; Fernando de Noronha), intertidal to sublittoral (49 meters).

***Reptadeonella cucullata* n. sp.**

(Figs 29–32; 41, Table 1)

*Adeona violacea*: Marcus 1949: 24 (in part), figs 35–36. [Brazil: Espírito Santo]

*Reptadeonella violacea*: Vieira *et al.* 2008: 24 (in part). [checklist]

Not *Lepralia violacea* Johnston, 1847: 325, pl. 57, fig. 9. [British Isles]

*Reptadeonella* sp.: Almeida *et al.* 2015: 4 (in part) [Brazil: Bahia; checklist]

**Material examined.** *Holotype*: UFBA 637, Caravelas, Bahia, Brazil, 16°24' S, 38°18' W, 80 m, coll. April 1996 by Revizee Central. *Paratypes*: UFBA 689, Camamu, Barra Grande, Bahia, Brazil, 13°45' S, 38°50' W, 30 m, coll. January 2004; UFBA 431, Banco Vitória, Espírito Santo, Brazil, 20°33' S, 38°03' W, 60 m, coll. April 1996 by Revizee Central; UFBA 990, UFBA 1045, Camaçari, Bahia, Brazil, 12°35'–13°07' S, 38°29'–38°48' W, 22–28 m, coll. 2000–2003. *Additional specimens*: MZUSP 1246–1248, MZUSP 1256, *Adeona violacea*, E. Marcus det., no locality in label, but presumably from Espírito Santo, Brazil, 35 m [acc. Marcus 1949]; UFBA 909, UFBA 1054, Camamu, Barra Grande, Bahia, Brazil, 13°45' S, 38°50' W, coll. January 2004.

**Diagnosis.** *Reptadeonella* with uni- to multilaminar colonies, distal peristomial rim slightly cucullate, orifice transversely elliptical to roundly semicircular; a transverse slit-like areolar pore often visible between peristomial rim and avicularium; suboral avicularium obliquely orientated, with curved rostrum; spiramen small, elliptical, denticulate.

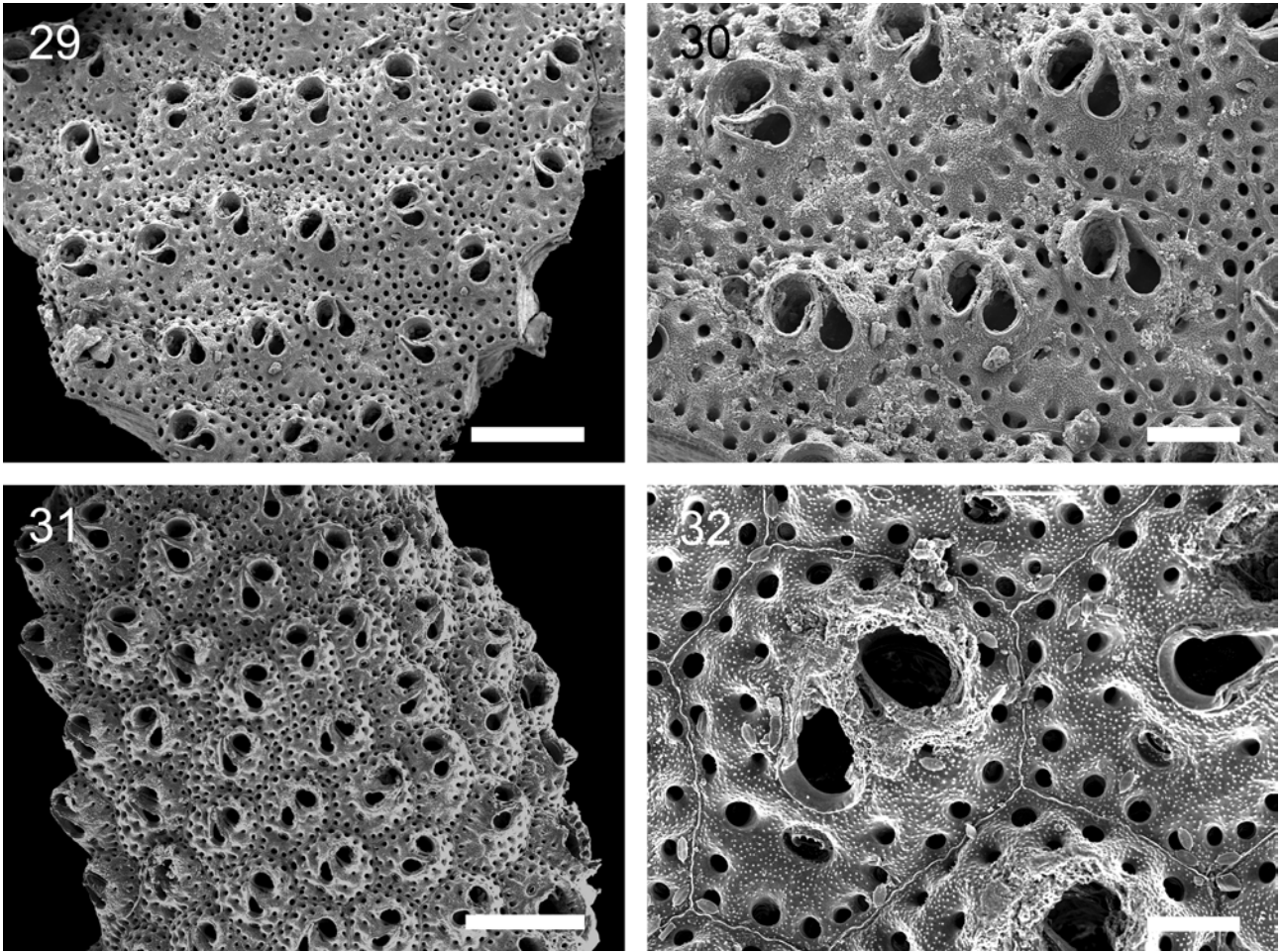
**Etymology.** Latin *cuculla*, hood, alluding to the distal peristomial rim.

**Description.** Colony encrusting, multiserial, uni- to multilaminar. Cuticle orange colored, skeleton white. Zooids hexagonal to polygonal, longer than wide, delimited by thin boundary lines within interzooidal furrows. Frontal shield heavily calcified, minutely granular, punctured by a single to double row of 28–38 marginal areolar pores. Orifice approximately 15% of total length of frontal shield, transversely elliptical to roundly semicircular, the distal rim raised, slightly cucullate, becoming more so with increasing calcification. A transversely narrow areolar pore between the peristomial rim and avicularium visible in many zooids, tending to be obliterated by secondary calcification. Suboral avicularium 0.107–0.226 mm long, obliquely directed, the acute rostral tip just curving around one side of the peristome; a pair of minute condyles placed at one-third length, the curved opesia rim with smooth, narrow, steeply descending cryptocyst. No additional frontal avicularia. Spiramen relatively small, transversely elliptical, denticulate, placed at mid-length of zooid. Gonozooids not recognized.

**Remarks.** *Reptadeonella cucullata* **n. sp.** can be distinguished from all congeners by the combination of multilaminar colonies, autozooids with cucullate peristomial rims, a large suboral avicularium with a curved rostrum and an elliptical denticulate spiramen. Specimens reported as *Adeona violacea* by Marcus (1949) from Espírito Santo, Brazil, are also characterized by zooids with a double row of frontal areolar pores, long curved avicularia and transversely oval spiramen; accordingly, specimens (MZUSP 1246–1248, 1256) are here reassigned to *R. cucullata* **n. sp.**

*Reptadeonella cucullata* **n. sp.** resembles *R. costulata* and *Reptadeonella hastingsae* Cheetham & Sandberg, 1964 in having hexagonal to polygonal elongate zooids and an obliquely directed suboral avicularium. *Reptadeonella cucullata* is distinguished from *R. costulata* by the double row of marginal areolar pores (single in *R. costulata*), peristomial calcification (low in *R. costulata*, cucullate in *R. cucullata*), subperistomial areolar pore (small and adjacent to the suboral avicularium in *R. costulata*, larger and distal to the suboral avicularium in *R. cucullata*) and the shape of the avicularian rostrum (straight in *R. costulata*, curved in *R. cucullata*). Differences from *R. hastingsae* include the multilaminar colonies (unilaminar in *R. hastingsae*), double row of marginal areolar pores (single in *R. hastingsae*) and transversely elliptical denticulate spiramen (crescentic and non-denticulate in *R. hastingsae*).

**Distribution.** Atlantic: Brazil (Bahia and Espírito Santo); sublittoral.



**FIGURES 29–32.** *Reptadeonella cucullata* n. sp.: **29**, colony surface; **30**, group of autozooids showing avicularia, subcucullate peristomial rims and spiramina (Figs 29, 30, UFBA 637, holotype, Bahia State, Brazil). **31**, colony surface; **32**, close-up of autozooids showing subcucullate peristomial rims, avicularia and spiramina (Figs 31, 32, UFBA 689, paratype, Bahia State, Brazil). Scale bars: 29, 31 = 500  $\mu$ m; 30 = 200  $\mu$ m; 32 = 100  $\mu$ m.

***Reptadeonella leilae* n. sp.**

(Figs 33–36, 42; Table 1)

? *Adeona tubulifera*: Marcus 1939: 152, pl. 11, fig. 19A, B. [Brazil: Parana]

Not *Adeona tubulifera* Canu & Bassler, 1930: 34, pl. 5, figs 6–9. [Galapagos Island]

*Reptadeonella* sp.2: Almeida *et al.* 2015: 4. [Brazil: Bahia; checklist]

**Material examined.** *Holotype*: UFBA 005, Camaari, Bahia, Brazil, 1247' S, 3802' W, 28 m, coll. February 2007. *Paratypes*: UFBA 982, UFBA 984, UFBA 986, UFBA 1006, UFBA 1008, UFBA 1026, UFBA 1047, UFBA 1050, Camaari, Bahia, Brazil, 1121'–1237' S, 3717'–3847' W, 11–27 m, coll. 1996–2010. *Additional specimens*: UFBA 011, UFBA 039, UFBA 085, UFBA 988, UFBA 993, UFBA 996, UFBA 998, UFBA 1002, UFBA 1004, UFBA 1006, UFBA 1008, UFBA 1010, UFBA 1012, UFBA 1014, UFBA 1016, UFBA 1018–1021, UFBA 1023–1025, UFBA 1027–1029, Camaari, Bahia, Brazil, 1235'–1307' S, 3829'–3848' W, 21–37 m, coll. 1995–2008.

**Diagnosis.** Unilaminar *Reptadeonella*, frontal shield minutely granular-tubercular, peristome tubular, areolar pore immediately distal to base of peristome; spiramen circular, placed midlength in zooid.

**Etymology.** Honorific for Leila Rodrigues Mendona Vieira, Leandro M. Vieira's wife.

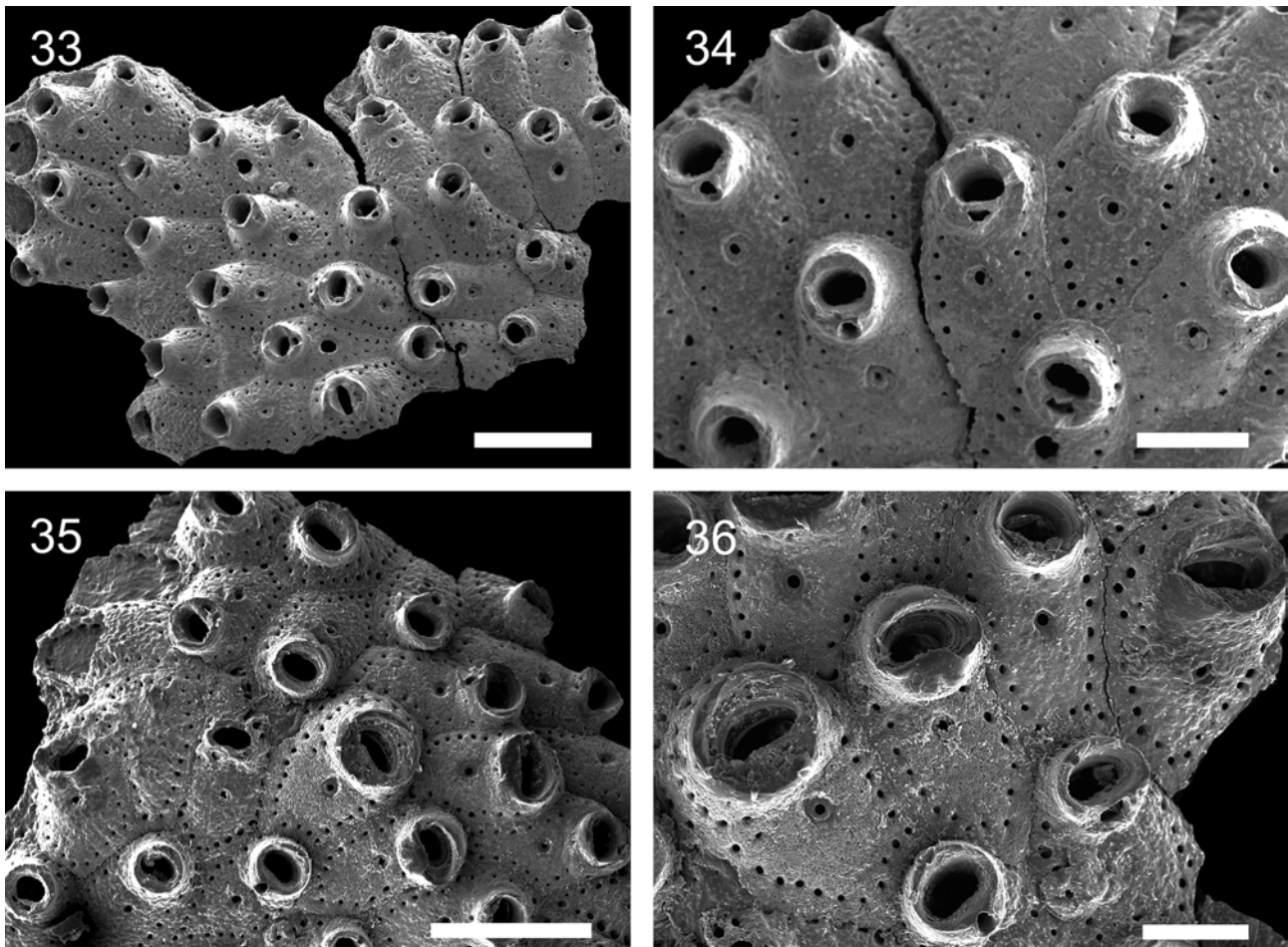
**Description.** Colony unilaminar, encrusting small hard substrata such as sand grains. Skeleton whitish. Zooids elongate-oval to polygonal, longer than wide, elongated, delimited by slightly raised lateral margins in interzooidal

furrows. Frontal shield heavily calcified, minutely granular-tubercular, marginally punctured by a single row of 14–25 areolar pores. Primary orifice approximately 14% of total length of frontal shield, transversely elliptical. Peristome well-developed, elevated, becoming tubular with increasing calcification, secondary orifice subelliptical; small areolar pore semilunar to semicircular immediately distal to base of peristome, often concealed. No avicularia. Spiramen depressed, circular, placed in center of zooid. Enlarged zooids present, here interpreted as gonozooids, with wider orifices.

**Remarks.** Unlike other *Reptadeonella* species, *R. leilae* n. sp. shares with *R. granulosa* and *Reptadeonella hymanae* Soule, 1961 the absence of avicularia. *Reptadeonella leilae* n. sp. and *R. granulosa* can be distinguished by the frontal calcification (granular-tubercular in *R. leilae*, with radiating ridges in *R. granulosa*), peristome (tubular in *R. leilae*, short in *R. granulosa*) and metrics (larger autozooids, gonozooids and orifice in *R. leilae*). *Reptadeonella leilae* n. sp. is distinguished from *R. hymanae* by its unilaminar colonies (uni- or multilaminar in *R. hymanae*), single row of marginal areolar pores (double in *R. hymanae*) and tubular peristome (low in *R. hymanae*).

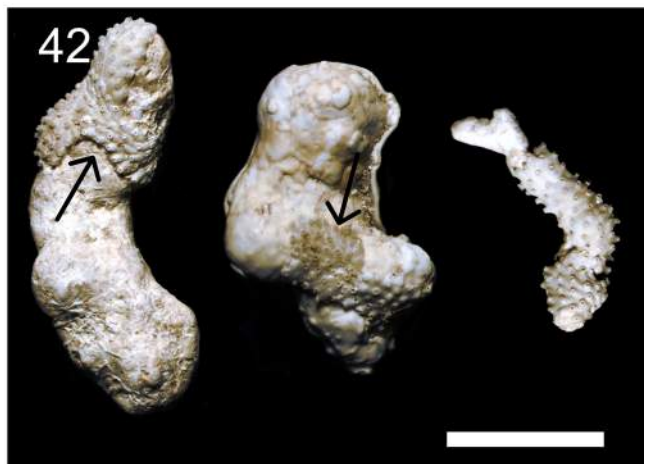
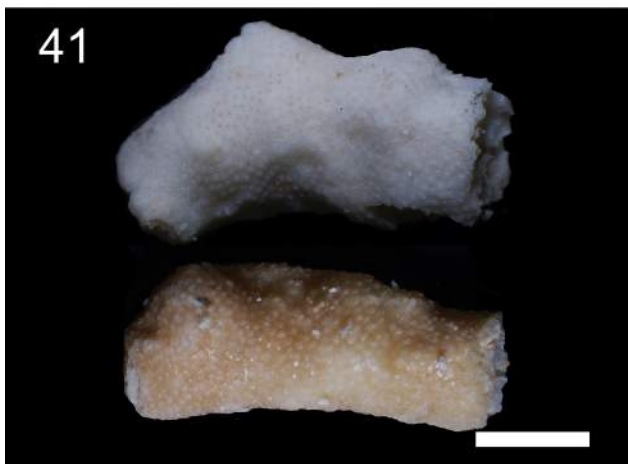
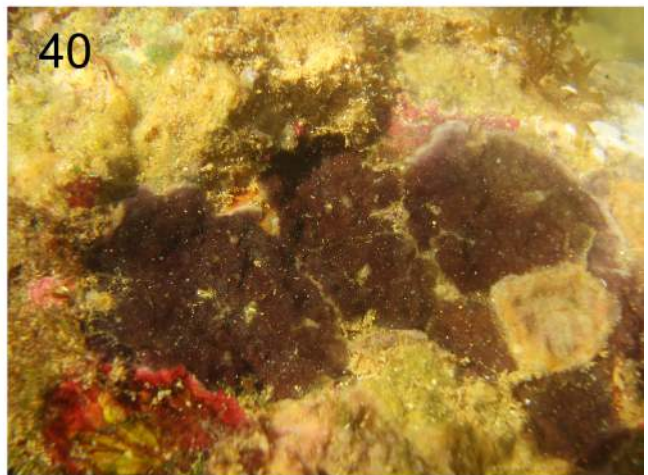
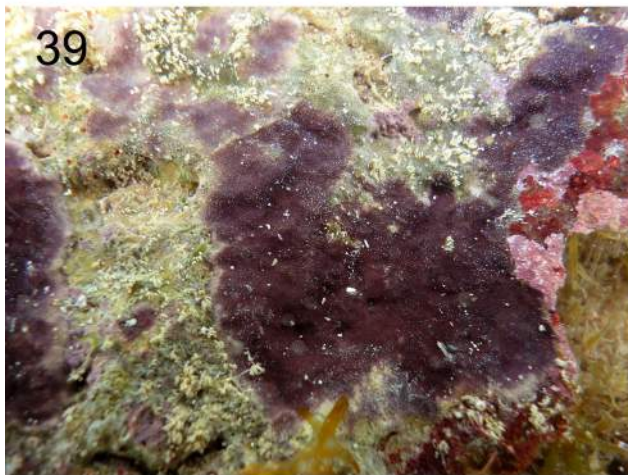
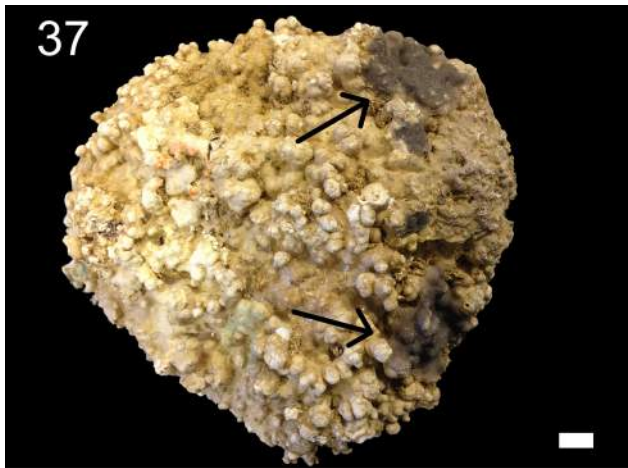
The lack of suboral avicularia and the size of the orifice in *R. leilae* n. sp. resemble specimens reported by Marcus (1939) as *Adeona tubulifera* from Paraná, Brazil; these specimens, however, differ in having radiating ridges as in *R. granulosa*. Examination of Marcus's *Adeona tubulifera* is required to assign it with certainty to *R. leilae*, *R. granulosa* or another species. *Reptadeonella leilae* n. sp. is distinguished from *R. tubulifera* by the absence of suboral avicularia (conspicuous in *R. tubulifera*) and by the circular spiramen (crescentic to double in *R. tubulifera* see Cheetham *et al.* 2007).

**Distribution.** Atlantic: Brazil (Bahia); sublittoral.



**FIGURES 33–36.** *Reptadeonella leilae* n. sp.: **33**, general aspect of colony, with autozooids and a gonozooid (middle bottom); **34**, close-up of autozooids showing tubular peristomes (Figs 33, 34, UFBA 005, holotype, Bahia state, Brazil). **35**, autozooids and a gonozooid (center right); **36**, close-up of autozooids and gonozooids (Figs 35, 36, UFBA 1008, paratype, Bahia State, Brazil). Scale bars: 33, 35 = 500  $\mu$ m; 34, 36 = 200  $\mu$ m.





**FIGURES 37–42.** Colonies of *Reptadeonella* species: **37**, *Reptadeonella bipartita* (UFBA 266, Bahia State, Brazil), encrusting colonies on large calcareous nodule. **38**, *Reptadeonella aspera* n. sp. (UFBA 994, paratype, Bahia State, Brazil), encrusting colonies on calcareous nodules. **39–40**, *Reptadeonella brasiliensis* n. sp., uncatalogued specimen from Alagoas State, Brazil (Fig. 39) and uncatalogued specimens, Bahia State, Brazil (Fig. 40). **41**, *Reptadeonella cucullata* n. sp. (UFBA 637, holotype, Bahia State, Brazil), encrusting multilaminar colonies. **42**, *Reptadeonella leilae* n. sp. (UFBA 1026, paratype, Bahia State, Brazil), encrusting colonies on calcareous nodules. Scale bars: 37 = 2 cm; 38 = 2 mm; 41, 42 = 5 mm.

TABLE 2. Morphological characters of *Reptadeonella* species: present (+) and absent (-), suboral avicularium (S), dimorphic avicularia (D), unknown states (?).

Species	Colony	Areolar pore rows	Peristome		Condytes	Avicularia		Spiramen	Gonozooids
			Morphology			S	D		
			Suboral pore						
<i>R. aspera</i> n. sp.	unilaminar	marginal	tubular	large/elliptical	-	+	-	elliptical	not recognized
<i>R. bipartita</i> Canu & Bassler, 1928a	unilaminar	marginal	nodular	large/elliptical	-	+	-	crenate	orifice crenate
<i>R. brasiliensis</i> n. sp.	unilaminar	marginal	nodular	large/elliptical	-	+	-	crenate	not recognized
<i>R. cucullata</i> n. sp.	multilaminar	double	hood-like	large/elliptical	-	+	-	elliptical	not recognized
<i>R. cellulana</i> Tilbrook, Hayward & Gordon, 2001	unilaminar	marginal	tubular	large/elliptical	-	+	-	oval	not recognized
<i>R. costulata</i> Canu & Bassler, 1928a	unilaminar	marginal	non-prominent	small/elliptical	-	+	-	elliptical	not recognized
<i>R. falciiformis</i> Tilbrook, 2006	unilaminar	marginal	tubular	-	+	+	+	circular	peristome oval to reniform
<i>R. fissa</i> (Hincks, 1880)	unilaminar	marginal	non-prominent	?	-	+	+	circular	orifice crenate
<i>R. granulosa</i> Winston & Vieira, 2013	unilaminar	marginal	thick	small/elliptical	-	-	-	circular	orifice broader than autozooids
<i>R. hastingsae</i> Cheetham & Sandberg, 1964	unilaminar	marginal	short	large/elliptical	-	+	-	crenate	2 rows of pores distal to orifice
<i>R. hymanae</i> Soule, 1961	uni- to multilaminar	double	non-prominent	?	-	-	-	circular	orifice broader than autozooids
<i>R. hystricosus</i> Tilbrook, 2006	unilaminar	double	tubular	?	+	+	-	oval	larger than autozooids
<i>R. insidiosa</i> (Jullien, 1903)	?	marginal	non-prominent	?	-	+	-	single / double	larger than autozooids, without peristome, reduced avicularia
<i>R. leitae</i> n. sp.	unilaminar	marginal	tubular	-	-	-	-	circular	larger than autozooids
<i>R. levinseni</i> (Borg, 1940)	?	double	tubular	?	+	+	-	circular	?
<i>R. novissima</i> Tilbrook, Hayward & Gordon, 2001	unilaminar	marginal	non-prominent	small/elliptical	+	+	-	circular	not recognized
<i>R. phelleanophila</i> Tilbrook, 2006	unilaminar	marginal	reniform	?	-	+	+	oval	not recognized
<i>R. plagiopora</i> (Busk, 1859)	?	marginal	thick	?	-	+	-	circular	not recognized
<i>R. sicilis</i> Tilbrook, 2006	unilaminar	marginal	circular	-	-	+	+	oval	not recognized
<i>R. tubulifera</i> (Canu & Bassler, 1930)	?	marginal	tubular	-	-	+	-	crenate	larger than autozooids and without avicularia
<i>R. violacea</i> (Johnston, 1847)	unilaminar	double	nodular	?	-	+	-	circular	larger than autozooids

## Discussion

Five *Reptadeonella* species were previously reported in Brazilian waters—*R. bipartita*, *R. costulata*, *R. granulosa*, *R. tubulifera* and *R. violacea* (Kirkpatrick 1890; Canu & Bassler 1928a; Marcus 1939, 1941, 1949; Braga 1967, 1968; Souza 1989; Machado & Souza 1994; Cheetham *et al.* 2007; Vieira *et al.* 2008). As noted by Vieira *et al.* (2008), records of *R. tubulifera* and *R. violacea* were doubtful and possibly represented distinct species. Our examination of specimens, descriptions and figures of putative *Adeona violacea* (see Marcus 1949) has led us to reassign them to *R. cucullata* **n. sp.** Similarly, specimens reported by Canu & Bassler (1928a), Souza (1989) and Machado & Souza (1994) as *R. violacea* are now assigned to *R. brasiliensis* **n. sp.** We conclude that *R. violacea* does not occur in coastal Brazil. Currently, we recognize seven *Reptadeonella* species from Brazil—*R. aspera* **n. sp.**, *R. bipartita*, *R. brasiliensis* **n. sp.**, *R. costulata*, *R. cucullata* **n. sp.**, *R. granulosa* and *R. leilae* **n. sp.**

Morphological characters commonly used to discriminate *Reptadeonella* species include shape of the primary and secondary orifices, height and degree of calcification of peristomes, presence of condyles, and the shape, position and orientation of avicularia, spiramina and gonozooids (Tilbrook *et al.* 2001; Tilbrook 2006). Our analysis using SEM images also showed the subperistomial areolar pore(s), adjacent or distal to the suboral avicularium (if present), to be a useful morphological character, since the number, shape and position of these vary largely between species studied.

Given these characters, *Reptadeonella* species show a wide range of morphologies (see Table 2). Four species—*R. levinseni*, *Reptadeonella novissima* Tilbrook, Hayward & Gordon, 2001, *R. hystricosus* and *R. falciformis*—have condyles in the primary orifice. Other species—*R. falciformis*, *Reptadeonella fissa* (Hincks, 1880), *Reptadeonella phelleaphila* Tilbrook, 2006 and *Reptadeonella sicilis* Tilbrook, 2006—have dimorphic avicularia. Only three species—*R. granulosa*, *R. hymanae* and *R. leilae* **n. sp.** lack any type of avicularia. All morphological characters, however, are best appreciated using SEM; historic western Atlantic records are not accompanied by such images and/or lack detailed descriptions of the specimens.

Recent studies of the Brazilian bryozoan fauna (e.g. Ramalho *et al.* 2010; Vieira *et al.* 2010; Winston & Vieira 2013; Almeida & Souza 2014; Winston *et al.* 2014) show a greater species diversity than previously known or anticipated. Our SEM study of *Retadeonella* from Brazil conforms to this pattern, with the recognition of four new taxa, which also differ in colour and gross morphology (Figs 37–42). Records from other regions of Brazil should be also studied using SEM imaging; we expect taxon diversity to be considerably greater than currently recognized.

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