



Research note

New record of the irregular sea urchin *Rhynobrissus cuneus* (Echinoidea: Brissidae)

Nuevo registro del erizo irregular *Rhynobrissus cuneus* (Echinoidea: Brissidae)

Alejandra Martínez-Melo^{1,2✉}, Francisco Alonso Solís-Marín² y Alfredo Laguarda-Figueras²

¹Posgrado de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México. Apartado postal 70-305, 04510 México, D. F., Mexico.

²Laboratorio de Sistemática y Ecología de Equinodermos, Instituto de Ciencias del Mar y Limnología. Universidad Nacional Autónoma de México. Apartado postal 70-305, 04510 México, D. F., Mexico.

✉ a.mtz.melo@gmail.com

Abstract. *Rhynobrissus cuneus* is a rare sea urchin species from the northern Atlantic Ocean. This echinoid was first described from 2 specimens collected in North Carolina, USA in 1956, and no other specimens have been reported since. We describe the external morphology of 7 specimens of *R. cuneus* collected in the state of Veracruz, Mexico in the southern Gulf of Mexico. This record extends the southern range of this species and provides further data on its habitat and bathymetric distribution. The species may eventually prove to have a wide but patchy distribution.

Key words: Spatangoida, Gulf of Mexico, SEM, distribution.

Resumen. *Rhynobrissus cuneus* es una especie rara de erizo de mar del norte del océano Atlántico. Este equinoide fue descrito a partir de 2 ejemplares recolectados en Carolina del Norte, EUA en 1956; no ha habido otros registros después de su descripción. En este trabajo se describe la morfología externa de 7 ejemplares de *R. cuneus* recolectados en el estado de Veracruz, México, al sur del golfo de México. Este registro amplía la distribución sur de esta especie y ofrece información sobre su hábitat y distribución batimétrica. Eventualmente la especie podría mostrar una distribución más amplia e irregular.

Palabras clave: Spatangoida, golfo de México, MEB, distribución.

The sea urchin genus *Rhynobrissus* Agassiz, 1872 (Echinoidea: Brissidae) includes 4 valid extant species: *R. pyramidalis* Agassiz, 1872 (type species), *R. hemiasteroides* Agassiz, 1879, *R. tumulus* McNamara, 1982 and *R. cuneus* Cooke, 1957. The first 3 are Indo-Pacific species (McNamara, 1982), while *R. cuneus* has been collected on the northern Atlantic coast of the USA in North Carolina. This genus also includes 1 fossil species, *R. daviesi* (Jain, 2002), from the Gaj Formation in India, from the early Miocene.

The holotype and paratype of *R. cuneus* are deposited in the National Museum of Natural History, Smithsonian Institution, Washington D. C. (USNM E8032, E8033). These type specimens, and 3 additional ones (USNM E8234, E8235, E36599) have remained the only known specimens of this species until now. Serafy (1979) reported *Rhynobrissus micrasteroides* from the Yucatán Channel (USNM E20413), this species was later designated the

type species of the monotypic genus *Neopneustes* Duncan, 1889 (Duncan, 1889).

Seven specimens of *Rhynobrissus cuneus* were collected during an expedition to Playa Jicacal, Los Tuxtlas, Veracruz, Mexico (18°35'15" N, 95°03'06" W) at 1 m in fine sand substrate (Fig. 1). The specimens were photographed, measured and deposited in the Colección Nacional de Equinodermos, Instituto de Ciencias del Mar y Limnología (ICML), Universidad Nacional Autónoma de México (UNAM). We used Mortensen (1951) and Serafy (1979) to determine order, family and genus; and used McNamara (1982) and Cooke (1957) to identify the species.

Systematics

Order Spatangoida Claus, 1876

Family Brissidae Gray, 1855

Genus *Rhynobrissus* Agassiz, 1872

Rhynobrissus Agassiz, 1872; Clark, 1925; McNamara, 1982; Schultz, 2005.



Figure 1. Map showing the known records of *Rhynobrissus cuneus*: ■ Type locality and previous reports (Fort Macon, North Carolina, USA; 34°41'35" N, 76°40'59" W) ● New report (Playa Jicacal, Los Tuxtlas, Veracruz, Mexico; 18°35'15" N, 95°03'06" W).

Diagnosis (modified from Agassiz, 1872-74: 590): test thin; outline from above diamond-shaped; vertex posterior. Paired ambulacra petaloid; odd anterior ambulacrum flush with the test. Peri-petalous fasciole present; independent anal and subanal fascioles. Spines of aboral surface short and curved; on the oral surface long, curved.

Type species: *Rhynobrissus pyramidalis* Agassiz, 1872.

Rhynobrissus cuneus Cooke, 1957

[Figs. 2-6, Table 1]

Rhynobrissus cuneus Cooke, 1957: 9-12, pl. 1; Schultz, 2005: 401.

Description (modified from Cooke, 1957): horizontal outline diamond-shaped: rounded in front, widest at apical system, pointed at rear. Longitudinal outline wedge-shaped (cuneus [L.], wedge), oral surface flat, aboral surface slightly convex; apex at the rear of peripetalous fasciole

Table 1. Measurements (mm) of specimens of *Rhynobrissus cuneus*. ICML-UNAM 4.78.0. TL: total length, TW: total width, TH: total height, FW: width of the peripetalous fasciole, FL: length of the peripetalous fasciole, PL: plastron length, PW: plastron width, AH: height from oral surface to anus

	TL	TW	TH	FW	FL	PL	PW	AH
1	36.0	35.0	18.0	28.0	29.0	20.0	9.0	14.0
2	14.0	13.5	8.0	10.0	10.5	9.0	2.0	5.0
3	17.0	17.5	9.0	13.0	13.5	9.0	3.0	6.5
4	26.5	*	15.0	*	*	13.0	6.5	10.0
5	*	*	*	24.0	25.0	*	*	*
6	*	*	19.0	*	*	18.0	6.0	13.0
7	33.0	35.0	20.0	27.5	29.0	18.0	8.5	15.0

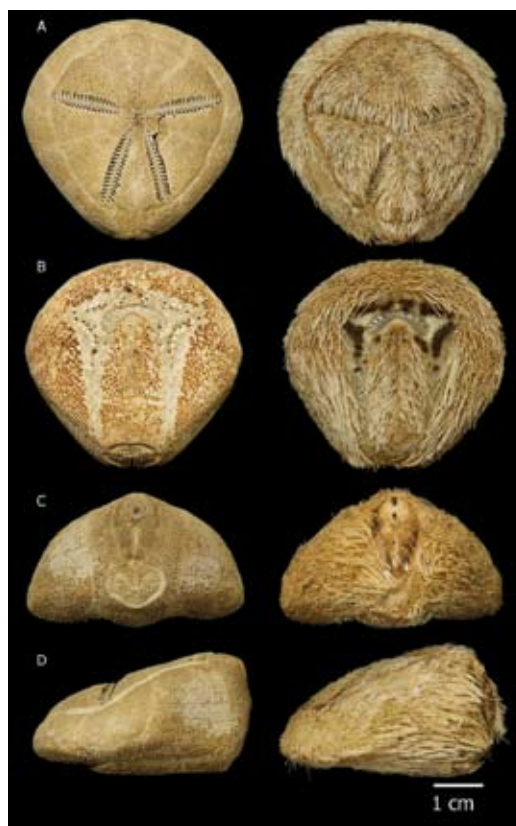


Figure 2. *Rhynobrissus cuneus* Cooke, 1857, ICML-UNAM 4.78.0. Dry, spineless specimen (left side); wet specimen with spines (right side). A, aboral view; B, oral view; C, posterior view, and D, lateral view.

(Fig. 2). The nearly central apical system is ethmolytic (i.e., the madreporite extends between and beyond the posterior ocular plates); adults with 4 genital pores. On aboral surface anterior ambulacrum not petaloid, inconspicuous, with small pores. Paired ambulacra long, straight, slightly sunken, with oval conjugate pores; reaching peripetalous fasciole. Interambulacra 2 and 3 approximately 5 times wider than ambulacra; interambulacrum 5 approximately 2 times wider than ambulacra. On oral surface, interambulacrum 5 with amphisternous plastron extending from labrum to subanal fasciole (Fig. 3). Peripetalous fasciole formula 5,5::6(7),7::10/11 (according to Smith and Stockley, 2005). Posterior surface with oval anal fasciole, reaching from apex to half the height (formula: 5-8), where adjoins the heart-shaped subanal fasciole with brissid pattern (Smith and Stockley, 2005); subanal fasciole covers ¼ of height. Peristome strongly reniform, because of bluntly pointed labrum, covered by many movable plates, surrounded by conspicuous phyllodes. Periproct oval with sharp ends, covered by several small movable plates on top of posterior

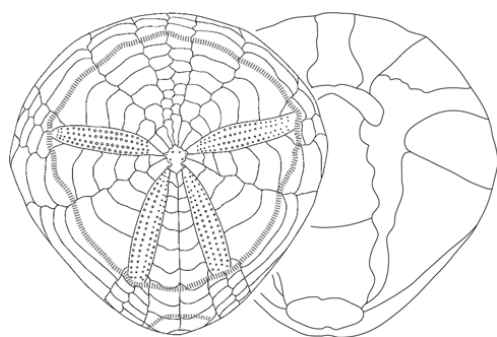


Figure 3. Schematic drawings of the aboral and oral plates of *Rhynobrissus cuneus*.

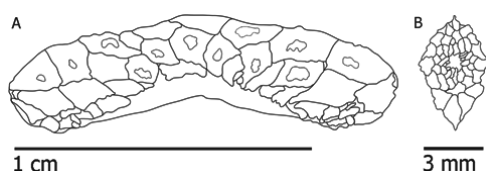


Figure 4. *Rhynobrissus cuneus*: schematic drawings of A, peristomal plates and B, periproctal plates.

surface (Fig. 4). Tubercles homogeneous on aboral surface, except for adapical end of ambulacrum III, where tubercles are almost 2 times bigger. Tubercles noticeably bigger on oral surface; phyllodes and posterior ambulacra bare. Aboral surface covered by slightly curved, hairlike, silky spines (Fig. 5); oral surface covered by spines 2 times longer than aboral spines, presenting spatulated ends (Fig. 6). No pedicellariae were found.

Type specimens: holotype USNM E8032 and paratype USNM E8033. Fort Macon Beach, North Carolina, USA (34°41'35" N, 76°40'59" W), January 1956, dry specimens washed onto the beach, no depth or habitat data.

Examined material: ICML-UNAM 4.78.0, 7 specimens (1 dry and 6 in ethanol 70%, Table 1), Playa Jicacal, Los Tuxtlas, Veracruz, Mexico, Gulf of Mexico (18°35'15" N, 95°03'06" W), September 17th, 2009, 1 m depth, fine sand substrate.

Remarks. We present the first report of *Rhynobrissus cuneus* since its original description in 1957; it is also the first report of the species outside its type locality (North Carolina, USA) and the first report of the genus and species for the Gulf of Mexico.

This record extends the known distribution of *R. cuneus* hundreds of kilometers and serves to establish its depth and habitat information. The species may eventually prove to have a wide but patchy distribution.

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Figure 5. Spines of *Rhynobrissus cuneus* on the oral surface: A, spine from oral surface; B, 2 spines from the plastron, and C, spatulated end of oral spines.

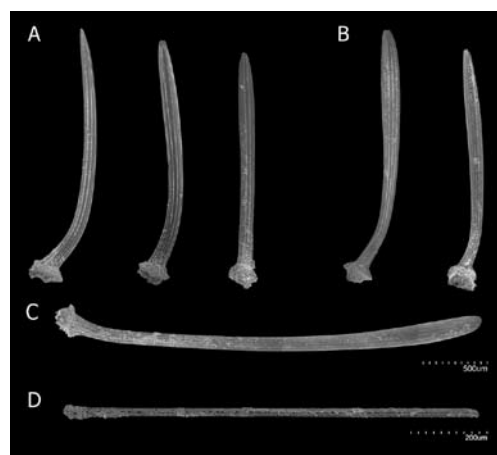


Figure 6. Spines of *Rhynobrissus cuneus* on the aboral surface: A, 3 spines from the interambulacrum in the peripetalous fasciole; B, 2 spines from the aboral surface, out of the peripetalous fasciole; C, spine from the inner side of the anal fasciole, and D, spine from the peripetalous fasciole.

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Literature cited

- Agassiz, A. 1872. Preliminary notice of a few species of Echini. Bulletin of the Museum of Comparative Zoology 3:55-58.
- Agassiz, A. 1872-74. Revision of the Echini. Memoirs of the Museum of Comparative Zoology 3. 744 p.
- Agassiz, A. 1878. Reports of the results of dredging, under the supervision of Alexander Agassiz, in the Gulf of México, by the United States Coast Survey Steamer "Blake". II. Report on the Echini. Bulletin of the Museum of Comparative Zoology 5:181-195.
- Agassiz, A. 1878-79. Preliminary report on the Echini of the exploring expedition of H. M. S. "Challenger". Sir C. Wyville Thomson chief of civilian staff. Proceedings of the American Academy of Arts and Sciences 14:190-212.
- Claus, C. F. W. 1876. Grundzüge der Zoologie. 3rd edition. N. G. Elwertsche Universitätsbuchhandlung. Marburg and Leipzig. 1254 p.
- Clark, H. L. 1925. A catalogue of the recent sea urchins (Echinoidea) in the collection of the British Museum (Natural History). The Oxford University Press, London. 250 p.
- Cooke, C. W. 1957. *Rhynobrissus cuneus*, a new echinoid from North Carolina. Proceedings of the United States National Museum 107:9-12.
- Duncan, P. M. 1889. A revision of the genera and great groups of the Echinoidea. Journal of the Linnean Society, Zoology 23:1-311.
- Gray, J. E. 1855. Catalogue of the Recent Echinida, or sea eggs, in the collection of the British Museum. Part I. Echinida Irregularia. Trustees of the British Museum, London. 69 p.
- Jain, R. L. 2002. Echinoids from the Gaj Formation (Early and Middle Miocene) of Kathiawar, Gujarat, India. Journal of the Paleontological Society of India 47:107-135.
- McNamara, K. J. 1982. A new species of the echinoid *Rhynobrissus* (Spatangoida: Brissidae) from North-West Australia. Records of the Western Australian Museum 9:349-360.
- Mortensen, T. 1951. A Monograph of the Echinoidea. V. 2. Spatangoida II. Amphisternata. II. Spatangidae, Loveniidae, Pericosmidae, Schizasteridae, Brissidae. Text. CA Reitzel. 593 p.
- Pomel, A. 1883. Classification méthodique et genera des échinides vivants et fossiles. PhD thesis. Faculté des Sciences de Paris, Paris, France. 131 p.
- Schultz, H. 2005. Sea Urchins -a guide to worldwide shallow water species. Heinke and Peter Schultz Partner, Scientific Publications. Hemdingen. 484 p.
- Serafy, D. K. 1979. Echinoids (Echinodermata: Echinoidea). Memoirs of the Hourglass Cruises 5:1-1120.
- Smith, A. B. and B. Stockley. 2005. Fasciole pathways in spatangoid echinoids: a new source of phylogenetically informative characters. Zoological Journal of the Linnean Society 144:15-35.