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SEXUAL DIMORPHISM IN SPECIES OF *RANINOIDES* (BRACHYURA: RANINIDAE) AND THE STATUS OF *RANINOIDES SCHMITTI* SAWAYA, 1944

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ABSTRACT The frog crab *Raninoides schmitti* was described from São Paulo, Brazil, as closely related to *R. loevis*. Detailed comparison shows *R. schmitti* to be a junior synonym of *R. loevis*. Absence of information detailing sexual dimorphism of species in the genus *Raninoides* contributed to the designation of a dimorphic male as a discrete taxon. Examples of sexual dimorphism within the genus *Raninoides* are described.

INTRODUCTION

Thirty-five extant species of frog crabs are currently assigned to the family Raninidae which is composed of ten Recent genera. This group appears to be most numerous in the western Pacific where approximately 22 species have been recorded. Nine species in four genera are represented in the western Atlantic. Members of the genus *Raninoides* H. Milne-Edwards, 1837, are the subject of this report.

Reports of sexual dimorphism within frog crabs have been largely confined to that exhibited in the type species, *Ranina ranina* (Linnaeus, 1758). It is well documented (Barnard 1950, Fielding and Haley 1976) that the dimorphism affects the anterolateral spines of the carapace in that taxon. However, until this report other species were not known to show strong sexual dimorphism. Within the genus *Raninoides*, sexual dimorphism is exhibited by the form of the cheliped and in some species the anterior spines of the carapace and the male gonopod.

Material examined — *Raninoides benedicti*: 1 ♂, 47.5 mm, 27 Aug. 1976, Isla Chepillo, Bay of Panama, coll. Gordon Hendler. *Raninoides loevis*: (Florida Department of Natural Resources, Marine Research Laboratory), FSBC I 2649, 9 Mar. 1966, 2 males (35.2–38.1); FSBC I 2648, 3 Mar. 1966, 1 male (39.2); FSBC I 2737, 11 Apr. 1966, 1 male (37.2); FSBC I 19940, 18 June 1966, 1 male (42.3); FSBC I 19963, 25 Oct. 1967, 1 male (42.2); EJ 66-444, 20 Nov. 1966, 1 male (39.1); FSBC I 19955, 14 Mar. 1967, 1 male (36.8); FSBC I 19967, 14 Nov. 1967, 1 male (36.7); EJ 67-113, 12 Apr. 1967, 1 male (39.8); FSBC I 19936, 19 Jan. 1966, 1 male (38.7); FSBC I 19961, 7 Aug. 1967, 4 males (38.0–41.6); FSBC I 19945, 6 Nov. 1966, 1 male (36.7); FSBC I 19948, 6 Jan. 1967, 1 male (42.0). *Raninoides louisianensis*: USL 836 (University of Southwestern Louisiana), 30 Oct. 1975, 1 male (61.2); TAMU 2-0961 (Texas A&M University), 19 Nov. 1968, 1 male (27.2); TAMU 2-1264, 28 Jan. 1971, 2 males (52.6–53.6); TAMU 2-1272, 23 June 1972, 2 males (59.1–61.2); TAMU 2-1269, 5 Feb. 1972, 1 male (49.5); USA 100401 (University of

South Alabama), 28 Aug. 1976, 3 males (49.8–52.3); GCRL 1125 (Gulf Coast Research Laboratory), 2 Apr. 1980, 1 male (57.3). *Raninoides schmitti*: Museu Nacional do Brasil, Nov. 1955, 1 male (45.0).

Remarks — Adult dimorphic males of *R. louisianensis* Rathbun, 1937, *R. loevis* (Latreille, 1825), and the Pacific species *R. benedicti* were examined. In *R. louisianensis*, adult males with a carapace length of over 50 mm often exhibit dimorphism in the shape of the above mentioned features. The chelae and frontal spines are perhaps the most evident of the dimorphic characters (Figure 1A and 1B). The movable finger of the claw in females and young males is very nearly equal in length to the fixed finger. In dimorphic males, however, the movable finger greatly exceeds the length of the fixed finger, sometimes by up to twice the length. The terminal portion of the finger becomes strongly curved, and the small spine at the base of the finger decreases in size. The propodus also increases in size, although the ventral spines of the palm do not. This gives the impression of a decrease in size of the spines of the palm. The second obvious dimorphic character in some species is the development of a sharply curved hepatic spine on the carapace. This feature is not as obvious at the early stages as is the increased finger length; however, a formidably curved spine is the eventual result. A third dimorphic character evident in the males of *R. louisianensis* is the development of the three spines which surround the apex of the first male gonopod. Among larger dimorphic males, these accessory spines become elongated and slightly curved.

Raninoides loevis and *R. benedicti* exhibit dimorphism in the shape of the chela only. No males examined showed evidence of dimorphism in the shape of the frontal spines of the carapace or the apical spines of the gonopods. The single dimorphic male of *R. benedicti* examined closely parallels the situation found in *R. loevis*, its Atlantic cognate. *Raninoides benedicti* closely agrees in the shape of the first gonopod with published accounts (Knight 1968) and no evidence of curvature was found in the frontal spines of the carapace.

Rathbun (1937) recognized seven nominal species of the frog crab genus *Raninoides* H. Milne-Edwards, 1837, from

Figure 1. (A) Cheliped and (B) frontal carapace region of *R. louisianensis*; (C) cheliped and (D) frontal carapace region of *R. loevis*; (E) cheliped and (F) frontal carapace region of *R. benedicti*.

Figure 2. *Raninoides schmitti* (topotype). (A) Frontal carapace region, (B) pleopod 2, (C) pleopod 1 (detail), (D) cheliped, (E) ultimate segments of pereopods 2, (F) 3, (G) 4, and (H) 5.

American waters. A single species, *R. schmitti* Sawaya, 1944, has been described off Brazil since Rathbun's report. Three species assigned to this genus were recently removed or designated synonyms. *Raninoides fossor* H. Milne-Edwards and Bouvier, 1923, is considered by Manning (1975) to be a junior synonym of *Notosceles chimmonis* Bourne, 1922, and not a member of the western Atlantic fauna. *Raninoides nitidus* A. Milne-Edwards, 1880, was shown to be a senior synonym for *Lyreidus bairdii* Smith, 1881, and was removed to *Lyreidus* de Haan, 1841, by Goeke (1980). Characters of diagnostic value used to separate the closely related genera *Notosceles* Bourne, 1922, and *Raninoides* are listed by Goeke (1981) and the eastern Pacific species *Raninoides ecuadorensis* Rathbun, 1935, was transferred to *Notosceles*.

Raninoides schmitti Sawaya, 1944, was described from a single male from the beach of São Sebastião, São Paulo, Brazil. Sawaya (1944:141) states "*R. schmitti* is distinct from *R. loevis* principally by the size of the dactylus in relation to the immobile finger of the cheliped and the not curved lateral spines." Additional specific characters for *R. schmitti* are listed as the two spine-like processes of the sternum between the bases of pereopods 1 and 2, and the "process" opposite the distal spine of the merus of the cheliped. A pronounced asymmetry in the size of the chelipeds is evident from the figures of the holotype and

Sawaya noted this as either a specific character or attributed this to regeneration. The size of the unique holotype was also given as 49 mm, "the biggest hitherto noted in the genus." The only additional record for *R. schmitti* is based on a large male (carapace length of 45 mm) from São Paulo by Gomes Corrêa (1970). That specimen (Figure 2) was collected by Sawaya in November, 1955, from Praia do Segredo, São Sebastião, São Paulo, and was examined by me.

As was detailed previously, sexual dimorphism in the genus *Raninoides* affects the length of the dactylus of the chelipeds. In the taxa examined by this author, the dactylus of pereopod 1 is disproportionately lengthened and in some instances, the dactyl approaches twice the length of the fixed finger. This increase in length of the finger is not a specific character as it has been noted in congeneric species. Other features of the dactylus and propodus are affected as well. The small size of the right chela of the holotype is probably due to regeneration as all known raninids are homoisochelic.

The second character detailed by Sawaya (1944) is the pair of spine-like processes between the bases of pereopods 1 and 2. This feature has been noted by previous workers on other species of *Raninoides* and has been used as evidence for the separation of *Raninoides* from *Notosceles* (Bourne 1922; Serène and Umali 1972; Goeke 1981). This feature is evident in seven species of *Raninoides* that have been examined by me and is of generic value and

not a species specific character.

The "not curved lateral spines" listed by Sawaya (1944) is not a specific feature of value in separating *R. schmitti* from *R. loevis*. Considerable variation in the form of the lateral spines of *R. loevis* has been observed in material from the eastern Gulf of Mexico (Goeke, unpublished data). Gomes Corrêa (1970) illustrated distinctly curved lateral spines in the specimen identified by Sawaya as *R. schmitti* from the type-locality. These spines are now broken and I am not able to observe the degree of curvature.

A "process" of unspecified form is mentioned by Sawaya as opposite the distal spine of the merus of pereopod 1. No process other than a slight swelling at the carpal-meral articulation is indicated or could be located on the specimen examined by this author. This swelling is a normal condition within the group.

A final important consideration is the form of the gonopod of the male. This important taxonomic character is

unique for each of the described species within *Raninoides* with the exception of *R. schmitti*. This feature was not discussed by Sawaya. The illustration of Gomes Corrêa (1970, Figure 35) closely resembles the previously published illustrations of *R. loevis* by Guinot-Dumortier (1960) and Knight (1968). The gonopod of the specimen examined (Figure 2C) agrees very well with those of *R. loevis* from the eastern Gulf of Mexico. Because of the examination of other specimens with small regenerative claws (*R. benedicti* from Panama) and the description of the form of sexual dimorphism found in crabs of the genus *Raninoides*, I consider *Raninoides schmitti* Sawaya, 1944, to be a junior synonym of *Raninoides loevis* (Latreille, 1825).

Four species of *Raninoides* are recognized by the author from American waters; 3 western Atlantic and 1 eastern Pacific. Eight species are now assigned to this genus, with the possibility that an additional species, *Raninoides barnardi* Sakai, 1974, will be transferred to *Notosceles*.

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