



## Two new species and a new genus of Calloporidae (Bryozoa: Cheilostomata) from the Southwest Atlantic

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### Abstract

The family Calloporidae occupies a basal position in the classification of the Cheilostomata, the relatively simple calloporid morphology seeming to be the basic pattern for the adaptive radiation of cheilostome bryozoans. The ovicells of the Calloporidae may be formed by the maternal zooid or the distal zooid, which can be an autozooid, a vicarious avicularium or a kenozooid. Examination of new calloporid material from the southern Patagonian shelf revealed the existence of two new species and a new genus. *Kenoaplousina fissurata* **gen. nov., sp. nov.** is characterized by its distinctive kenozooidal oecium. The new genus is also deemed to include *Aplousina grandipora* Moyano, an allied species from the Chilean continental slope. *Alderina simplicissima* **sp. nov.**, is also described from the Magellanic region.

**Key words:** bryozoan, kenozooid, ovicell structure, taxonomy, Argentina

### Introduction

The family Calloporidae is regarded as occupying a basal position in the classification of the Cheilostomata, as several clades of this order seem to have originated, since the early Middle Cretaceous, from ancestors having relatively simple calloporid zooidal morphology (Taylor 1988). For example, the tatiform ancestrula of many ascophoran bryozoans possesses a frontal membrane surrounded by spines, which resembles the basic calloporid structure.

Notwithstanding, the family as presently circumscribed is rather large and heterogeneous and several authors have emphasized that it is much in need of taxonomic revision, especially in view of the wide range of characters exhibited by the included genera (Ryland & Hayward 1977; Cook & Bock 2000). For example, recent studies (Ostrovsky & Schäfer 2003; Ostrovsky *et al.* 2003, 2007, 2009; Ostrovsky & Taylor 2005) have noted the structural diversity and evolutionary trends of the brood chambers in different members of the family. The aim of the present study is to describe two new species and a new genus of Calloporidae from the Southwest Atlantic and to discuss their affinities with morphologically similar taxa in the family.

### Materials and methods

Samples came from two separate cruises. The benthic survey of the R/V *Shinkai Maru* was carried out in July–August 1978 (Cousseau *et al.* 1979). Samples from the Patagonian shelf off the Atlantic coast of Tierra del Fuego province were collected on December 2011 by the AHTS *Lenga* using a 13.49 dm<sup>2</sup> Van Veen grab.

Specimens were cleaned in diluted domestic bleach (NaOCl solution) and coated with gold-palladium (40%–60%). Digital images were obtained using a conventional SEM (Phillips XL–30) at the Museo Argentino de Ciencias Naturales (MACN). The length and width of zooids and ovicells were measured using a stereomicroscope with a micrometer eyepiece.

All the material under study has been deposited in the collection of invertebrates of the MACN (MACN–In).

## Taxonomy

### Suborder Flustrina Smitt, 1868

### Superfamily Calloporoidea Norman, 1903

### Family Calloporidae Norman, 1903

### Genus *Kenoaplousina* gen. nov.

**Diagnosis.** Colony encrusting. Zooidal opesia occupying almost the entire frontal surface. Gymnocyst and cryptocyst scarcely developed. Spines, avicularia and pore chambers absent. Basal wall mostly uncalcified. Ovicell produced by a kenozooid distal to the maternal one, not covered either by the cryptocyst or the gymnocyst of the distal zooid. Lateral walls perforated by multiporous pore plates.

**Type-species.** *Kenoaplousina fissurata* sp. nov.

**Etymology.** From the Greek, *kenos*, alluding to the kenozooidal nature of the ovicell, and *Aplousina*, a genus of calloporid bryozoans. Gender feminine.

**Remarks.** *Kenoaplousina* gen. nov. agrees with *Aplousina* in the poorly developed cryptocyst and gymnocyst, and in the absence of spines, avicularia and pore chambers. Its ovicells produced by a distal kenozooid, however, are completely different from the hood-shaped, endozooidal ovicells characteristic of *A. gigantea* Canu & Bassler (see Osburn 1940; Maturo 1957; Winston 1982), type species of *Aplousina* by original designation (Canu & Bassler 1927). *Aplousina grandipora* Moyano, from the Chilean continental slope, is also regarded as belonging to this new genus owing to the absence of spines and avicularia and the kenozooidal nature of its ovicell (Moyano 1991).

### *Kenoaplousina fissurata* sp. nov.

(Fig. 1, Table 1)

**Material examined.** *Holotype*: MACN–In 38956, a colony coated with gold-palladium, *Shinkai Maru* SM IV, Station 71, 28 July 1978, 48°30' S, 62°31' W, 141 m. *Paratypes*: MACN–In 38957, eight colonies, same station as holotype. MACN–In 38959, SM IV, Station 108, 11 August 1978, 52°31' S, 67°18' W, 92 m. *Other material examined*: MACN–In 38958, *Lenga* Station Z1–E13, 3 December 2011, 53°09.539' S, 67°09.401' W, 76 m.

**Description.** Colony encrusting, unilaminar. Autozooids oval, lightly calcified, separated by distinct grooves. Opesia extensive, occupying almost entire frontal surface. Operculum located in distal end of membranous frontal wall. Gymnocyst smooth, strongly reduced, more developed on proximal or proximolateral corners of autozooid. Cryptocyst granular, of almost constant width from the proximal to distal end of opesia. Spines and avicularia absent. Ooecium not closed by operculum, broader than long, produced by kenozooid distal to maternal autozooid. Ectoecium smooth, slightly creased proximolaterally, interrupted medially by keyhole-shaped area of exposed granular entoecium encircling a small, round, distal opesial perforation. Basal wall mostly cuticular, calcification restricted to margin. Lateral walls punctured by multiporous pore plates.

**Etymology.** The species name is derived from the Latin *fissura*, alluding to the split nature of the ectoecium.

**Remarks.** *Kenoaplousina grandipora* (Moyano) **comb. nov.** differs from this new species in having an uninterrupted ectoecium (Moyano 1991), while in *K. fissurata* sp. nov. it is interrupted medially by a keyhole-shaped exposed area of granular entoecium and a distal opesia.

The early astogeny of *K. fissurata* was observed in a partially broken colony. Spines were not present in periancestrular zooids.

**Distribution.** Patagonian shelf, off Santa Cruz and Tierra del Fuego provinces, on gravelly bottoms, 76–141 m.

TABLE 1. Measurements (mm) of *Kenoaplousina fissurata* gen. nov., sp. nov.

	Zooid length	Zooid width	Ovicell length	Ovicell width
N	20	20	10	10
Mean	0.704	0.412	0.206	0.299
Standard deviation	0.059	0.032	0.033	0.015
Maximum	0.792	0.475	0.277	0.317
Minimum	0.614	0.356	0.158	0.277

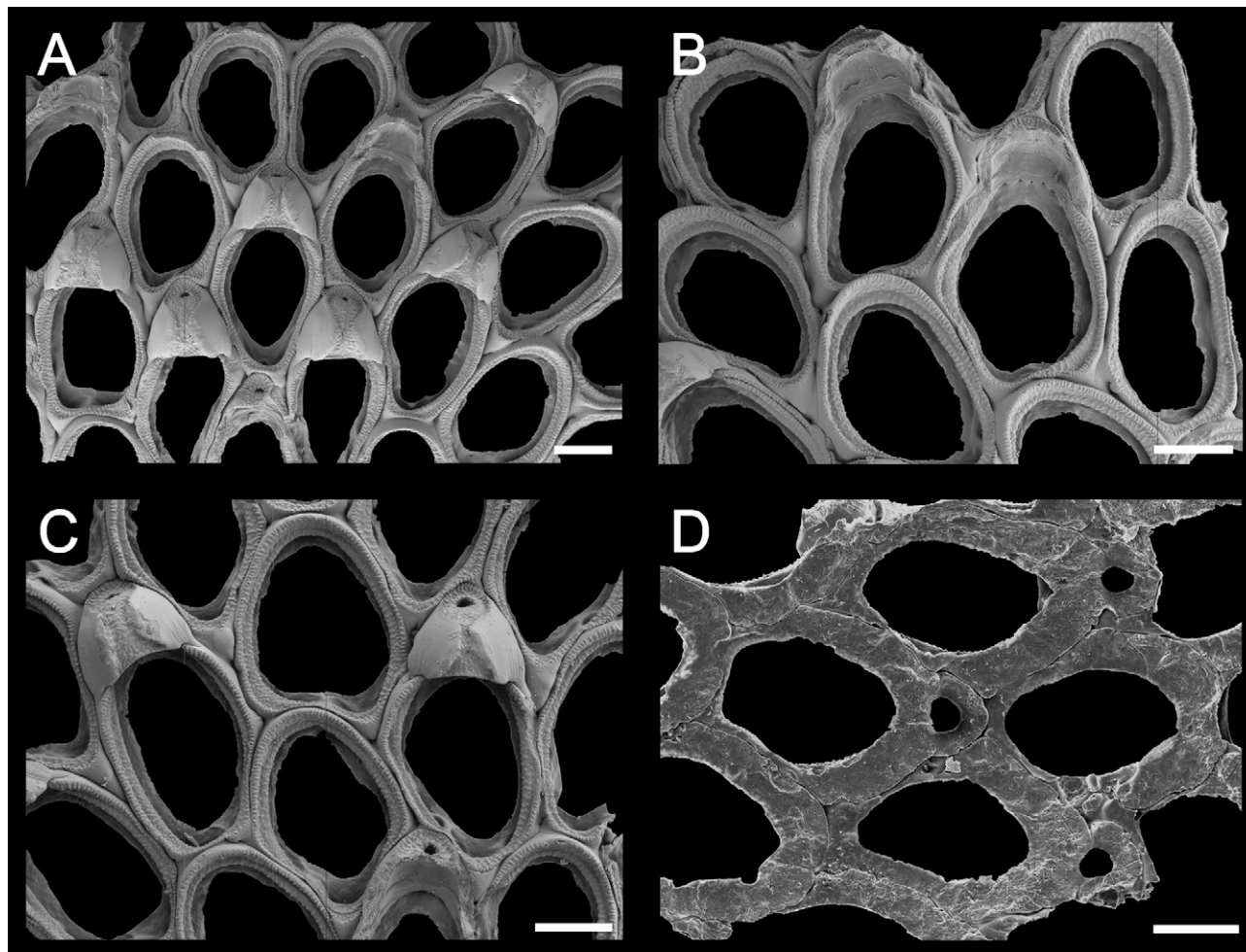


FIGURE 1. A–D, *Kenoaplousina fissurata* gen. nov., sp. nov., holotype. A, General aspect. B, Two developing ovicells. C, Details of ovicells and kenozooids. D, Basal view. All scalebars: 0.2 mm.

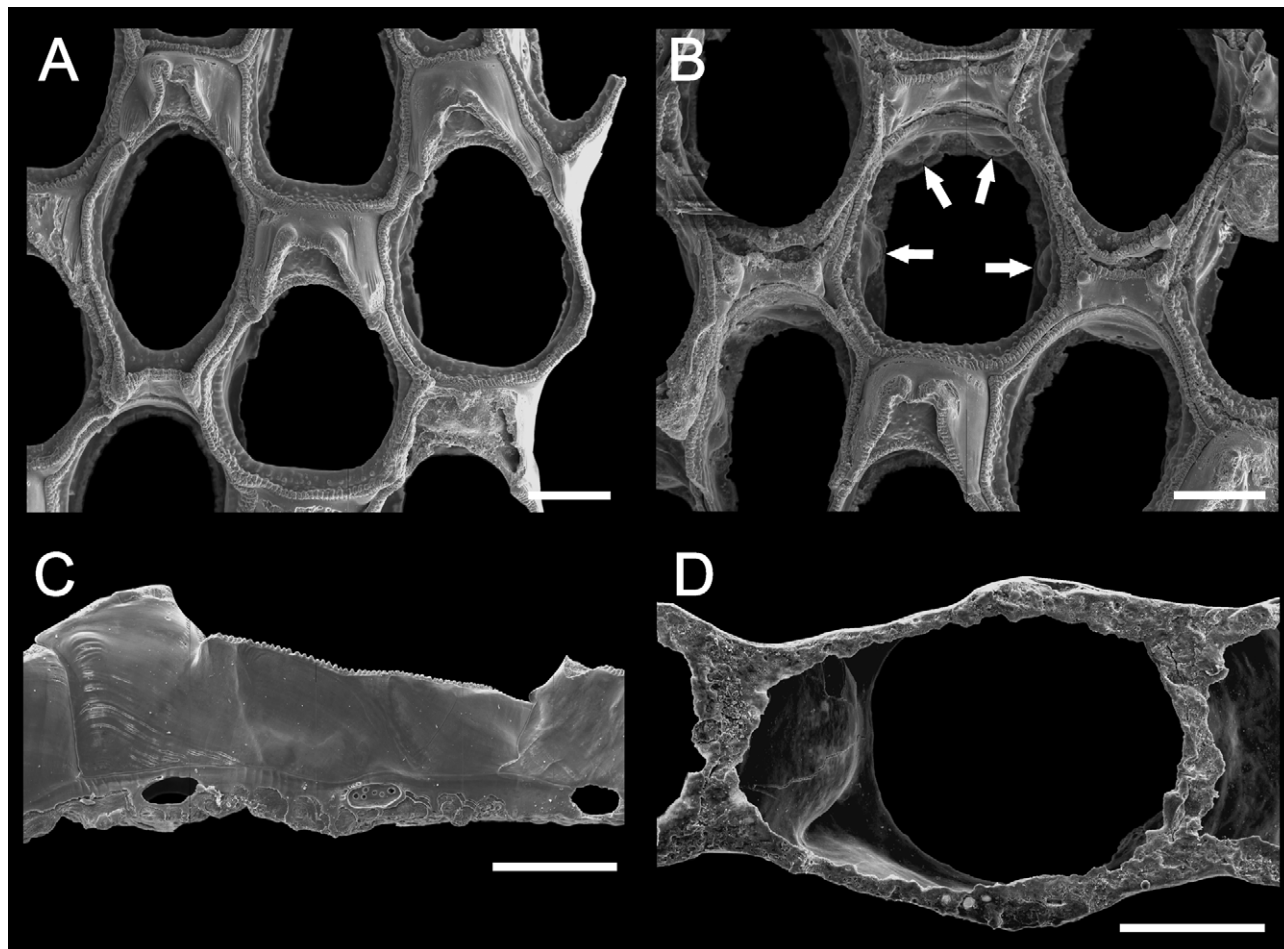
*Alderina simplicissima* sp. nov.

(Fig. 2, Table 2)

**Material examined.** *Holotype*: MACN–In 38953, a colony coated with gold-palladium, *Lenga* Station Z1–I4, 53°04.263' S, 67°12.025' W, 90 m, 3 December 2011. *Paratypes*: MACN–In 38954, one colony, same date and vessel as holotype, Station Z1–E13, 53° 09.539' S, 67°09.401' W, 76 m. MACN–In 38955, SM IV, Station 111, 52°29' S, 64°35' W, 183 m, 12 August 1978.

**Description.** Colony encrusting, unilaminar. Autozooids oval, lightly calcified, separated by grooves. Opesia extensive, occupying almost the whole frontal surface. Operculum located in distal end of membranous frontal wall. Gymnocyst strongly reduced, protruding as a tuberculated rim around the opesia. A pair of gymnocystal protuberances may occur at the proximolateral corners of some zooids. Cryptocyst reduced, granular, more

developed towards the proximal half of the zoid. Spines and avicularia absent. Ooecium roughly quadrangular, broader than long, closed by the operculum of the maternal zoid but not covered either by the cryptocyst or the gymnocyst of the distal zoid. Ectooecium smooth, slightly creased proximolaterally, developing medially a pair of tuberculated ridges ending in a pair of central knobs. A reduced proximal area of granular entoecium is enclosed by the ectooecial ridges. Basal wall mostly cuticular, calcification restricted to margin. Lateral walls punctured by multiporous pore plates. Ancestrula and early astogeny not seen.



**FIGURE 2.** A–D, *Alderina simplicissima* sp. nov., holotype. A, Ovicelled zooids. B, Arrows point to multiporous pore plates. C, Lateral view. D, Basal view. All scalebars: 0.2 mm.

**Etymology.** The species name is derived from the Latin superlative of *simplex*, *-icis*, simple, simplicity, alluding to the uncomplicated morphology of the zoid.

**Remarks.** Colonies without ovicells may be difficult to tell apart from those of other calloporids. In the Magellanic region, three other species could be confused at first glance with *A. simplicissima* sp. nov. *Valdemunitella lata* (Kluge), an Antarctic species reaching the southern Patagonian shelf (Hayward & Thorpe 1989) also lacks avicularia, but can be readily distinguished by its bifenestrate ooecium. In addition, two members of the genus *Ellisina*, *E. incrustans* (Waters) and *E. antarctica* Hastings, can be clearly differentiated by the presence of interzooidal avicularia (Hastings 1945).

Three related calloporid genera lacking spines and avicularia may potentially accommodate this new species: *Aplousina* Canu & Bassler, *Membraniporidra* Canu & Bassler and *Alderina* Norman. As mentioned above, *Aplousina gigantea* differs clearly owing to the presence of a reduced, hood-like ooecium. The type species of *Membraniporidra* is *M. porrecta* Canu & Bassler, a Tertiary fossil from the USA. It agrees with our new species in the absence of pore chambers, but its proximal gymnocyst is relatively well developed and its ovicell is deeply immersed. The only important difference separating *A. simplicissima* sp. nov. from *Membranipora imbellis* Hincks (type species of *Alderina*), is the presence of pore chambers in the latter. However, *Alderina flaventa* Dick *et al.*,



another species whose zooids connect each other through pore plates instead of pore chambers, was recently assigned to *Alderina* owing to extensive similarities in most of its morphological features (Dick *et al.* 2006). Therefore, we tentatively assign this new calloporid species to the genus *Alderina* until more evidence is gathered concerning whether or not the sole presence of a different type of communication pore is a sufficiently important character to justify the allocation of species with pore plates to a separate genus.

**Distribution.** Patagonian shelf, off the northern tip of Tierra del Fuego province, on gravelly bottoms, 76–183 m.

**TABLE 2.** Measurements (mm) of *Alderina simplicissima* sp. nov.

	Zooid length	Zooid width	Ovicell length	Ovicell width
N	20	20	10	10
Mean	0.669	0.469	0.196	0.335
Standard deviation	0.115	0.083	0.043	0.024
Maximum	0.832	0.594	0.277	0.396
Minimum	0.475	0.317	0.158	0.317

## Discussion

Bishop & Househam (1987) were the first to attempt a classification of ovicells based on their morphological inception in the cribrilid genus *Puellina*. Ooecia may indistinctly originate from a distal autozooid or kenozooid in the flustrid *Gregarinidra denticulata* (Busk) (see Busk 1852), whereas in the calloporids *Corbulella maderensis* (Waters) and *Callopora craticula* (Alder) they can be produced by distal kenozooids or vicarious avicularia (Ostrovsky *et al.* 2009). Kenozooidally produced ooecia seem to have evolved more than once in different cheilostome lineages, occurring also in the genera *Concertina*, *Bryocalyx* (Ostrovsky *et al.* 2009), *Cauloramphus* (Ostrovsky *et al.* 2007), *Alderina* (López-Fé 2006), *Barrosia* (Souto *et al.* 2010) and *Pyriporoides* (Branch & Hayward 2005), where a further reduction in size of the distal kenozooid has been a common trend. This process, however, has not taken place in *K. fissurata* and *K. grandipora*, which retain a well-developed kenozooidal ooecium with a small circular opesia, a conspicuous granular cryptocyst representing the entoecium, and a smooth gymnocyst corresponding to the ectoecium. The ooecia of another calloporid, *Ellisina levata* (Hincks), are also associated with distal kenozooids and produce a relatively large opesia (see Hastings 1945; Osburn 1950; Moyano 1991). However, *E. levata* possesses interzooidal avicularia and their zooids communicate via pore chambers.

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