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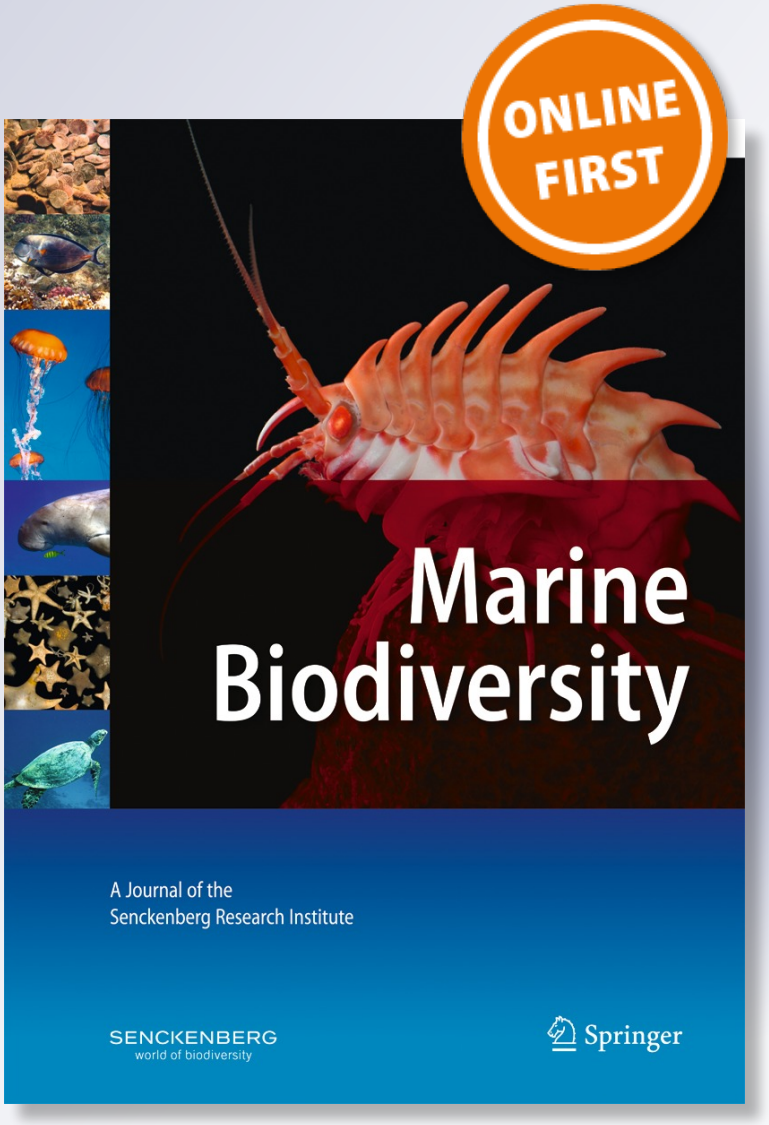

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Isopods present on deep-water sharks *Squalus cubensis* and *Heptranchias perlo* from The Bahamas

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Abstract Isopods are micropredators of deep-water sharks; however, their associations are poorly described in the scientific literature. We present the association of three isopod genera *Aega* sp., *Aegaphales* sp., and *Cirolana* sp. with two species of deep-sea shark, the Cuban dogfish (*Squalus cubensis*) and the sharpnose sevengill (*Heptranchias perlo*). Although limited conclusions can be drawn from this observation, it provides a novel association of micropredatory isopods with two poorly studied species of deep-water shark.

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Isopods can be micropredators of deep-sea sharks (see early bibliography by Moreira and Sadowsky 1978); however, specific reports of such interactions are lacking in the scientific literature. We provide the first report documenting the interaction of three genera of isopods, *Aega* sp. (Leach, 1815), *Aegaphales* sp. (Bruce, 2009) and *Cirolana* sp. (Leach, 1818), with two species of deep-water shark, the Cuban dogfish (*Squalus cubensis*, Howell Rivero, 1936) and the sharpnose sevengill shark (*Heptranchias perlo*, Bonnaterre, 1810). One published account of isopod interaction exists for *S. cubensis*; Sadowsky and Moreira (1981) noted *Livoneca splendida* (Leach, 1818) on individuals captured from southern Brazil. Interactions of isopod parasites with *H. perlo* are undocumented.

Sharks were captured from depths between 603 and 705 m during scientific longline surveys in the Exuma Sound, The Bahamas between 2014 and 2015. A juvenile *Aega* sp. (Bruce, 2004, Fig. 1a, NHMUK 2016.63) was removed from the abdomen of a live *S. cubensis* (male, 57 cm TL). *Aegaphales* sp. (Bruce, 2004, NHMUK 2016.64) was removed from the clasper of a second live *S. cubensis* (male, 53 cm TL). The isopod's gut was distended with blood, suggesting active

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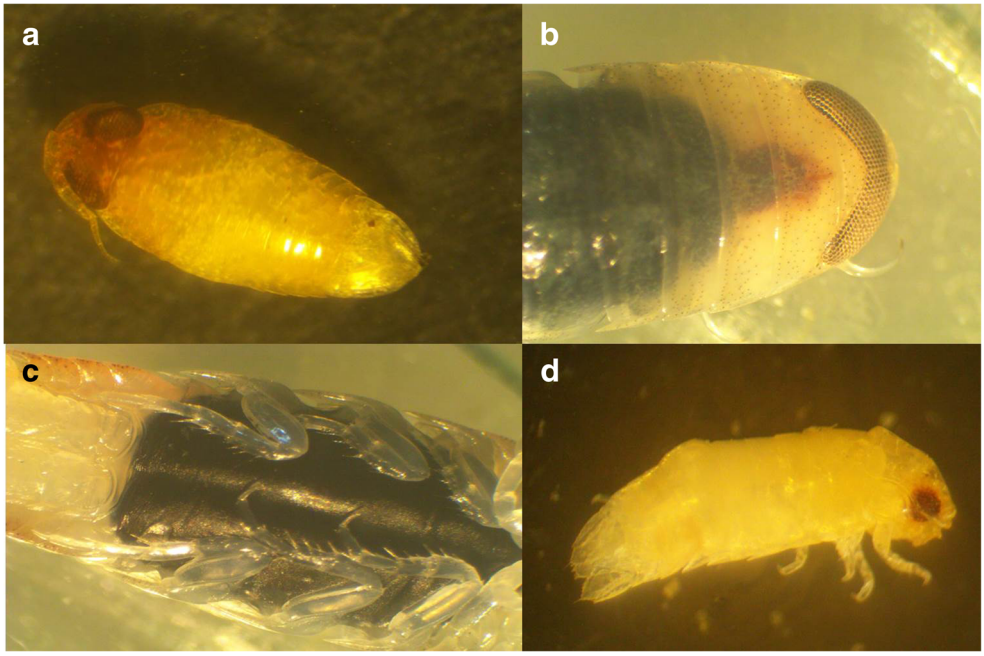

Fig. 1 **a** Juvenile *Aega* sp. from ventral surface of *S. cubensis*; **b** Anterior dorsal view of *Aegaphales* sp. from clasper of *S. cubensis*; **c** *Aegaphales* sp. ventral surface, with pereopods 5–7; **d** *Cirolana* sp. from ventral surface of *H. perlo*

micropredation on this species (Fig. 1b, c). *Cirolana* sp. (Brusca et al. 1995, NHMUK 2016.66) (Fig. 1d) was removed from the ventral surface a *H. perlo* (male, 63 cm TL), which had suffered mortality during capture.

Although isopods are micropredators of sharks (Moreira and Sadowsky 1978; Bunkley-Williams and Williams 1998; Bruce 2004), their effects on host health remains inconclusive. *Aegaphales* sp. may prey on *S. cubensis*, for example, but whether this contributes directly to mortality is unclear, especially as captured animals appeared healthy prior to release. For *H. perlo*, the interaction of *Cirolana* sp. may have occurred post-mortality, as cirolanid isopods commonly scavenge on larger carrion, and can be active predators of sharks (Bruce 2004, B. Talward, Unpublished Data). Limited conclusions can be drawn from these observations; however, we provide a novel insight into the interaction of isopods with two data-poor species of deep-water sharks.

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