

First record of *Chelonibia testudinaria* (Linnaeus, 1758) (Cirripedia: Chelonibiidae) in northern Chile

Primer registro de *Chelonibia testudinaria* (Linnaeus, 1758) (Cirripedia: Chelonibiidae) en el norte de Chile

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ABSTRACT

The first record of the epibiont cirripedium of sea turtles, *Chelonibia testudinaria* (Linnaeus, 1758), is described for northern Chile (the second record for the species in the country), extending the distribution of this species by almost 10 latitudinal degrees (about 1020 km), and filling a gap in its geographic range in the southeastern Pacific.

Palabras clave: Cirripedia, Crustacea, epibiosis, Pacífico Sur, tortugas marinas.

RESUMEN

Se describe el primer registro del cirripedio epibionte de tortugas marinas, *Chelonibia testudinaria* (Linnaeus, 1758), para el norte de Chile (el segundo registro para la especie en el país), extendiendo la distribución de esta especie en casi 10 grados latitudinales (alrededor de 1020 km), y llenando un vacío en su rango geográfico en el Pacífico suroriental.

Keywords: Cirripedia, Crustacea, epibiosis, South Pacific, marine turtles.

Five species of the coronulid barnacle genus *Chelonibia* Leach, 1817 are currently known; they are obligate commensals of mobile marine animals, and they are found in all oceans (Chan *et al.* 2021). The largest species in the genus, *Chelonibia testudinaria* (Linnaeus, 1758), is the species with the largest distribution, and it is commonly found as an epibiont of several sea turtles (on their shells), on two crocodylians, and in rare occasions on inanimate objects (Hayashi 2012). This species was previously recognized as three separate

species depending upon the substrate on which they live: *C. testudinaria*, *C. patula* (Ranzani, 1818), and *C. manati* Gruvel, 1903, but a recent work synonymized them all under *C. testudinaria* (Zardus *et al.* 2014). In the Southeastern Pacific this species has been recorded from Ecuador at the Galapagos Archipelago (Zullo 1991), and from central Peru (Quiñones *et al.* 2015). The occurrence of *Chelonibia* species in Chile, however, is not well known, with a single previous work citing *C. testudinaria* in *Chelonia mydas* and *Lepidochelys*

olivacea from Concepción, southern Chile (Fernández *et al.* 2015), with no subsequent documentation for the species. In this work we present the first record of *C. testudinaria* for northern Chile, the second record for the country, extending the known distribution of this species in almost ten latitudinal degrees (about 1020 km), and filling a gap through its geographical range in the Southeastern Pacific.

Two specimens of *C. testudinaria* (Fig. 1), collected by fishermen near the port of Caldera (27°04'00" S; 70°49'00" W), Región de Atacama, in northern Chile, were examined, cleaned and disarticulated following Newman & Ross (1971), but using a 10% solution of potassium hydroxide to dissolve most of the remaining organic matter. The specimens were identified according to Chan *et al.* (2009), unfortunately, they only preserve the shell and opercular plates, and no soft parts could be recovered. The specimens are deposited at the Museo de Zoología de la Universidad de Concepción (MZUC-CCCC, unnumbered).

Family Chelonibiidae Pilsbry, 1916

Chelonibia testudinaria (Linnaeus, 1758)

(Figs. 1-2)

Description of examined specimens: Shells large (86 mm and 78 mm), flattened (height 23 and 21 mm), oval, white, and smooth, extremely thick (up to 27 mm at basis) and porous, formed by six parietes which are calcified together (Fig. 1a). The body chamber is less than half of the basal diameter. Aperture oval, elongated, about one third of the total rostrocarinal length (Fig. 1a). Opercular valves narrow, thick, not closing the aperture. The rostrum (R), formed by three plates firmly interlocked (Fig. 1b), and the carina (C) have about the same width (Figs. 1b, 2a, 2d), while the carinolateral plates 1 (CL1) (Figs. 2b, 2e) are smaller than the carinolateral plates 2 (CL2) (Figs. 1b, 2c, 2f). All the parietes are sturdy and very porous, almost smooth externally (with the exception of a few striae), and with numerous internal vertical plates and elongated cavities between them (Fig. 1b, 2g). Scuta and terga sturdy, thick, united by a chitinous articular ligament. The occludent margin of the scuta is inflected. The tergum is mitre-formed, well-developed, with a small articular ridge (Fig. 1b).

Remarks: Although these specimens were found alive, they were in bad conditions and consisted only of the parietal plates and opercular valves (Fig. 1a). No other epibionts or evidence of male specimens were found on the shells examined.

The examined *C. testudinaria* specimens were most probably recovered from the shell of a turtle of the species *Caretta caretta* or *Chelonya midas*, which are known hosts for *C. testudinaria* (Hayashi 2013), and which have been recorded previously in the Chilean coasts; these species are rarely caught in nets by fishermen (Frazier & Salas 1982), but they are sometimes found washed ashore near their feeding grounds. Considering that this species is mostly a commensal of sea turtles its distribution is clearly limited to their hosts, which limits the availability of shells of *C. testudinaria* for study, and which is evident in the rather scarce record of this comparatively common cirripedian species in Chilean waters, or in the Pacific of South America (Fig. 3). The occurrence of sea turtles in northern Chile is only occasional –most of the recorded specimens have been identified as juveniles or subadults (Sarmiento-Devia *et al.* 2015)–, and it has been also associated with changes related with the El Niño Southern Oscillation Events (Ibarra-Vidal & Ortiz 1990). Barnacle as epibionts have been rarely studied in Chilean waters, although there are several records for species associated with marine mammals, sea turtles and other large marine animals (see Pitombo & Ross 2002).

A recent work, published much after the submission of this manuscript, has recorded a single specimen of *Chelonibia testudinaria* at La Puntilla (18°28' S; 70°18' W), Arica, northern Chile, from a single shell of a *C. mydas* sea turtle (Sielfeld *et al.* 2021). The low abundance of this barnacle at Arica agrees with the present report, and with the previous record of Fernández *et al.* (2015). Sielfeld *et al.* (2021) argue that this may be explained by the low temperature sea waters in the area, which are not favourable for the larvae development of *C. testudinaria*. These works, together with the present study, evidence the presence of this species along most of the Chilean coast, however, further work is needed to document the cirriped epibiont communities of marine turtles in Chilean waters, and to identify if related *Chelonibia* species are present in the area, where only *C. testudinaria* has been so far recorded.

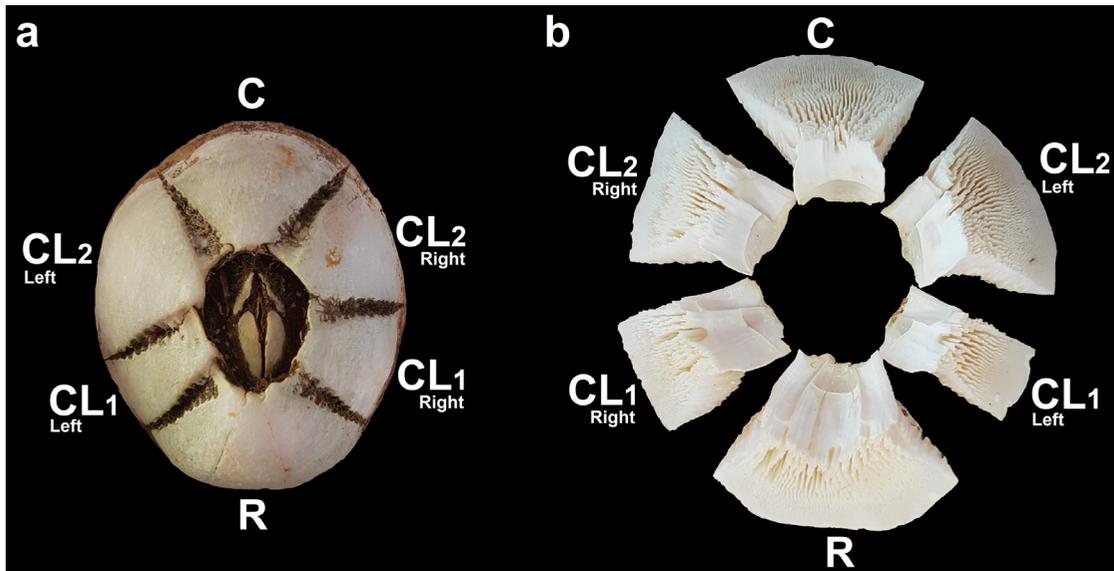


FIGURE 1. *Chelonibia testudinaria* (Linnaeus, 1758), Caldera (27° S), northern Chile (MZUC-CCCC, unnumbered); a. External view of complete specimen (whole parietes and opercular valves), b. Internal view of dissected parietes. C=Carina, CL= Carinolateral plate, R=Rostrum / *Chelonibia testudinaria* (Linnaeus, 1758), Caldera (27° S), norte de Chile (MZUC-CCCC, unnumbered); a. Vista externa de ejemplar completo (Placas parietales y operculares unidas), b. Vista interna de placas parietales disectadas. C=Carina, CL= Placa Carinolateral, R=Rostrum.

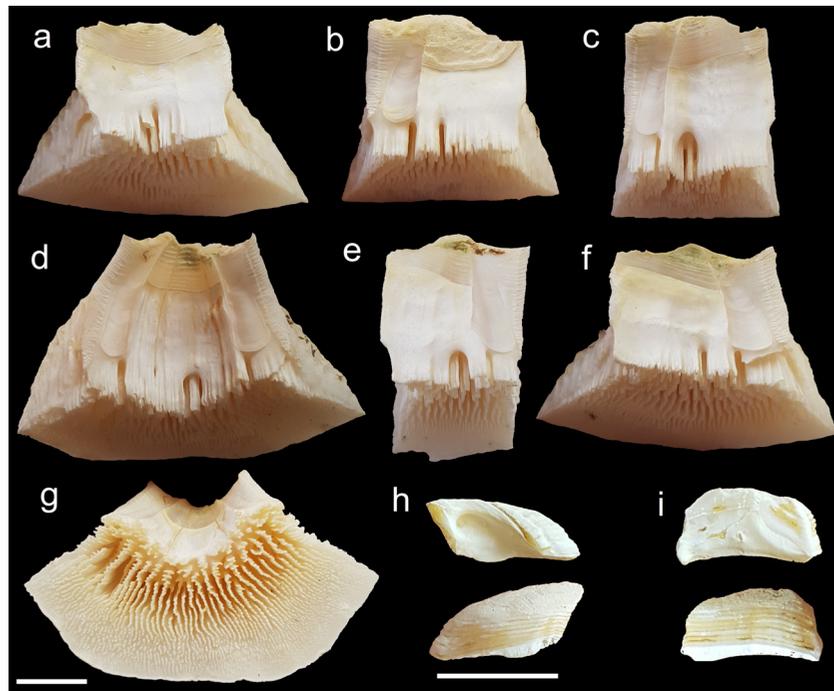


FIGURE 2. *Chelonibia testudinaria* (Linnaeus, 1758), Caldera (27° S), northern Chile (MZUC-CCCC, unnumbered); a. Internal view of carina, b. Internal view of right carino-lateral 2, c. Internal view of right carino-lateral 1, d. Internal view of Rostrum, e. Internal view of left carino-lateral 1, f. Internal view of left carino-lateral 2, g. Basal view of rostrum. h. Scutum, internal and external view, i. Tergum, internal and external view. / *Chelonibia testudinaria* (Linnaeus, 1758), Caldera (27° S), norte de Chile (MZUC-CCCC, unnumbered); parietes; a. Vista interna de Carina, b. Vista interna de carino-lateral derecho 2, c. Vista interna de carino-lateral derecho 1, d. Vista interna de rostrum, e. Vista interna de carino-lateral izquierdo 2, f. Vista interna de carino-lateral izquierdo 1, g. Vista basal de rostrum, h. Scutum, vista interna y externa, i. Tergum, vista interna y externa.



FIGURE 3. Records of *Chelonibia testudinaria* (Linnaeus, 1758) in the Southeastern Pacific; circles indicate previous records for the species, from Galapagos, Perú and Concepción Bay, while the star denotes the record of the present study. / Registros de *Chelonibia testudinaria* (Linnaeus, 1758) en el Pacífico Suroriental; los círculos indican registros previos para la especie, mientras que la estrella denota el registro del estudio presente.

REFERENCES

- Chan, B.K.K., Prabowo, R.E., Lee, K-S. 2009. Crustacean fauna of Taiwan: barnacles, volume I-Cirripedia: Thoracica excluding the Pyrgomatidae and Acastinae. Editions of the National Taiwan Ocean University, Taiwan. 297 pp.
- Fernández, I., Retamal, M.A., Mansilla, M., Yáñez, F., Campos, V., Smith, C., Puentes, G., Valenzuela, A., González, H. 2015. Analysis of epibiont data in relation with the Debilitated Turtle Syndrome of sea turtles in *Chelonia mydas* and *Lepidochelys olivacea* from Concepción coast, Chile. Latin American Journal of Aquatic Research 43(5): 1024-1029.
- Frazier, J., Salas, S. 1982. Tortugas marinas en Chile. Boletín del Museo Nacional de Historia Natural (Chile) 39: 63-73.
- Hayashi, R. 2013. A checklist of turtle and whale barnacles (Cirripedia: Thoracica: Coronuloidea). Marine Biological Association of the United Kingdom. Journal of the Marine Biological Association of the United Kingdom 93(1): 143-182.
- Ibarra-Vidal, H., Ortiz, J.C. 1990. Nuevos registros y ampliación de la distribución geográfica de algunas tortugas marinas en Chile. Boletín de la Sociedad de Biología de Concepción (Chile) 61: 149-151.
- Pitombo, F.B., Ross, A. 2002. A checklist of the intertidal and shallow-water sessile barnacles of the Eastern Pacific, Alaska to Chile; pp. 97-107. In: Hendrickx, M.E. (Ed.) Contributions to the study of East Pacific crustaceans. Instituto de Ciencias del Mar y Limnología, UNAM. 383 pp.
- Quiñones J., Paredes, E., Quispe Cayhualla, S., Delgado, L. 2015. Tortugas marinas durante el 2010 en Pisco, Perú. Informaciones del Instituto del Mar del Perú 42(4): 516-525.
- Sarmiento-Devia, R.A., Harrod, C., Pacheco, A.S. 2015. Ecology and conservation of sea turtles in Chile. Chelonian Conservation and Biology 14(1): 21-33.
- Sielfeld, W., Salinas, P., Contreras, D. 2021. Condición de las tortugas verdes, *Chelonia mydas* (Linnaeus 1758) (Testudines, Cheloniidae), del área de alimentación de La Puntilla, Arica, norte de Chile. Boletín Chileno de Herpetología 8: 22-35.
- Zardus, J.D., Lake, D.T., Frick, M.G., Rawson, P.D. 2014. Deconstructing an assemblage of "turtle" barnacles: species assignments and fickle fidelity in *Chelonibia*. Marine Biology 161(1): 45-59.
- Zullo, V.A. 1991. Zoogeography of the shallow-water cirriped fauna of the Galápagos Islands and adjacent regions in the tropical eastern Pacific. In: James, M. (Ed.) Galapagos Marine Invertebrates: 173-192. Springer, Boston.

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