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DISTINCTION BETWEEN A GULF OF MEXICO
AND A CAROLINIAN ATLANTIC SPECIES OF
THE SWIMMING CRAB *OVALIPES*
(DECAPODA: PORTUNIDAE)

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In their revision of *Ovalipes* Rathbun, 1898, Stephenson and Rees (1968) distinguished two forms of what they and Williams (1962, 1965) called *Ovalipes guadulpensis* (Saussure, 1858), and Rathbun (1930) called *Ovalipes ocellatus guadulpensis* (Saussure). They found *Form a* in the Carolinian Province off the southeastern United States, *Form b* in the Gulf of Mexico, and gave an analysis of each form with illustrations but felt that more study was needed before two species could be recognized.

Türkay (1971) discovered, from study of type-specimens in collections of the Muséum d'Histoire Naturelle, Geneva, that Saussure's *guadulpensis* does not belong to *Ovalipes*, but to *Macropipus*, and was named for the locality Guadalupe on the island of Graciosa in the Azores. *Macropipus* does not occur in the Western Hemisphere. The next available name for the western Atlantic taxon mistakenly attributed to Saussure, is *Ovalipes ocellatus floridanus* Hay and Shore, 1918, which Türkay continued to recognize as a subspecies.

Reviewing the evidence again, I still regard the spotted *O. ocellatus* (Herbst) of the western North Atlantic as a full species and in addition formally recognize the unspotted, yellow *Ovalipes* *Forms a* and *b* of the Carolinian Atlantic and Gulf of Mexico respectively as separate species. The analysis is based on study of material in collections of the National

Museum of Natural History, Smithsonian Institution (USNM), a considerable part of which was collected by vessels of agencies parent to the present National Marine Fisheries Service (*Albatross, George M. Bowers, Combat, Delaware, Fish Hawk, Oregon, Oregon II, Silver Bay*), as well as collections of the Marine Research Laboratory, Florida Natural Resources Department, St. Petersburg (FSBC), Texas A & M University Oceanographic Collection, College Station (TAMAC), Moody College of Marine Studies, Galveston (MCMS), and University of North Carolina Institute of Marine Sciences (UNC).

Ovalipes floridanus Hay and Shore

Figures 1 *a-d*

Ovalipes ocellatus floridanus Hay and Shore, 1918, p. 427, pl. 32, fig. 8.

Türkay, 1971, p. 139, fig. 3.

Ovalipes ocellatus guadulpensis: Rathbun, 1930, p. 23, pl. 4 (part, the Pensacola, Alabama and Gulf of Mexico specimens).—Hildebrand, 1954, p. 275.

Ovalipes guadulpensis (Form *b*): Stephenson and Rees, 1968, p. 243, pls. 37D, 40F, 41E, 42K; fig. 1K.

Ovalipes guadulpensis: Felder, 1973, p. 54, pl. 8, fig. 2.

Description: As in Stephenson and Rees (1968). Recapitulating their diagnosis in part, the characters are:

Carapace with granulation generally fine but more pronounced anteriorly, lacking narrow tract of slightly enlarged granules in midline.

Chelipeds with dorsal surface of carpus smooth or sparsely granular; dorsal surface of palm between ridges considerably strewn with moderately fine granules except along smooth tract on dorsal aspect of outer ridge; dorsal surface of dactyl between ridges smooth or with sparse fine granules. Outer surface of palm granular, with inconspicuous granular carina; fixed finger granular and pitted. Inner surface of palm with scattered fine granules dorsally and moderately to coarse granules ventrally; dactyl and fixed finger granular.

Merus of third maxilliped with distal projection short, nearly as broad as long, its anterolateral border nearly straight.

Male first pleopod with proximal $\frac{3}{4}$ broad and platelike, its lateral expansion abruptly narrowing distally to slender terminal $\frac{1}{4}$ which tapers through broad arc to slightly recurved, narrowly flared tip; terminal $\frac{1}{4}$ bearing many short, sharp, reflexed spinules.

Measurements in mm: Carapace: holotype ♀ (USNM 47959) cl 31, cb 37; large ♂ (USNM 98153) cl 71.6, cb 88.

Variation: Some individuals show faint development of a narrow tract of slightly enlarged granules in the midline of the carapace as is characteristic of *O. stephensoni*. Many specimens have scattered, dorsal granules

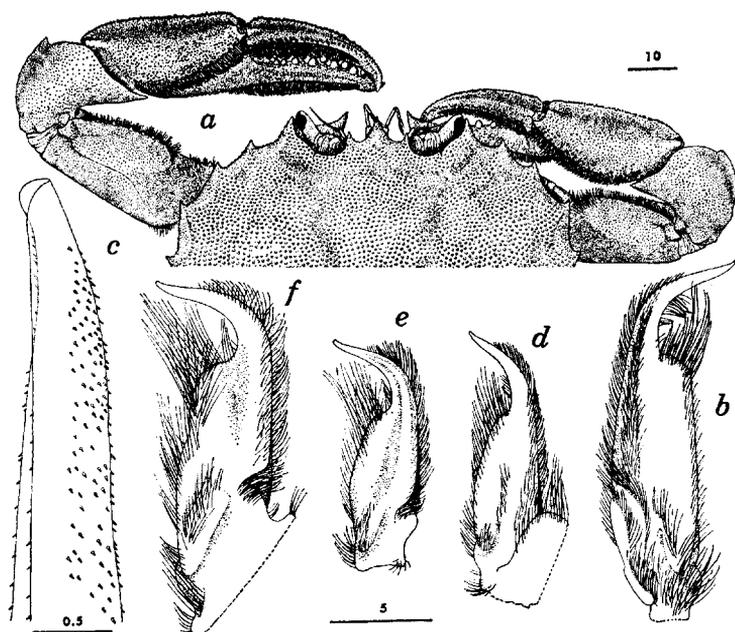


FIG. 1. *a*, *Ovalipes floridanus* Hay and Shore, anterior part of carapace and chelipeds, male in dorsal view, USNM 98153, NW Fla. Male first pleopods in ventral view: *O. floridanus*; *b*, Large adult, left, USNM 101427, NW Fla.; *c*, Tip magnified, same specimen; *d*, Young adult, right, FSBC EJ-65-34, NW Fla. *O. stephensoni*, n. sp.; *e*, Young adult, right, USNM 136890, Ga. *f*, Large adult, right, USNM 155124, NE Fla. Scales: *a* = 10 mm; *b*, *d*, *e*, *f* = 5 mm; *c* = 0.5 mm.

on the palm that are slightly larger, somewhat smoother and more elevated than the majority of granules, and (in preserved specimens) often each colored by a light orange basal ring that not only surrounds the granule but imparts an orange color to it. A few crabs have these granules on the carpus as well.

Type-locality: Pensacola, Florida.

Distribution: Gulf of Mexico from southwest Florida, 13.7 km WSW Gordon Pass Sea Buoy, 26°03.1'N, 81°57.7'W, to off Port Aransas, Texas; surface to 31 m, once near surface over depth of 1692 m.

Type-series: The holotype ♀ (47959) and paratypes, 10 ♂, 9 ♀ (17915), are in the crustacean collection of the USNM.

Material: 76 specimens. USNM, 14 lots (21 ♂, 13 ♀, 2 juvs., 2 unsexed); TAMOC, 5 lots (4 ♂, 1 ♀); MCMS, 1 lot (1 ♂); FSBC, 15 lots (6 ♂, 3 ♀, 13 juvs.).

Remarks: From collections for which months are recorded (J2, F3, M4, A1, M3, J5, J6, A0, S1, O1, N1, D2), ovigerous females are known only in February from Florida.

Ovalipes stephensoni, new species

Figures 1e,f, 2

Platyonichus ocellatus (var.): Smith, 1887, p. 632.

Ovalipes ocellatus guadulpensis: Rathbun, 1930, p. 23 (part, the North Carolina and Georgia specimens).

Ovalipes guadulpensis: Williams, 1962, pp. 39–41.—1965, p. 161.

Ovalipes guadulpensis (Form a): Stephenson and Rees, 1968, p. 243, pls. 37C, 40E, 41D, 42J; figs. 1J, 2I, 3I, 4I.

Description: As in Stephenson and Rees (1968). Recapitulating their diagnosis in part, the characters are:

Carapace with relatively coarse granulation behind frontal margin and inside anterolateral borders, median elongate tract of slightly but variably enlarged granules extending from mesogastric to anterior cardiac region.

Chelipeds with dorsal surface of carpus finely and densely granular; dorsal surface of palm between ridges densely granular, mostly fine, but often with scattered enlarged granules; dorsal surface of dactyl between ridges very finely and densely granular. Outer surface of palm finely to obsolescently granular, fixed finger becoming smooth or microscopically pitted. Inner surface of palm similar to outer surface or smooth and microscopically granular ventrally, but becoming granular in very large males; dactyl smooth or microscopically pitted, fixed finger partly granular.

Merus of third maxilliped with distal projection relatively long and narrow, its anterolateral border straight or very slightly curved.

Male first pleopod with proximal $\frac{3}{4}$ platelike, its lateral expansion narrowing distally to slender terminal $\frac{1}{4}$ which tapers through broadly diverging arc to slightly recurved, narrowly flared tip; terminal $\frac{1}{4}$ bearing many short, sharp, reflexed spinules.

Measurements in mm: Carapace: holotype ♂, USNM 155110, cl 65, cb 76; ovigerous ♀ paratype, USNM 99723, cl 50, cb 61; mature ♀ paratype, USNM 152583, cl 63, cb 78.

Variation: Juvenile specimens do not have well developed granules along the tract just inside the dorsal outer ridge of the palm, but granulation on the ridge and remaining upper surface is coarser than in *O. floridanus* of comparable size. (The right first walking leg and dactyl of left third walking leg are missing from the holotype.)

Color: The color described by Williams (1962; 1965) was from specimens taken off North Carolina.

Type-locality: South of Beaufort Inlet, North Carolina, 31°11'N, 76°42'W, 35m, *Silver Bay* 2945.

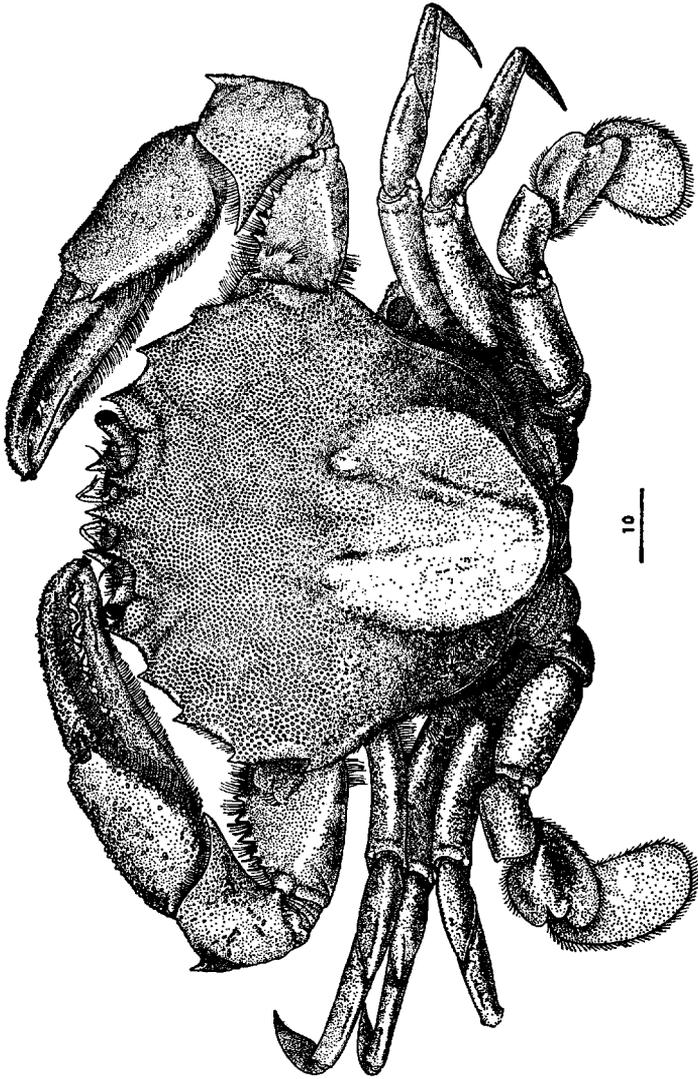


FIG. 2. *Ovalipes stephensoni*, new species, male holotype in dorsal view. Scale = 10 mm.

Distribution: Off Accomack Co., Virginia, 37°31'N (Musick and McEachran, 1972) to near Biscayne Bay, Florida (Park, 1969); surface to 183 m.

Disposition of types: The holotypes ♂ (155110), and paratypes, 1 ♂, 1 ♀ (152583), 4 ♂, 6 ♀ (3 ov.) (99723) are placed in the USNM.

The following as paratypes have been transferred to other museums: USNM 155112, 1 ♀, Muséum d'Histoire Naturelle, Genève; USNM 155111, 1 ♂, Museum of Comparative Zoology, Harvard University; USNM 155113, 1 ♂, 1 ♀, 15 juvs., Rijksmuseum van Natuurlijke Historie, Leiden.

Material: 156 specimens. USNM, 33 lots (28 ♂, 20 ♀, 75+ juvs.); FSBC, 1 lot (1 ♂); UNC, 13 lots (10 ♂, 7 ♀, 15+ juvs.).

Remarks: From collections for which months are recorded (J6, F5, M3, A2, M7, J2, J4, A2, S3, O3, N3, D5), ovigerous females are known only in December and January in North Carolina, and Florida in March.

DISCUSSION

The Carolinian Atlantic species *O. stephensoni*, can be separated from the Gulf of Mexico species, *O. floridanus*, easily because the anterior part of its carapace and particularly its chelipeds are much more granular than in the Gulf species (Fig. 1a and Fig. 2). These differences may be another expression of the marked tendency in *Ovalipes* for development of stridulatory surfaces (Stephenson and Rees, 1968; Stephenson, 1969).

The type-series of *O. floridanus* consists of a young female holotype and several similar sized paratypes. Granular patterns on the carapace and chelipeds and shape of the distal projection on the merus of the third maxillipeds fit Stephenson and Rees's (1968) description well, but characters on inner and outer surfaces of the fingers seem less distinctive than they indicated, both on specimens in the type-series and on other specimens studied. The smooth dorsal areas on carpus, palm and dactyl of the chelipeds are especially well developed in large specimens, iridescence being pronounced there as well as on anterior parts of the carapace and in the semicircular spots between the anterolateral teeth.

The illustrations in Rathbun (1930) refer to *O. floridanus*. The dorsal view of the holotype (Plate 4, fig. 1 USNM 47959) is unquestionable, but the ventral view of an immature female labelled USNM 17959 (Plate 4, fig. 2) presents a slight problem in that the latter number refers to a *Macrocoeloma* in the crustacean catalogue. It is almost certain that the number cited (17959) should have been 47959, for the holotype in ventral view has the same angular displacement of antennules and slight discoloration on sternites 1-4 (yellowed) as the specimen in Plate 4, fig. 2. More remote is the possibility that the --- 59 of the holotype was substituted for --- 15 of one of the paratypes.

Comparison of first male pleopods in the two species does not confirm distinctions noted by Stephenson and Rees (1968) which are possibly attributable to individual variation. In both species, the tract of plumose hairs extending along the sternomesial (inner) surface terminates beyond, often well beyond the region of greatest curvature. In both, the sternolateral (outer) surface, indeed the whole divergent distal part of the appendage, is armed with tiny, sharp, reflexed spinules. The chief difference between first male pleopods of the two species lies in the narrowing of the proximal expanded part into the slender, divergent tip. Shape of the proximal part changes in both species, the distal narrowing being gradual in the young (Figs. 1*d* and 1*e*) but increasingly abrupt with age (Figs. 1*b* and 1*f*). However, the abruptness is more pronounced in *floridanus* (Figs. 1*b*, 1*d*) than in *stephensoni*, (Figs. 1*e*, 1*f*) with tendency toward formation of a shoulder at the region of narrowing in the former.

The distal projection of the merus of the third maxilliped is comparable in the two species, the difference described by Stephenson and Rees (1968) representing an average condition subject to variation.

Distribution of these closely related swimming crabs in two discrete populations confined to the Gulf of Mexico and warm temperate Atlantic parallels that of many species of decapod crustaceans from the Carolinian Province that are not found in southern Florida (Hedgpeth, 1953). In most such cases, as in the closely related *Ovalipes ocellatus* which has a known distribution reaching from Prince Edward Island, Canada, to Georgia, and along the northern Gulf of Mexico from Mississippi to Texas, no differences between the two populations have been detected. But differences have been documented in a few, such as *Neopanope sayi* and *N. texana* (Abele, 1972), *Uca pugnax pugnax* and *U. p. longisignalis* (Crane, 1975), and among fishes in certain seabasses of the genus *Centropristes* (Miller, 1959) and the butterflyfishes *Poronotus triacanthus* and *P. burti* (Collette, 1963). Distributions such as these indicate that the region of southern Florida acts as a selective barrier to dispersal or genetic continuity, although it would seem that drift of larvae if not occasional adults around the southern tip of Florida might maintain continuity between the populations. Length of larval life of *O. ocellatus*, fairly representative of crabs in temperate waters, seems long enough to accomplish this. Under experimental conditions larvae developed from hatching to first crab stage in 26.1 to 27 days at 20°C and approximately 18 days at 25°C (Costlow and Bookhout, 1966). However, temperature or some other factor in southern Florida waters may prove inimical to survival of either these larvae or larvae of other *Ovalipes* species in the area which might have similar tolerances. Even if such larvae could survive, water circulation in the region may not favor movement eastward around southern Florida. Results of extensive study of the dispersal of penaeid shrimp larvae on the Tortugas fishing grounds and adjacent region (Rehrer, Jones and Roessler, 1967; Munro, Jones, and Dimitriou, 1968; Jones, Dimitriou, Ewald, and Tweedy, 1970) indi-

cate that decapod crustacean larvae there would either be entrained in a clockwise gyre or meander through channels between the Florida Keys into Florida Bay and toward the mainland, but not be carried eastward around the tip of the peninsula. Thus, a combination of conditions in southern Florida seems to divide *Ovalipes* populations in the Carolinian Province.

NOMENCLATRURAL NOTE

Cancer Ciri Apoa, seu Aratti Pinima, Brasiliensis Seba, 1759, p. 44, pl. 18, fig. 9 attributed to Saussure's *guadulpensis* by both Rathbun (1930) and Stephenson and Rees (1968), as well as Williams (1965) and Coelho and Ramos (1972), has been mistakenly associated with *Ovalipes*. Both Seba's figure and his notation, "Color of all parts light shining yellow" (translation), gave credence to this association, but there is no evidence of a continuous distribution of any North American *Ovalipes* species far into the Caribbean Sea or tropical west Atlantic Ocean. Holthuis and Sivertsen (1967) and Holthuis (personal communication) point out that the specimen represented in Seba's figure belongs to the European species *Macropipus holsatus* (Fabricius, 1798); therefore this old record off Brazil should be disregarded. Dates of Seba's work are given by Holthuis (1969).

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LITERATURE CITED

- ABELE, L. G. 1972. A reevaluation of the *Neopanope texana-sayi* complex with notes on *N. packardii* (Crustacea: Decapoda: Xanthidae) in the northwestern Atlantic. *Chesapeake Science* 13(4): 263-271.
- COELHO, P. A., AND M. A. RAMOS. 1972. A constituição e a distribuição da fauna de decápodos do litoral leste da América do Sul entre as latitudes de 5°N e 39°S. *Trabalhos do Instituto Oceanográfico da Universidade Pernambuco, Recife* 13:133-236.
- COLLETTE, B. B. 1963. The systematic status of the Gulf of Mexico butterflyfish *Poronotus burti* (Fowler). *Copeia*, No. 3:582-583.
- COSTLOW, J. D., JR., AND C. G. BOOKHOUT. 1966. The laval development of *Ovalipes ocellatus* (Herbst) under laboratory conditions. *Journal of the Elisha Mitchell Scientific Society* 82(2): 160-171.

- CRANE, J. 1975. Fiddler crabs of the world. Ocypodidae: genus *Uca*. Princeton University Press, Princeton, New Jersey, pp. i-xxiv, 1-736.
- FELDER, D. L. 1973. An annotated key to crabs and lobsters (Decapoda, Reptantia) from coastal waters of the northwestern Gulf of Mexico. Center for Wetland Resources, Louisiana State University, Publication No. LSU-SG-73-02, pp. vii + 1-103.
- HAY, W. P., AND C. A. SHORE. 1918. The decapod crustaceans of Beaufort N. C., and the surrounding region. Bulletin of the United States Bureau of Fisheries 35 (for 1915 and 1916): 369-475, pls. 25-39.
- HEDGPETH, J. W. 1953. An introduction to the zoogeography of the northwestern Gulf of Mexico with reference to the invertebrate fauna. Publications of the Institute of Marine Science, University of Texas 3(1):107-224.
- HILDEBRAND, H. H. 1954. A study of the fauna of the brown shrimp (*Penaeus aztecus* Ives) grounds in the western Gulf of Mexico. Publications of the Institute of Marine Science, University of Texas 3(2):233-366.
- HOLTHUIS, L. B. 1969. Albertus Seba's "Locupletissimi rerum naturalium thesauri ..." (1734-1765) and the "Planches de Seba" (1827-1831). Zoologische Mededelingen 43(19):239-252, pls. 1-3.
- , AND E. SIVERTSEN. 1967. The Crustacea Decapoda, Mysidacea and Cirripedia of the Tristan da Cunha Archipelago with a revision of the "Frontalis" subgroup of the genus *Jasus*. Results of the Norwegian Scientific Expedition to Tristan da Cunha 1937-1938, No. 52:1-50, 5 pls.
- JONES, A. C., D. E. DIMITRIOU, J. J. EWALD, AND J. H. TWEEDY. 1970. Distribution of early developmental stages of pink shrimp, *Penaeus duorarum*, in Florida waters. Bulletin of Marine Science 20(3):634-661.
- MILLER, R. J. 1959. A review of the seabasses of the genus *Centropristes* (*Serranidae*). Tulane Studies in Zoology 7(2):33-68.
- MUNRO, J. L., A. C. JONES, AND C. DIMITRIOU. 1968. Abundance and distribution of the larvae of the pink shrimp (*Penaeus duorarum*) on the Tortugas shelf of Florida, August 1962-October 1964. Fishery Bulletin, United States Fish and Wildlife Service 67(1):165-181.
- MUSICK, J. A., AND J. D. MCEACHRAN. 1972. Autumn and winter occurrence of decapod crustaceans in Chesapeake Bight, U.S.A. Crustaceana 22(2):190-200.
- PARK, J. R. 1969. A preliminary study of portunid crabs in Biscayne Bay. Quarterly Journal of the Florida Academy of Sciences 32(1):12-20.
- RATHBUN, M. J. 1930. The cancrivora crabs of America of the families Euryalidae, Portunidae, Atelecyclidae, Cancridae and Xanthi-

- dae. United States National Museum Bulletin 152: i-xvi, 1-609.
- REHRER, R., A. C. JONES, AND M. A. ROESSLER. 1967. Bottom water drift on the Tortugas grounds. *Bulletin of Marine Science* 17(3):562-575.
- SAUSSURE, H. DE. 1858. Mémoire sur divers crustacés nouveaux du Mexique et des Antilles. *Memoires Societe Physique et d'histoire Naturelle de Genève* 14(2):417-496, 6 pls.
- SEBA, A. 1759. *Locupletissimi rerum naturalium thesauri accurata descriptio et iconibus artificiosissimis expressio per universam physices historiam*, Vol. 3, 22 pp., pp. 1-212, pls. 1-116.
- SMITH, S. I. 1887. Report on the decapod Crustacea of the Albatross dredgings off the east coast of the United States during the summer and autumn of 1884. United States Commission of Fish and Fisheries, pt. 8, Report of the Commissioner for 1885, No. 21:605-705, 22 pls.
- STEPHENSON, W. 1969. The morphology of stridulatory structures in the genus *Ovalipes* Rathbun. *Transactions of the Royal Society of New Zealand, Biological Sciences* 11(4):43-71.
- , AND M. REES. 1968. A revision of the genus *Ovalipes* Rathbun, 1898 (Crustacea, Decapoda, Portunidae). *Records of the Australian Museum, Sydney* 27(11):213-261.
- TÜRKAY, M. 1971. Die *Portunidae* des Naturhistorischen Museums Genf, mit einem Anhang Über die Typen von *Ovalipes ocellatus floridanus* Hay and Shore 1918 (Crustacea, Decapoda). *Archives des Sciences (Genève)* 24(1):111-143.
- WILLIAMS, A. B. 1962. A re-examination of *Ovalipes* species in the Carolinas (Decapoda, Portunidae). *Crustaceana* 4(1):39-41.
- . 1965. Marine decapod crustaceans of the Carolinas. *Fishery Bulletin of the United States Fish and Wildlife Service* 65(1): i-xi, 1-298.