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A new species of *Agostocaris* (Caridea: Agostocarididae) from Acklins Island, Bahamas

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Abstract.—The new bresilioid shrimp *Agostocaris acklinsensis* is described from an anchialine cave in Acklins Island, Bahamas. This is the third species described in the genus. The new species is characterized by having small exopods on the third and fourth pereiopods, one spine on the ischium of the fifth pereiopod, and an outer ramus of the uropods with one distolateral spine. A key to the species of *Agostocaris* is provided.

The family *Agostocarididae* Hart & Manning, 1986, was created to accommodate *Agostocaris williamsi,* from Grand Bahama and Turks and Caicos, a species that appeared to be morphologically similar to some species in the Atyidae De Haan, 1849, and the Bresiliidae Calman, 1896, but had a distinct morphology of the propodus and dactylus of the first two pereiopods. Kensley (1988) described a second species from Cozumel, Mexico, *Agostocaris bozanici,* which exhibits the same unique pereiopodal morphology, placing it also in the Agostocarididae. Holthuis (1993) synonymized the Agostocariidae with the Bresiliidae. However, Martin & Davis (2001) have proposed to recognize the family Agostocarididae within the superfamily Bresilioidea Calman, 1896, where a hetereogeneous assemblage of forms are included in five families.

At best, as pointed out by Kensley (1988), the relationships of *Agostocaris* are unclear. The particular articulation of the proprodus of the first pair of legs, and the morphology of the chela of the second pair of legs, are unique characters not shared by any other genus in the Bresilioidea. With respect to the diagnosis of *Agostocaris,* with the new species described herein, the range of variation in taxonomically important characters increases, making it necessary to provide a new diagnosis for the genus.

Materials and Methods

Specimens of the new *Agostocaris* described herein were collected during an expedition to Crooked and Acklins Islands, Bahamas, in January 1999. The new species was captured in Jumby Hole Cave (22°29.275′N, 73°53.501′W), Snug Corner, Acklins Island, Bahamas, 11 January 1999 (Fig. 1). This cave is located about 250 m inland from the west side of the island facing the shallow water Bight of Acklins. It is actually a complex of closely associated caves that were mined for guano in the past. More than 3 m of soil and guano were removed from pits within dry portions of the cave. One of these caves contains a 20 m diameter, shallow (30 to 50 cm deep) pool. Sediments in the pool consist of a thick layer of guano from a bat roost located directly above. Tidal range in the pool appeared to be about 30 cm. This pool is in total darkness but is close to 4 or more entrances on all sides. Salinity was measured at 32.5‰

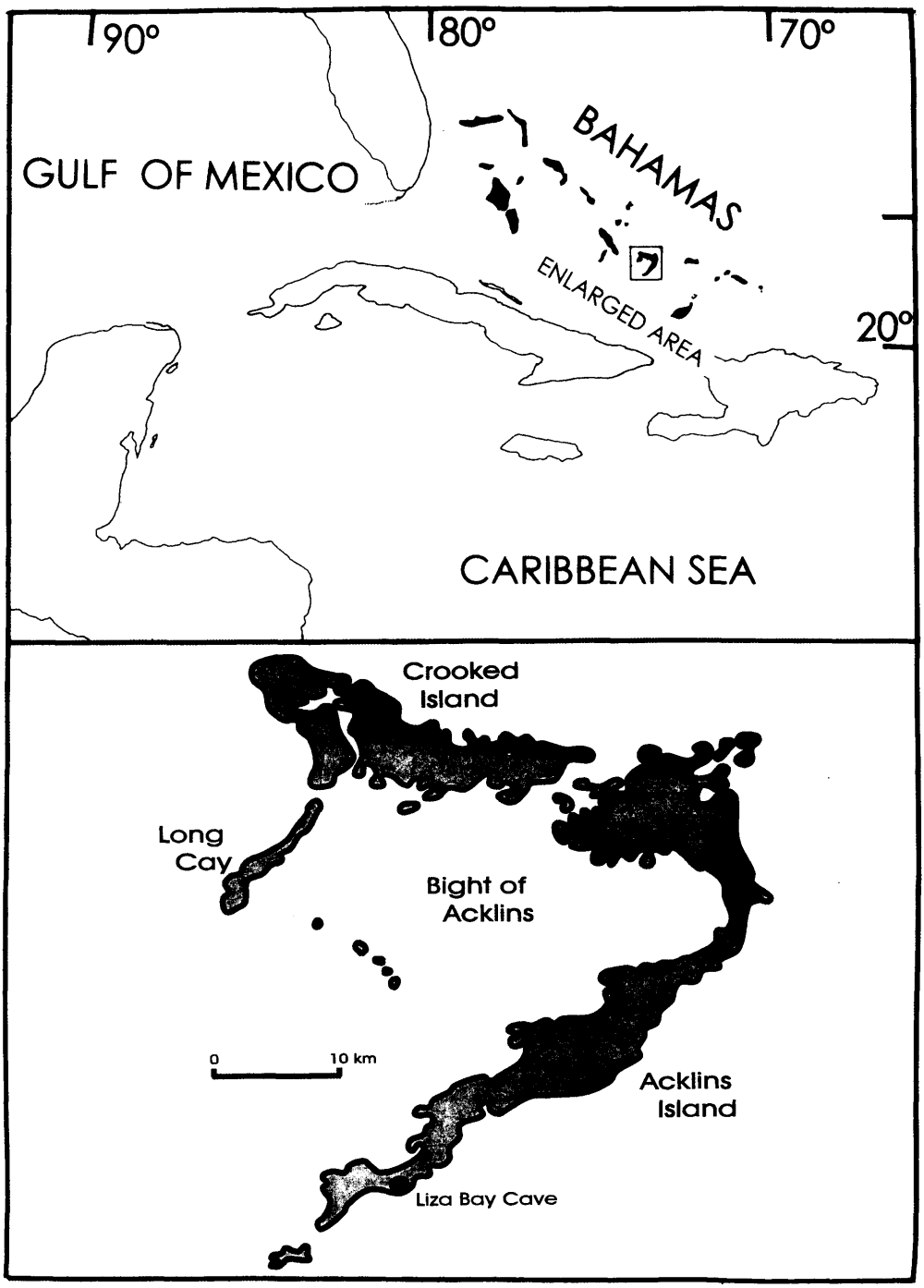

Fig. 1. Map showing the location of the type locality of *Agostocaris acklinsensis,* Acklins Island in the Bahamas.

with a refractometer and water temperature was 25.5°C. Specimens of *Agostocaris* were observed walking across the surface of rocks and the guano bottom in 50 cm depth. They were collected by hand using glass vials. Other invertebrates collected from the cave pools included copepods, archiannelid and other polychaetes, mites and the shrimp *Barbouria cubensis* (von Martens, 1872) (Hippolytidae).

The specimens representing the new species are deposited in the Colección Nacional de Crustáceos (CNCR), Instituto de Biología, Universidad Nacional Autónoma de México. Other abbreviations used are: cl, postorbital carapace length, and tl, total length.

Results

Agostocaris Hart & Manning, 1986

Diagnosis.—Rostrum well developed, with or without dorsal teeth. Carapace lacking spines and grooves. Eyes reduced, fused, without pigment or weakly pigmented. Antennal scale with lateral spine. First maxilliped with lash on exopod. Second maxilliped with terminal segments serial. Pleurobranchs on all pereiopods or on pereiopods 2–5. First and second pereiopods chelate, first pair heavier than second one. First pereiopod with propodus articulating with carpus at one third of its length. Second pereiopod with carpus undivided; dactylus digitiform, heavier and longer than propodus, both fingers without teeth or spines. Telson with 4–5 pairs of dorsal spines, posterior margin with variable number of spines.

Agostocaris acklinsensis, new species
Figs. 2–4

Material examined.—Holotype, female, cl 7.3 mm, tl 21.5 mm; 11 January 1999; Jumby Hole Cave, Snug Corner, Acklins Island, Bahamas; collected by T. M. Iliffe; CNCR 19601. Paratypes, 8 females, cl 4.0–8.0 mm, tl 13.6–21.7 mm; same locality, date and collector as holotype; CNCR 19602.

Description.—Carapace globose, smooth, devoid of spines. Rostrum laterally compressed, triangular, ending in sharp tip, reaching distal end of first antennular segment; without teeth in mature individuals, with three dorsal teeth with alternating setae in juveniles (Fig. 2a, b). Carapace without grooves, inferior margin of orbit and pterygostomian angle slightly produced (Fig. 2a), pterygostomian regions produced laterally (Fig. 2b).

Abdomen smooth, somites 1–2 with rounded pleura, somites 3–5 with posterior angle of pleura subacute, sixth somite with posterior margin sinuous at insertions of telson and uropods. Telson 2.5 times as long as its basal width, tapering distally, distal width less than half of basal width; bearing four pairs of movable spines on dorsal surface, spines located on distal two thirds of dorsal surface; posterior margin rounded, bearing 9 spines, second pair from external one longest (Fig. 4g).

Eyes pigmented, fused, forming part of a single plate, peduncle and cornea not discernible, projected dorsally (Fig. 2c). Antennule with first segment as long as segments 2 and 3 combined; stylocerite acute, reaching distal margin of first segment (Fig. 4e). Antennal scale 1.8 times as long as wide, laterodistal tooth short not exceeding distal margin of blade (Fig. 4f), flagellum 1.25 times total length (Fig. 2a).

Mandible with stout 2-segmented palp, incisor process with six distal teeth, molar process conical, sharp distal end (Fig. 2d). Both mandibles approximately symmetrical. First maxilla with distal lacinia oval shaped, bearing three rows of short, thick setae on mesial surface; proximal lacinia with single row of short, thick setae on distomesial margin; palp bearing one distal, long setae and two subdistal short ones on internal margin (Fig. 2e). Second maxilla with scaphognathite approximately rectangular distally, subtriangular proximally; distal margin with long, plumose setae; lateral

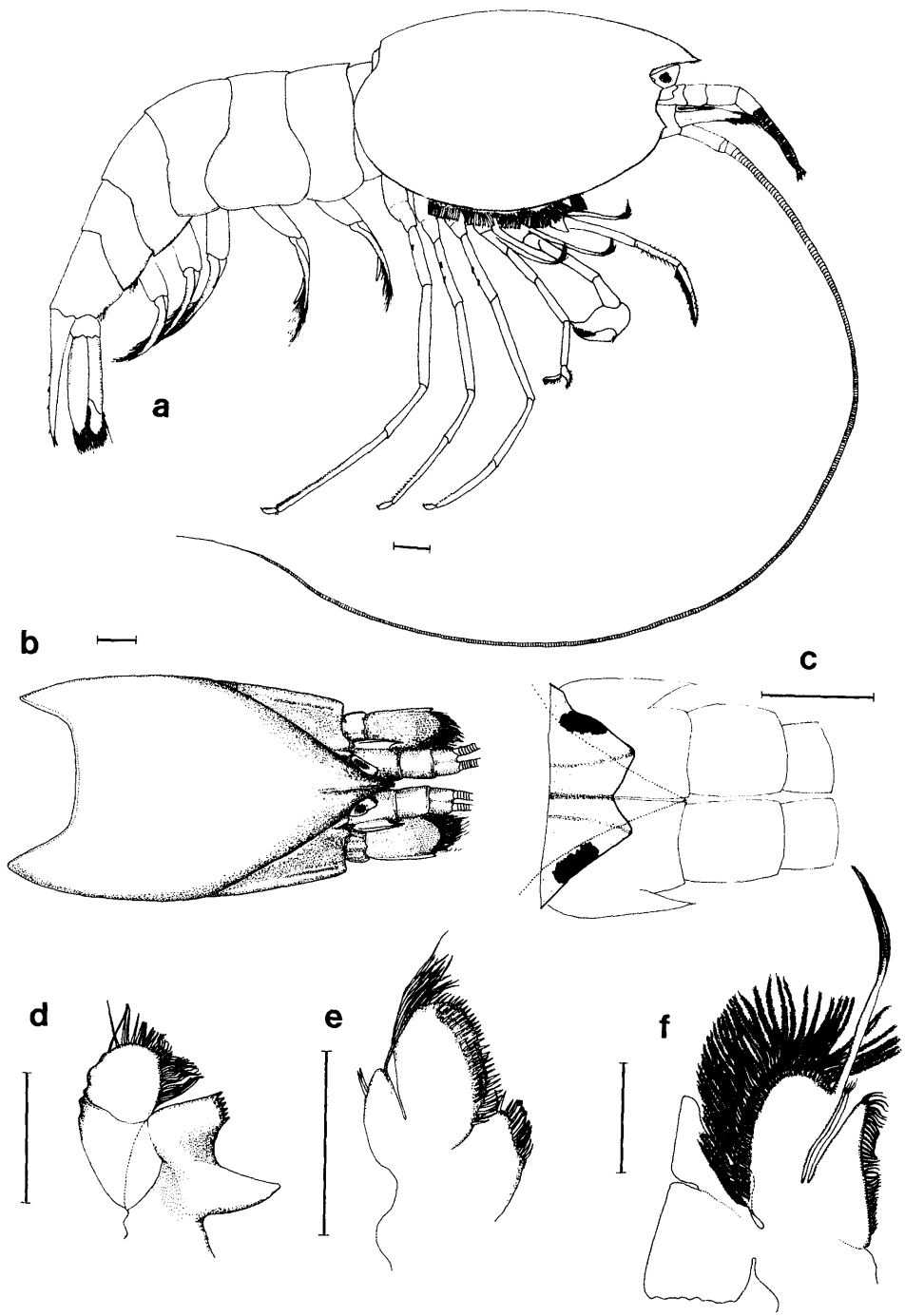

Fig. 2. *Agostocaris acklinsensis,* new species, a female holotype, b–f female paratype: a, total lateral view; b, carapace, dorsal view; c, dorsal view of eyes, carapace removed; d, mandible; e, first maxilla; f, first maxilliped. Scale bar represent: a–c, f, 1 mm; d–e, 0.5 mm.

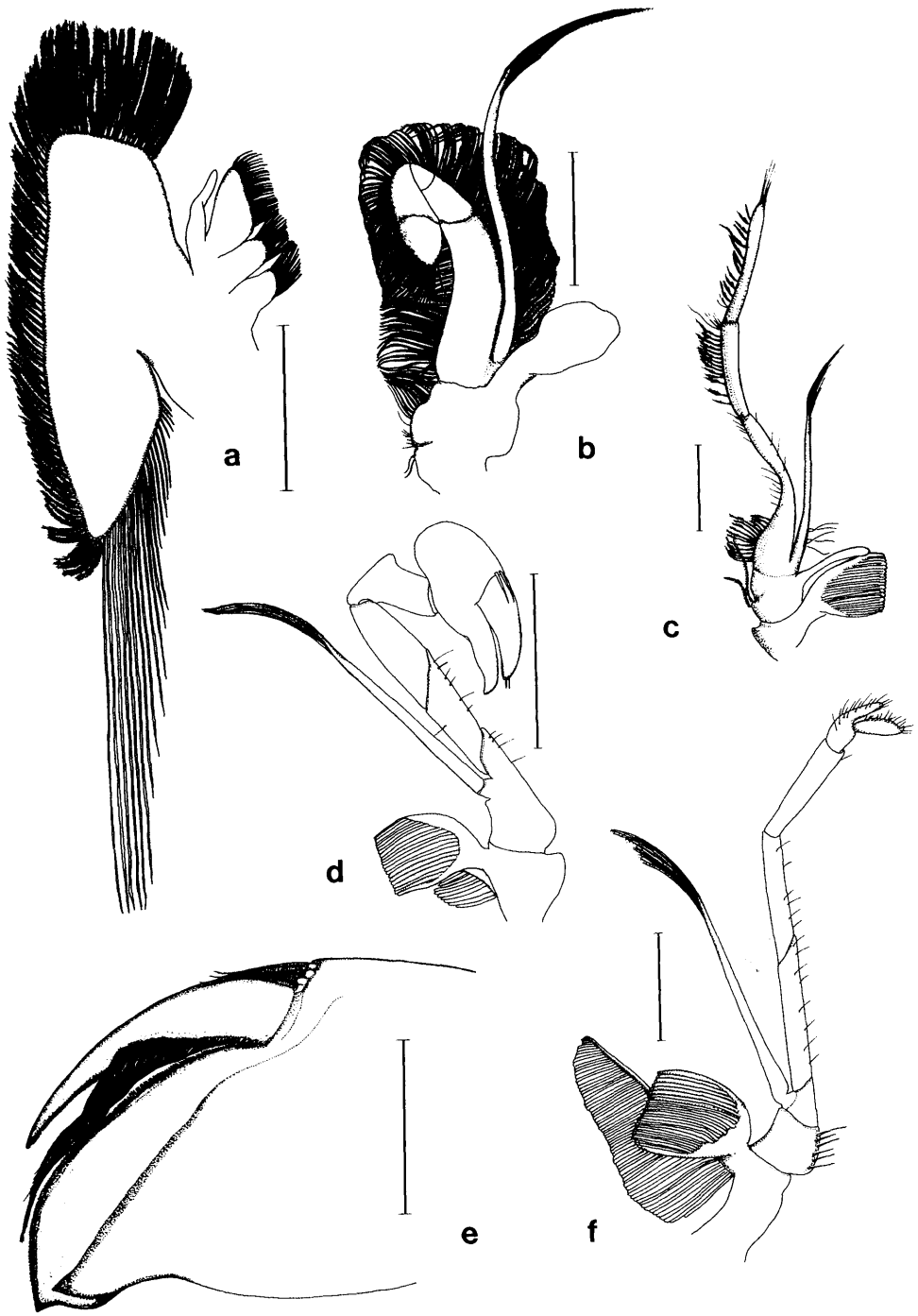

Fig. 3. *Agostocaris acklinsensis,* new species, female paratype: a, second maxilla; b, second maxilliped; c, third maxilliped; d, first pereiopod; e, detail of propodus and dactylus of first pereiopod; f, second pereiopod. Scale bars represent: a–d, f, 1 mm; e, 0.5 mm.

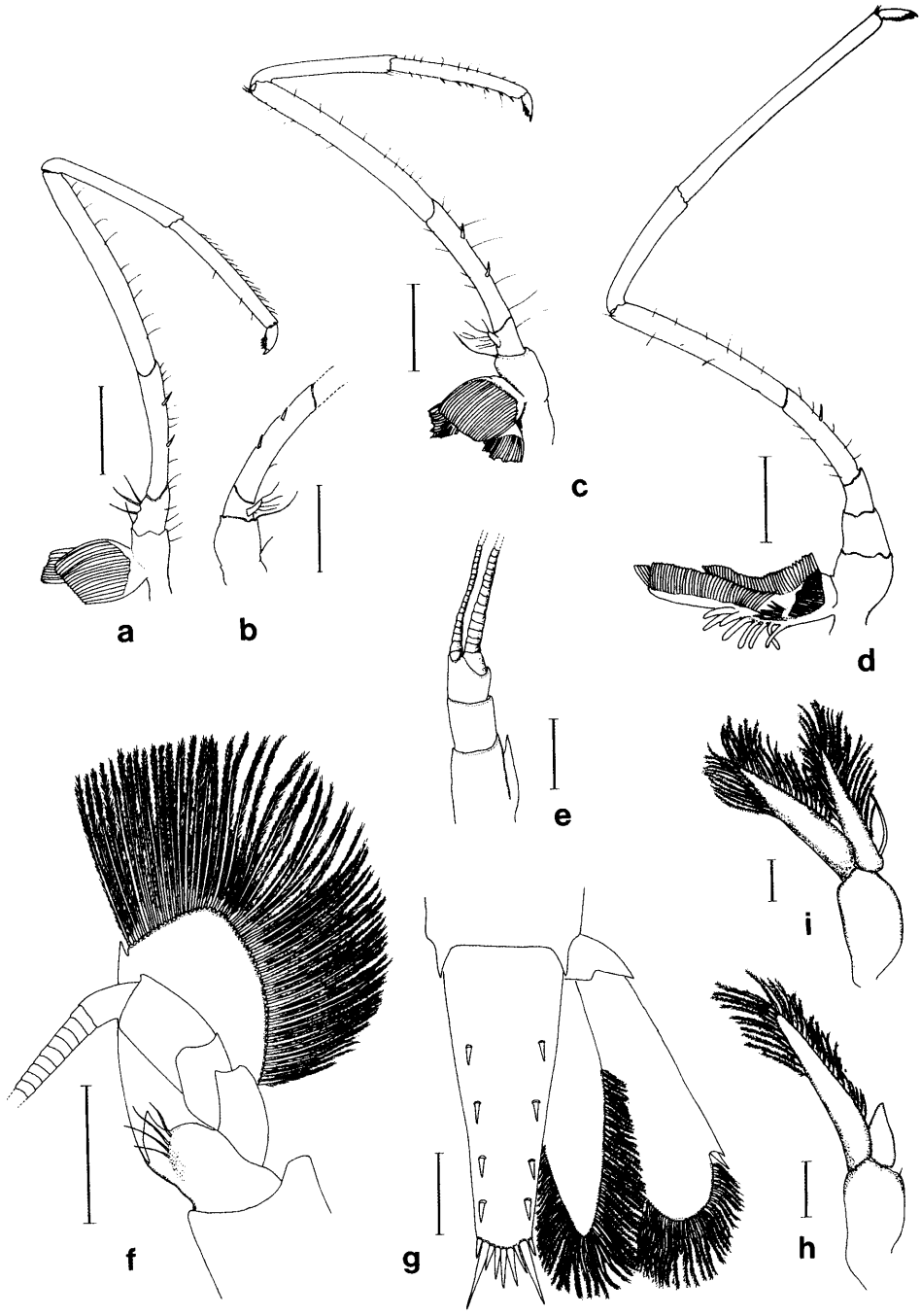

Fig. 4. *Agostocaris acklinsensis,* new species, female paratype: a, third pereiopod; b, detail of proximal segments of third pereiopod; c, fourth pereiopod; d, fifth pereiopod; e, antennule; f, antenna; g; telson and uropods, left side omitted; h, first pleopod; i, second pleopod. Scale bars represent 1 mm.

margin with short plumose setae; internal margin with long simple setae, increasing in length distally, almost as long as scaphognathite; palp digitiform, devoid of setae; distal endite trapezoidal, middle and proximal endites approximately rectangular, all three bearing simple setae on distal margins (Fig. 3a).

First maxilliped with triangular endite bearing marginal setae; palp digitiform, with apical tuft of setae; exopod elongated, bearing long, simple setae distally; caridean lobe broadly rounded, with submarginal row of short setae and long plumose setae along margin; epipod bilobed, both lobes trapezoidal, distal one smaller, devoid of setae (Fig. 2f). Second maxilliped with endopod pediform, 4-segmented, with continuous row of setae along margin; exopod slender, bearing long simple setae distally; epipod simple, flat, rounded (Fig. 3b). Third maxilliped with endopod 4-segmented, bearing setae on mesial margin; exopod as long as first segment of endopod, with distal tuft of long setae; epipod digitiform, less than half the length of exopod; arthrobranches present (Fig. 3c).

First pereiopod with ischium and merus of about same length and width, carpus wider proximally, propodus articulating with carpus at one third of its length, palm as long as fingers, cutting edges of both fingers with minute sharp teeth, dactylus with long setae arising from proximal half teeth (Fig. 3d); exopod as long as ischium and merus combined, with apical tuft of long setae; arthrobranch and pleurobranch present (Fig. 3d). Second pereiopod longer than first one, with merus slightly shorter than ischium, carpus becoming wider distally and as long as merus, propodus with palm shorter than fixed finger, dactylus heavier and longer than fixed finger; exopod shorter than ischium and merus combined, bearing apical tuft of long setae; arthrobranch and pleurobranch present (Fig. 3f). Third pereiopod with ischium with two spines, merus the longest segment, carpus and propodus of about the same length, dactylus with corneous sharp tip and four smaller teeth on internal surface, arthrobranch and pleurobranch present, finger-like exopod arising from basis (Fig. 4a, b). Fourth pereiopod with ischium with two spines, merus the longest segment, carpus and propodus of about the same length, dactylus with corneous sharp tip and three smaller teeth on internal surface, arthrobranch and pleurobranch present, finger-like exopod arising from basis (Fig. 4c). Fifth pereiopod with ischium with one spine, propodus the longest segment, dactylus with corneous sharp tip and eight smaller teeth on internal surface, arthrobranch and pleurobranch present (Fig. 4d).

First pleopod with exopod setose, endopod devoid of setae, one third the length of exopod (Fig. 4h). Second pleopod with endopod and exopod setose, appendix interna slender more than half the length of endopod (Fig. 4i).

Uropods with external ramus bearing one distolateral movable spine, distal margin broadly rounded, with long plumose setae on distal and internal margins. Internal ramus bearing marginal long plumose setae except on proximal third, distal margin subacute (Fig. 4g).

Etymology.—The specific name is derived from "Acklins", the name of the Bahamian island where the new species was captured.

Key to the species of *Agostocaris*

1. First maxilliped with palp 2-segmented, ischium of fifth pereiopod devoid of spines, outer ramus of uropods devoid of distolateral spines, .. *Agostocaris williamsi*
– First maxilliped with palp unsegmented, ischium of fifth pereiopod with spines, outer ramus of uropods with spines, outer ramus of uropods with distolateral spines 2
2. Ischium of fifth pereiopod with two spines, outer ramus of uropod with two distolateral spines, telson with five pairs of dorsal spines .... *Agostocaris bozanici*

– Ischium of fifth pereiopod with one spine, outer ramus of uropod with one distolateral spine, telson with four pairs of dorsal spines . . *Agostocaris acklinsensis*

Remarks.—Agostocaris acklinsensis can be easily distinguished from the other two known species in the genus by the presence of: exopods on the third and fourth pereiopods, a fifth pereiopod with one spine on the ischium and one distolateral movable spine on the outer ramus of the uropods. Other taxonomically important characters vary among the three species. A second maxilla with a palp devoid of setae and an unsegmented palp of the first maxilliped distinguish *A. acklinsensis* from *A. williamsi,* whereas the number of dorsal spines on the telson, unpigmented eyes and two distolateral spines on the outer ramus of the uropods seprate *A. bozanici* (Table 1).

Noteworthy are the eyes of *Agostocaris,* which are composed of one single plate not differentiated into peduncle and cornea. This plate is projected outside the orbits creating the eye-like structures, which in the three species are pointed distally. Since all the species of *Agostocaris* are cave dwellers it is reasonable to suppose that the cornea was lost and later the peduncle was reduced, in such a way that the "eyes" we see now are part of the basal plate. This singular morphology merits further studies on its ontogeny and functionality.

The placement of the genus *Agostocaris* is a matter of controversy. Holthuis (1993), by synonymizing Agostocarididae with the Bresiliidae, gave more weight to characters that are shared by many taxa in the Caridea (mandible with palp, carpus of second legs undivided, first two pairs of legs chelate, first pair of legs more robust than second one, Williams, 1984) with little resolution among families, than to exceptional autapomorphic characters such as the fused eyes and the particular morphology of the first two pereiopods of *Agostocaris.*

We agree with Martin & Davis' (2001) proposal of recognizing a superfamily Bre-

Table 1.—Comparison of selected characters of the three species of *Agostocaris.*

	A. williamsi	*A. bozanici*	*A. acklinsensis*
Eyes	Weakly pigmented	Without pigment	Weakly pigmented
Second maxilla	Palp with setae	Palp without setae	Palp without setae
First maxilliped	Palp 2-segmented	Palp unsegmented	Palp unsegmented
Third pereiopod	Basis without exopod	Basis without exopod	Basis with finger-like exopod
Fourth pereiopod	Basis without exopod	Basis without exopod	Basis with finger-like exopod
Fifth pereiopod	Ischium devoid of spines	Ischium with two spines	Ischium with one spine
Second pleopod	Appendix interna two thirds length of endopod	Appendix interna less than half length of endopod	Appendix interna less than half length of endopod
Telson	With four pairs of dorsal spines	With five pairs of dorsal spines	With four pairs of dorsal spines
Uropods	Outer ramus without distolateral spines	Outer ramus with two distolateral spines	Outer ramus with one distolateral spine

silioidea, which includes five families, and concur with the opinion that this taxon still represents an artificial grouping. While it is beyond the scope of this paper to discuss the relationships among bresilioids, it is clear that Agostocarididae represents a distinct family that can be easily separated from the other four bresilioid families. The Alvinocarididae Christoffersen, 1986, and Mirocarididae Vereshchaka, 1997, lack exopods on all pereiopods, whereas the Agostocarididae can have exopods on all five pereiopods. The Diascididae Rathbun, 1902, have well developed eyes with peduncle and cornea, a dorsoventrally flattened rostrum and a disc-like dactylus of the first pereiopod, contrasting with the fused eyes, acuminate rostrum and typically shaped dactylus of pereiopod 1 of the Agostocarididae. Finally the Bresiliidae, and the rest of the bresilioid families, can be separated from the Agostocarididae based on the carpus-propodus articulation of the first pereiopod which is normal in the former, being the distal end of the carpus articulated to the proximal end of the propodus; while in the latter the carpus is articulated to an area close to the middle portion of the propodus. In addition, the chela of the second pereiopod in the Agostocarididae is unique in that the digitiform dactylus is longer than the fixed finger and lacks teeth or spines.

Acknowledgments

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