First Record of the anchialine shrimp *Parhippolyte sterreri* (Decapoda, Barbouriidae) from San Salvador Island, Bahamas, with observations on *Barbouria cubensis*

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Sterrer’s cave shrimp (*Parhippolyte sterreri*) is recorded for the first time from San Salvador Island, Bahamas. A single adult specimen was collected in June 2011 with hand nets at the southern conduit mouth in Mermaid Pond, an anchialine pond on the south-east corner of the island. Twelve additional specimens were collected in June 2013 from two additional sites near Mermaid Pond (Dunk City Pond and the Pigeon Creek Conduit). These collections represent a minor range extension of *P. sterreri* in the Bahamas. Additionally, we report on populations of *Barbouria cubensis* observed in 17 other anchialine ponds on San Salvador Island.

**Keywords**: Barbouriidae, *Parhippolyte sterreri*, *Barbouria cubensis*, San Salvador, Bahamas, cave shrimp

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**INTRODUCTION**

Members of the family Barbouriidae are characterized as anchialine troglobitic decapod Crustaceans. This Caridean family includes four genera: *Barbouria, Parhippolyte, Janicea* and *Calliasmata*, totalling 11 species (De Grave & Fransen, 2011; De Grave et al., 2014). Western Atlantic troglodytic shrimps may be relicts of ancient stocks and are believed to have evolved from deep-sea shrimp that invaded shallower anchialine caves and pools in the West Indies sometime during the Jurassic (Hobbs et al., 1977; Hart et al., 1985; Hobbs, 1994). Both *Barbouria cubensis* (Von Martens, 1872) and *Parhippolyte sterreri* (Hart & Manning, 1981) exhibit wide-ranging yet disjunct distributions in the tropical western Atlantic and are thought to have originated from broadly distributed marine ancestors (Hobbs, 1994).

Modern Barbouriidae are typically found in tropical waters, inhabiting marine caves and anchialine lakes, and it is not unusual to find different species of this family inhabiting the same site (Hart & Manning, 1981). In the western Atlantic, *P. sterreri* has been previously reported from Bermuda, the islands of Andros, Exuma and Grand Bahama in the Bahamas, and Cozumel, Mexico (Hart & Manning, 1981; Brooks, 1987; Kelsey, 1988; Wicksten, 1996). *Barbouria cubensis* has previously been reported from Bermuda, Cayman Brac, Cuba, Jamaica, the islands of Abaco, Exuma, San Salvador and Grand Bahama in the Bahamas, and Providenciales in the Turks and Caicos Islands (Hobbs et al., 1977; Manning & Hart, 1984).

Prior to this study, only *B. cubensis* was reported from San Salvador Island and all anecdotal reports of shrimp observed in inland ponds and lakes were assumed to be this species. We report on the first occurrence of *P. sterreri* from San Salvador Island, which represents a minor range extension for this species in the Bahamas. We also describe the occurrence of *B. cubensis* based on widespread sampling in anchialine ponds across the island.

**MATERIALS AND METHODS**

**Environmental setting**

San Salvador is a small island in the Bahamian archipelago, measuring 9.66 km in width and 19.3 km in length. A prominent feature of the island is numerous inland ponds and lakes (Figure 1). Many are seep-fed, with high evaporation rates and exhibit hypersaline conditions, while others are conduit-fed and are marine in nature (Mylroie & Carew, 1995). Most inland ponds and lakes on the island are nearly undisturbed ecosystems, which form ecological ‘islands’ within islands, each somewhat unique from the other ponds and lakes. These ‘islands’ typically contain faunal components of reduced ecological diversity and may be dominated by just a few groups of marine organisms (Edwards, 1996). It is believed that, with the exception of rare large storm events,
these inland bodies of water have been isolated since the last sea-level high stand approximately 125,000 years ago (Carew & Mylroie, 1995).

Methods

Samples were collected using SCUBA and baited minnow traps were deployed in 30 sites during 2011, 2012 and 2013. All specimens were fixed in 95–100% ethanol. Identification of Parhippolyte sterreri (Figure 2A) and Barbouria cubensis (Figure 2B) was based on Hobbs et al. (1977), Hobbs (1978), Hart & Manning (1981), Manning & Hart (1984), Wicksten (1996) and Mejia et al. (2008). Representative specimens of P. sterreri were deposited in the US National Museum of Natural History (USNM 1234891-94) and the Oxford University Museum of Natural History (OU-MNH.ZC.2014-07-027, 028 and 034, 035). The remaining samples are currently retained at Florida International University.

RESULTS AND DISCUSSION

A total of 1587 shrimp were captured from 17 of the 30 ponds sampled (Figure 1), of which 143 individuals were retained for
further study. The incidence of *Barbouria cubensis* indicates a broad geographic distribution on San Salvador, while *Parhippolyte sterreri* was restricted to three sites (Mermaid Pond, Dunk City Pond and the Pigeon Creek Conduit) in the south-eastern portion of the island (Figure 3). Both *B. cubensis* and *P. sterreri* were readily visible in and around the conduit mouths of Mermaid Pond and Dunk City Pond, but observations could not be made in the Pigeon Creek Conduit mouth due to strong tidal flow. In all instances that *P. sterreri* was captured, *B. cubensis* was also present, but in far fewer numbers.

The fact that *P. sterreri* was only found in the southern portion of the island is interesting, as this suggests a possible subterranean connection between Mermaid Pond, Dunk City Pond and the Pigeon Creek Conduit. *Parhippolyte sterreri* was not found in Merman Pond or Three Roses Cave within the pond. However, due to possible sampling errors (trap placement), strong tidal flow and the small number of *B. cubensis* captured in Merman Pond, the absence of *P. sterreri* in the pond on a single visit may not represent their true status. Previous investigations have attempted to trace the water flow through Three Roses Cave in Merman Pond, but have been unsuccessful (E. Cole, personal communication). Although this would suggest that Merman Pond is isolated from the neighbouring ponds and the Pigeon Creek tidal lagoon, its proximity and position on the landscape would suggest otherwise (Figure 3).

Neither species has been visible or present in and around the mouth of the conduits on each visit to samples sites (i.e.
in 2011 only *P. sterreri* was present in Mermaid Pond vs in 2012 only *B. cubensis* was present). This might be due to the localized movement of individuals within conduits associated with tidal cycles and that a single sampling event may not accurately reflect the species composition in each pond.

The present study is the first record of *P. sterreri* from San Salvador Island, which represents a minor range extension for this species in the Bahamas. This study also represents the first record of *P. sterreri* and *B. cubensis* inhabiting a cave/conduit outside of landlocked anchialine pools (i.e. the Pigeon Creek Conduit). Future studies are required to confirm the species composition of previously sampled sites, to diagnose any remaining unsampled populations and to identify the source of *P. sterreri* on San Salvador Island. Additionally, further research is required to clarify the intermittent presence of *P. sterreri* and *B. cubensis*, or other Barbouriidae, cohabitating the same anchialine pools.

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**REFERENCES**


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