Marine Biodiversity Records, page 1 of 3. © Marine Biological Association of the United Kingdom, 2015
doi:10.1017/S1755267215000536; Vol. 8; e71; 2015 Published online

First record of the sea anemone *Bunodosoma californicum* (Cnidaria: Actiniaria) on the Pacific coast of Costa Rica

ANDRÉS J. QUESADA[1], FABIÁN H. ACUÑA[2] AND JORGE CORTÉS[3]

[1]Department of Environmental Sciences, Western Washington University, Bellingham, WA 98225, USA, [2]Instituto de Investigaciones Marinas y Costeras, CONICET, Facultad de Ciencias Exactas y Naturales, Universidad Nacional de Mar del Plata, Funes 3250, Mar del Plata, 7600, Argentina, [3]Centro de Investigación en Ciencias del Mar y Limnología (CIMAR), Ciudad de la Investigación, Universidad de Costa Rica, San Pedro, 11501–2060 San José, Costa Rica

We report the first record of the sea anemone Bunodosoma californicum *on the Pacific coast of Costa Rica, extending its southern distribution. Four specimens were collected from an artificial breakwater in Mata de Limón, Puntarenas. We present images of the live specimens and analyses of their cnidae composition.*

Keywords: Actiniidae, *Bunodosoma californicum*, Central America, Costa Rica, Pacific coast, sea anemone

Submitted 27 January 2015; accepted 16 April 2015

INTRODUCTION

Bunodosoma is a sea anemone genus comprising 13 valid species (Fautin, 2013), eight of which are distributed throughout the Americas. *Bunodosoma grande* and *Bunodosoma granuliferum* have been previously reported for the Pacific and Caribbean coasts of Costa Rica, respectively (Acuña *et al.*, 2013). *Bunodosoma californicum* was first described by Carlgren (1951) and is distributed from the Gulf of California to El Salvador (Daly, 2004). Here, we extend the southern distribution of this species to Costa Rica.

MATERIALS AND METHODS

Four specimens of *Bunodosoma californicum* were collected from an artificial breakwater (9°55′15′N 84°42′53′W) in Mata de Limón, Puntarenas, on Costa Rica's Pacific coast. Specimens were collected from the lower littoral zone on 19 January 2013 during a low tide. The breakwater was colonized by a mat of microalgae, barnacles, serpulid polychaetes, small bivalves and the recently reported sea anemone species *Anthopleura nigrescens* (see Acuña *et al.*, 2012). The *B. californicum* specimens were removed from the rocky substrate and transported live in seawater to the laboratory, where they were placed in a small aquarium and photographed. Then, specimens were placed in jars, fixed in 5% formalin and later preserved in 70% alcohol. Species identification was based on the cnidae composition and description given in Daly (2004). Analyses of the cnidom were conducted at the Centro de Investigación en Ciencias del Mar y Limnología (CIMAR) of the Universidad de Costa Rica. Cnidae from four individuals were analysed using an inverted microscope at a magnification of 1000x. Cnida nomenclature follows England (1991). Cnidae measurements were made to the nearest 0.5 μm. After examination, the specimens were deposited in the Museo de Zoología of the Universidad de Costa Rica (MZUCR-2426).

Corresponding author:
A.J. Quesada
Email: andresjquesada@gmail.com

RESULTS

SYSTEMATICS

Order ACTINIARIA
Suborder NYNANTHEAE Carlgren, 1899
Infraorder THENARIA Carlgren, 1899
Superfamily ACTINIOIDEA Rafinesque, 1815 (~Endomyaria Stephenson, 1921)
Family ACTINIIDAE Rafinesque, 1815
Genus *Bunodosoma* Verrill, 1899
Bunodosoma californicum Carlgren, 1951

DESCRIPTION

Green-grey oral disk with white patches (Figure 1). Mouth elevated into an oral cone in the centre of the disk. Oral disk diameter in the studied individuals was 45–55 mm. Tentacles arranged in three cycles, the inner two light red in colour, the outer cycle similar in colour to the oral disk. Tentacles look red when contracted. The number of tentacles in the studied specimens varied between 74 and 79. Tentacles with multiple white spots of variable size. Each tentacle tapers to a point. Variable number of non-adhesive vesicles in rows covering the entire column. Column dark green-grey, although some vesicles are a lighter colour than the column. Some specimens appeared to have very light reddish or yellowish vertical stripes along the column. No gravel attached to the column. In some specimens, the vesicles at the top of the column are lighter in colour, forming a visible

Fig. 1. *Bunodosoma californicum* Carlgren, 1951: (A) top view, (B) side view of a semi-contracted specimen, (C) side view of a fully expanded specimen, (D) contracted specimens in the field during low tide. The images shown have different scales.

yellowish ring when the sea anemone contacts. White acrorhagi form a ring at the top of the column beneath the outer cycle of tentacles. However, one of the specimens collected lacked acrorhagi. Pedal disk light orange in colour. One specimen had a division scar (i.e. a portion of the column lacked vesicles).

Table 1. Cnidae of *Bunodosoma californicum*. N is the proportion of examined specimens with a given type of cnida, n is the number of capsules measured, A (abundance) indicates how common a given type of cnida was in each tissue type (vc, very common; c, common; u, uncommon; r, rare; vr, very rare). Parentheses next to the mean length and width indicate standard deviation.

					Sizes (μm)			
Tissue	**Cnida**	**N**	**n**	**A**	**Length range**	**Mean length**	**Width range**	**Mean width**
Tentacles	Spirocysts	4/4	90	vc	17.0–33.0	25.5 (3.8)	2.5–3.5	2.9 (0.3)
	Small basitrichs	4/4	32	r	11.0–14.0	12.8 (0.8)	2.0–2.5	2.0 (0.1)
	Large basitrichs	4/4	94	vc	18.5–25.0	22.4 (1.1)	2.5–3.5	2.8 (0.3)
Acrorhagi	Holotrichs	3/3	75	vc	30.5–44.0	36.2 (2.5)	3.5–5.5	4.6 (0.4)
Column	Small basitrichs	2/3	14	r	11.5–18.0	15.0 (1.9)	2.0–2.5	2.2 (0.2)
	Medium basitrichs	3/3	63	vc	16.0–24.0	18.4 (1.5)	2.5–3.0	2.9 (0.2)
	Large basitrichs	3/3	62	vc	19.5–27.0	24.2 (1.4)	3.5–5.0	3.8 (0.3)
Actinopharynx	Small basitrichs	4/4	65	u	11.0–16.0	12.9 (0.9)	1.5–2.5	2.1 (0.2)
	Large basitrichs	4/4	83	c	18.5–31.0	26.1 (2.1)	2.5–4.0	3.4 (0.3)
	p-mastigophores	3/4	7	vr	18.0–20.0	19.1 (0.8)	4.5–5.0	4.9 (0.2)
Filaments	Small basitrichs	4/4	81	vc	11.0–16.0	13.8 (1.1)	1.5–2.0	2.0 (0.1)
	Large basitrichs	4/4	80	u	20.0–31.0	26.9 (1.9)	2.5–4.0	3.3 (0.3)
	Large b-mastigophores	4/4	81	u	28.5–35.0	31.8 (1.7)	5.0–7.0	5.7 (0.5)
	Small b-mastigophores	4/4	80	c	13.5–20.0	16.0 (1.4)	3.0–5.0	4.0 (0.5)
	p-mastigophores	4/4	81	vc	18.0–23.0	20.5 (0.9)	4.5–6.0	5.1 (0.4)

CNIDAE

Spirocysts, basitrichs, microbasic p-mastigophores, microbasic b-mastigophores and holotrichs (Table 1). The cnidae makeup and sizes agree with previous descriptions of this species (Carlgren, 1951; Daly, 2004). However, we also found small basitrichs in the tentacles and observed three size-classes of basitrichs in the column. Nematocysts were scarce in the actinopharynx tissue and p-mastigophores were very rare, which coincides with Daly's (2004) observations.

PREVIOUS RECORDS

The Gulf of California in Mexico (Carlgren, 1951; McCommas, 1991; Daly, 2004) and the Pacific coast of El Salvador (Daly, 2004).

DISCUSSION

This is the first record of *Bunodosoma californicum* for Costa Rica. Because this species was found on an artificial breakwater near a major port (Caldera), it is possible that it has been recently introduced. However, sea anemone diversity in Costa Rica has only recently been studied in depth (see Acuña *et al.*, 2013), so it is possible that species were overlooked during previous benthic surveys due to a lack of taxonomic specialists. This new record increases the biodiversity of sea anemones (*sensu stricto*) in Costa Rica to 15 species.

ACKNOWLEDGEMENTS

We thank the Centro de Investigación en Ciencias del Mar y Limnología (CIMAR) for providing the equipment necessary for this study. We also thank Brian Bingham for reviewing the manuscript.

REFERENCES

Acuña F.H., Alvarado J., Garese A. and Cortés J. (2012) First record of the sea anemone *Anthopleura nigrescens* (Cnidaria: Actiniaria: Actiniidae) on the Pacific coast of Central America. *Marine Biodiversity Records* 5, e24, doi: http://dx.doi.org/10.1017/S1755267212000022X.

Acuña F.H., Garese A., Excoffon A.C. and Cortés J. (2013) New records of sea anemones (Cnidaria: Anthozoa) from Costa Rica. *Revista de Biología Marina y Oceanografía* 48, 177–184.

Carlgren O. (1951) The actinian fauna of the Gulf of California. *Proceedings of the United States National Museum* 101, 415–449.

Daly M. (2004) Anatomy and taxonomy of three species of sea anemones (Cnidaria: Anthozoa: Actiniidae) from the Gulf of California, including *Isoaulactinia hespervolita* Daly, n. sp. *Pacific Science* 58, 377–390.

England K. (1991) Nematocysts of sea anemones (Actiniaria, Ceriantharia and Corallimorpharia: Cnidaria): nomenclature. *Hydrobiologia* 216/217, 691–697.

Fautin D.G. (2013) Hexacorallians of the world. Available at: http://geoportal.kgs.ku.edu/hexacoral/anemone2/index.cfm (accessed 11 January 2015).

and

McCommas S.A. (1991) Relationships within the family Actiniidae (Cnidaria, Actiniaria) based on molecular characters. *Hydrobiologia* 216–217, 509–512.

Correspondence should be addressed to:
A.J. Quesada
Department of Environmental Sciences
Western Washington University, Bellingham
WA 98225, USA
email: andresjquesada@gmail.com