The sea cucumber *Psolus patagonicus* Ekman 1925 (Echinodermata: Holothuroidea) from the southwestern Atlantic, redescription of the holotype and new synonym.

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ABSTRACT

The present study analyzed the species *Psolus patagonicus* from material of the *Zoologisches Museum Hamburg* (ZIM), including the holotype, and specimens from the *Museo Argentino de Ciencias Naturales* (MACN). A redescription was made and a new synonym were stablished between *P. marcusi* and *P. patagonicus* and since *P. patagonicus* is the older name, it has priority over *P. marcusi* and it is the valid name of the species. Moreover, the only psolid brooder for South America, after this work, is *P. patagonicus*. Specimens (ZIM: E4168) identified as *P. patagonicus* were examined and it was found that were the same used by Ludwig to report the brooding behavior for *Psolus antarcticus*.

RESUMEN

El presente estudio analiza la especie *Psolus patagonicus* a partir de material del *Zoologisches Museum Hamburg* (ZIM) incluyendo al holotipo, y especímenes del *Museo Argentino de Ciencias Naturales* (MACN). Se realizó una redescripción y se estableció una nueva sinonimia entre *P. marcusi* y *P. patagonicus*, y dado que *P. patagonicus* es el nombre más viejo, tiene prioridad sobre *P. marcusi* y es el nombre válido de la especie. Además, el único psolido incubante de America del Sur, después de este trabajo, es P. patagonicus. Especímenes (ZIM E4168) identificados como *P. patagonicus* fueron examinados y se encontró que los mismos, fueron los especímenes analizados por el propio Ludwig para su reporte del comportamiento de incubación de *Psolus antarcticus*.

Keywords: *Psolus antarcticus*; brooding; *Psolus marcusi*; *Zoologisches Museum Hamburg*; *Museo Argentino de Ciencias Naturales*

INTRODUCTION

The species *Psolus patagonicus* Ekman, 1925 is the most common Psolidae from Argentine coast, with five species, *Psolus patagonicus*, *Psolus segregatus* Perrier 1905, *Psolus antarcticus* (Philipi 1857), *Psolidium dorsipes* Ludwig 1887 and *Psolidium disciformis* (Théel, 1886) (Deichman 1947, Pawson 1969, Hernández 1981). *P. patagonicus* was descripted by Ekman (1925) for the "*Patagoniske Bank"* (46ºS), and with some reports and descriptions near Tierra del Fuego (Deichman 1947, Pawson 1969). Bernasconi (1941) and Hernández (1981) studied some specimens from northern waters (around 38ºS), extending the distribution for this species for almost all the Argentine shelf. Hernandez (1981), Tommasi (1971) described a new species of *Psolus*, *P. marcusi* Tommasi, 1971, in front of Mar del Plata, Argentina (38ºS). After this work no other study about the holotype has been made. The purpose of this work is to study the species *Psolus patagonicus*, analyzing the holotype from the *Zoologisches Museum Hamburg* (ZIM) and specimens from the *Museo Argentino de Ciencias Naturales* (MACN). Besides, study the species *P. marcusi* and compare it with *P. patagonicus*.

RESULTS

Psolus patagonicus Ekman, 1925

Psolus patagonicus Ekman, 1925 pag 140, Bernasconi 1941 pag 48 fig VI, Deichmann 1941: 145, Deichmann 1947 pag 339, Pawson 1964 pag 463, Pawson 1969a pag 129, Pawson 1969b Map 5, Hernandez 1981 pag 155, Tommasi et al. 1988 pag 2, McEuen & Chia 1991, Larrain 1995 pag 89, Lancellotti & Vasquez 1999 anexo, Lancellotti & Vasquez 2000, Ríos et al. 2003 pag 7, Ríos et al. 2005 pag 231, Mutschke & Ríos 2006, Giménez & Penchaszadeh 2010: 1, Martinez et al. 2011: 1, Brogger et al. 2013: 380, Solís-Marín et al. 2013: 590.

Psolus marcusi: Tommasi, 1971: 4

Description: Psolid shape, up to 23.26 mm large, color in life, light orange to white, fixed white. Mouth and anus dorsal, covered by five valves and five interradial teeth between valves. Valves and interradial teeth in anus about half size of mouth pieces (fig 1). Tentacles 10 white color with brown dots, with two most ventral reduced, with bifid end, ratio 1:3. Tube feet of up to 0.35 mm in diameter, only on ventral side, trivium with central ambulacra naked, lateral ambulacra one, zig-zag and two rows. Calcareous ring simple, five radial and five interradial pieces fused at the base. Radial piece with an anterior notch and wider in the anterior part than the interradial piece without notch. One Polian vesicle in the left ventral side, one stone canal and a two kidney´s shape madreporite, in the middorsal. Gonad on the dorsal side, down the calcareous ring, composed by multiple tubes, well develops at reproductive season. Respiratory trees well extended up to the anterior part of the body, right side longer. Ossicles from ventral side, plates with four holes (70 µm - 170 µm), slightly curved and plates with multiple perforations with lobed ends (Fig 2a, 3a). Tentacles and podia with curved bars (70 – 200 µm), end plate up to 400 µm (Fig 2b, Fig 3 b, c).

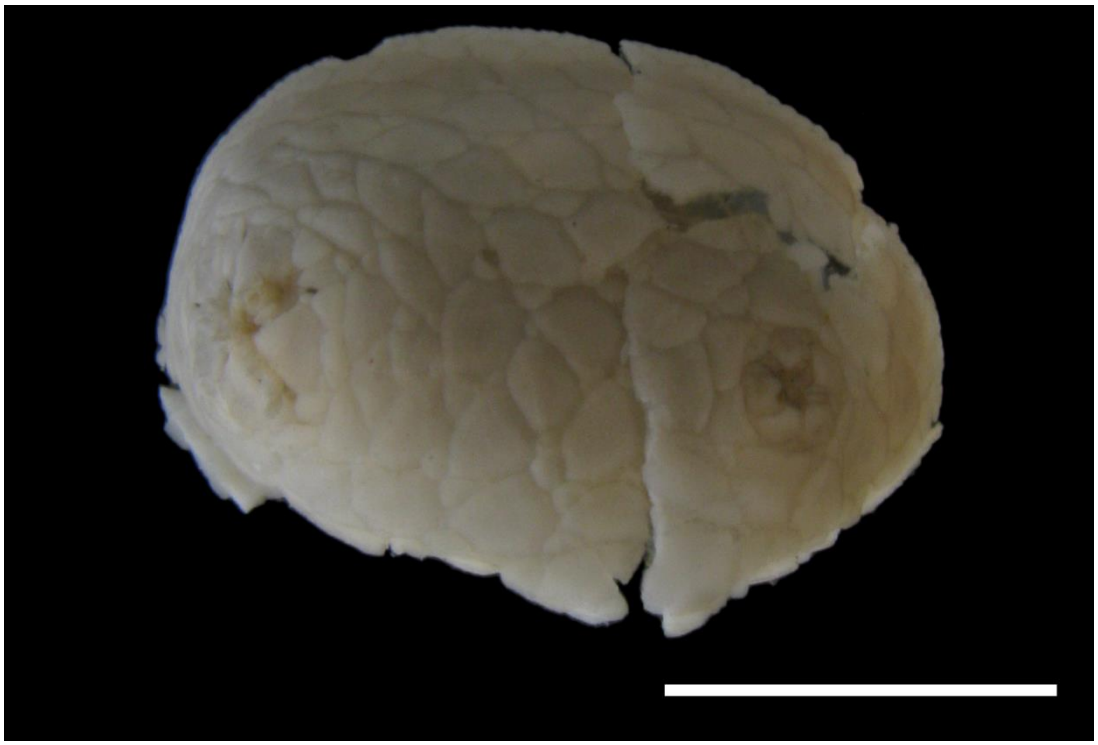
Distribution: In the southwest Atlantic from Mar del Plata 38ºS to Tierra del Fuego 54ºS and Cape Horn. In the Pacific, known for the vicinity of Magellan Strait 48ºS (Hernandez 1981).

Examined material: ZIM, Holotype "*Patagonische Bank 46ºS.B. 60 fad. Kpt. H. Nissen 15.VI.1906"* (ZIM - E4173), E4172, E4171, E4168, E4167; MACN-In: 12661, 16264, 23362, 25125, 34776, 34777, 37574.

Habitat: Rocks, Macrocystis fronds and holdfast (Pawson 1969a).

Depth: Intertidal to about 308 m (Hernández 1981 and the present report).

Figure 1. Holotype *Psolus patagonicus* Ekman, 1925; ZIM: E4173, dorsal view, scale bar 1 cm.



DISCUSSION

The description made by Tommasi (1971) on his *Psolus marcusi* Tommasi, 1971 (fig 4) had only one difference from *P. patagonicus* and it was in the absence of oral teeth (Fig 1, 4). Pawson (1964) pointed out that oral teeth could be absented in juveniles, and for this reason, I synonymize *P. marcusi* and *P. patagonicus*. Since *P. patagonicus* is the older name it has priority over *P. marcusi* and it is the valid name of the species.

Psolus patagonicus was reported as a brooder by Bernasconi (1941), Hernández (1981) and Gimenez & Penchaszadeh (2010). Martinez et al. (2011) studied the reproductive cycle and found one reproductive event for February which is continued with the brooding period that has been reported from February to September, by Gimenez & Penchaszadeh (2010).

After the study of the specimens from the ZIM collection (accession number: E4168), it was notice that this material, not only belongs to the species *P. patagonicus* (according to the label in the flask, previously determined by Power in 1965) but also, are the exact same specimens used by Ludwig (1897) to report the brooding behavior for *Psolus antarcticus* (Philippi, 1857). Besides for *P. antarcticus* there are no other reports of brooding, indicating that the only psolid brooder for South America is up to now, and properly described, *P. patagonicus*.

Figure 2. Ossicles, *Psolus patagonicus* Ekman, 1925; A. plates from sole, B. end plate. Scale bar 50 µm.

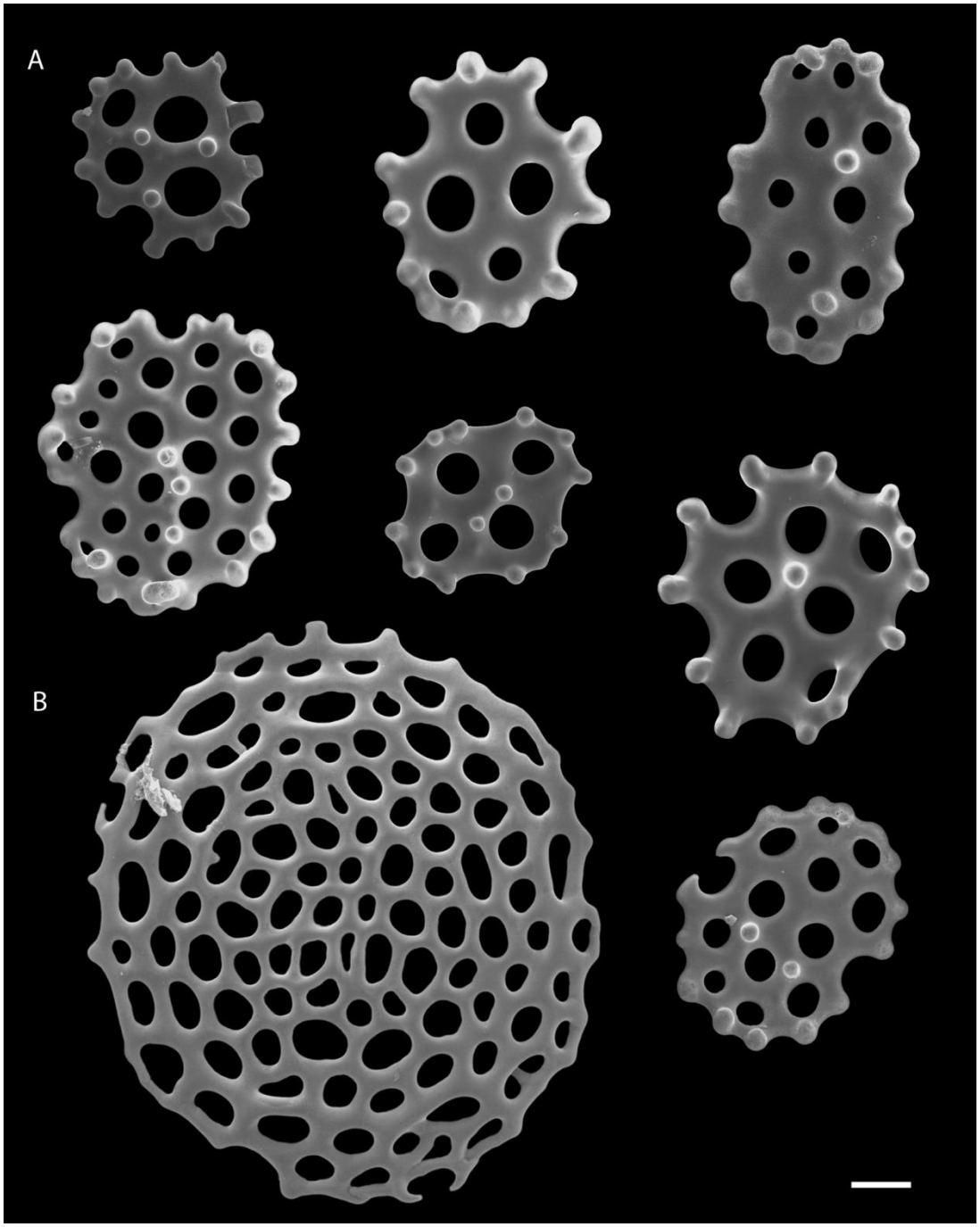


Figure 3. Ossicles, *P. patagonicus*, A. Plates from ventral side, B. Curved plates from podia, C. Curved plates from tentacles. Scale bar: 100 µm.

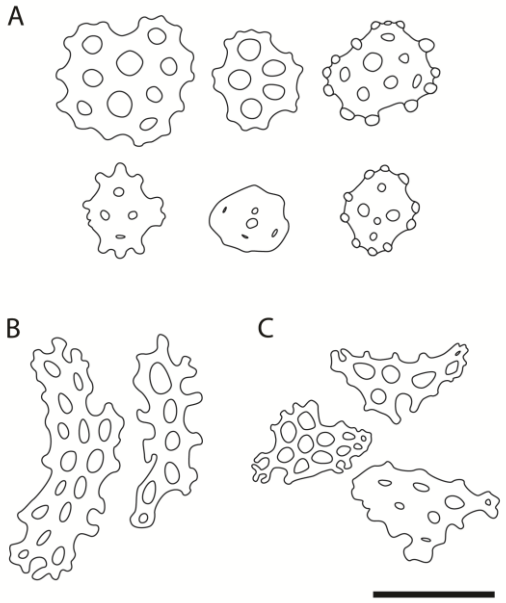
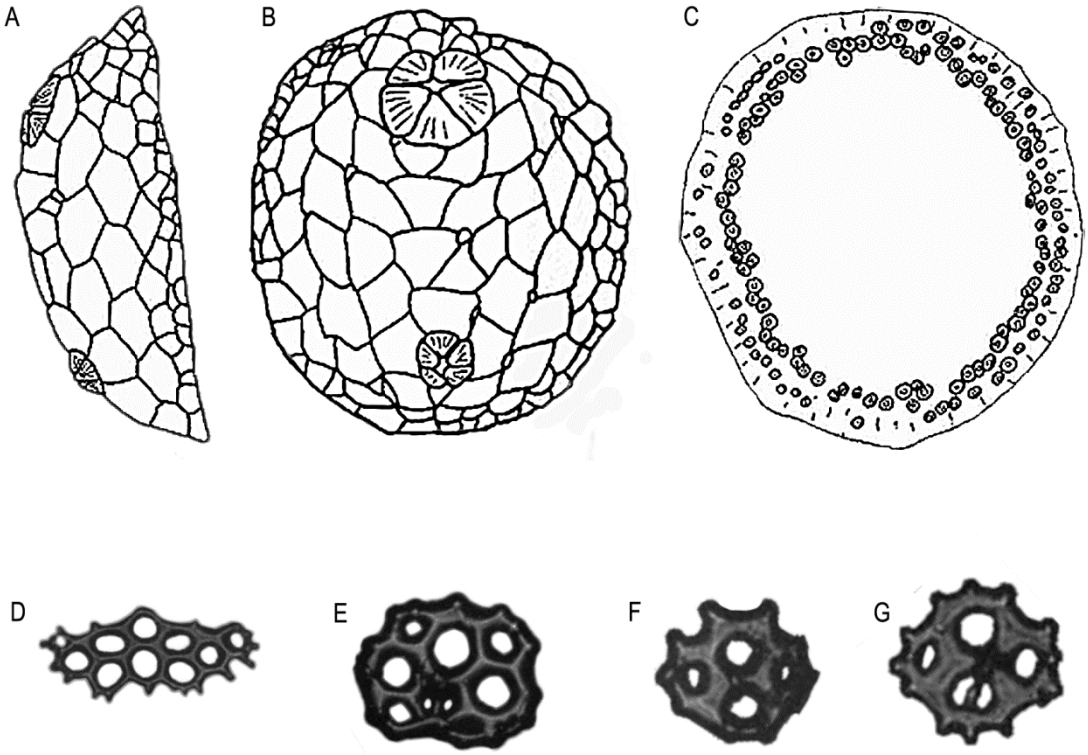


Figure 4. Drawings from Tommasi (1971) of *Psolus marcusi* Tommasi, 1971 Fig. 9 and 10. A. lateral, B. dorsal, C. ventral view, D., E. Plates, F. G. curved plates with multiple perforations.



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