

Banner, D. M. 1972  
Banner, A. H.

CONTRIBUTIONS TO THE KNOWLEDGE OF THE ALPHEID SHRIMP  
OF THE PACIFIC OCEAN

XV. The relationship of *Synalpheus neptunus* (Dana, 1852) to *Synalpheus theano* De Man, 1911, and the establishment of a neotype for *Synalpheus neptunus* (Decapoda, Alpheidae)

BY

D. M. BANNER and A. H. BANNER

Hawaii Institute of Marine Biology, University of Hawaii, Honolulu, Hawaii, U.S.A.

*Reprinted from:* CRUSTACEANA, Vol. 23, Part 1, 1972



LEIDEN  
E. J. BRILL

UNIVERSITY OF HAWAII  
ZOOLOGY  
Crustacea



## CONTRIBUTIONS TO THE KNOWLEDGE OF THE ALPHEID SHRIMP OF THE PACIFIC OCEAN

XV. The relationship of *Synalpheus neptunus* (Dana, 1852) to *Synalpheus theano* De Man, 1911, and the establishment of a neotype for *Synalpheus neptunus* (Decapoda, Alpheidae) <sup>1)</sup>

BY

D. M. BANNER and A. H. BANNER

Hawaii Institute of Marine Biology, University of Hawaii, Honolulu, Hawaii, U.S.A.

### INTRODUCTION

Considerable confusion has occurred in the literature because of the incomplete descriptions of *Synalpheus neptunus* (Dana, 1852) and *S. theano* De Man, 1911 which did not allow for their normally occurring variation. The type specimen of *S. neptunus* has been lost. In our present collection we have 243 specimens from the southernmost Philippines, including the Sulu ("Sooloo") Sea, from where *S. neptunus* was described, and 68 specimens from various parts of Australia. We have also reexamined De Man's type specimen of *S. theano* which came from "between Misool and New Guinea". We have decided to use this collection and the reexamination of De Man's type to establish the identity of the two species, to record their normal variation on points previously considered of systematic importance, and to establish the true identity of *S. neptunus* by the description of a neotype from Dana's type location.

In 1852 Dana described as *Alpheus neptunus* a specimen of "8-9 lines" (19 mm) from the Sulu Sea. In 1909 Coutière redescribed and figured what he called "typical male examples from the Sulu Sea" as *S. neptunus*. His specimens have also been lost, but they were considerably smaller than that of Dana, for they had a carapace length of 3 mm giving a probable total body length of 8 mm.

In 1911 De Man described what he termed a closely related species under the name of *S. theano*. De Man had one specimen, 10.5 mm long. He did not state the sex, but he noted it was without eggs. As differentiating characters he used the lateral spine of the basicerite in relation to the antennular article, the longer fingers of the small chela, and the shorter terminal spine of the scaphocerite, stating further that they could be separated "no doubt, also by other differences" (De Man, 1911: 294). We have compared the two species on these three characteristics as well as other characteristics which are often used for taxonomic separations; we have found none of them reliable for their differentiation. However,

---

<sup>1)</sup> Contribution number 382 Hawaii Institute of Marine Biology.

we have discovered that in one characteristic the two species can be easily separated. In *S. neptunus*, as redescribed from the neotype below, the apex of the distal article of the endopod of the third maxilliped bears a circlet of heavy spinules. The corresponding article of *S. theano* bears a "brush" consisting of many fine setae. This character was not described by De Man, but was ascertained upon the re-examination of the type. The contrast in the condition is best understood by comparing figures 3E and 3F.

Dana did state "The outer maxilliped has the last joint short pubescent with short hairs at apex." This description, unsupported by figures, can be variously interpreted, but it seems that he is differentiating between the setae on the inner face and some heavier "hairs" at the tip. As all of our 243 specimens from the Sulu Sea and adjacent waters had the spinules we describe, not setae, we believe Dana was describing the condition we found.

We have carefully examined all the specimens in the collection and selected 29 specimens of *S. neptunus* from the Philippines, 32 of *S. neptunus* from Australia and 15 specimens of *S. theano*, also from Australia, for detailed measurement and analysis of the supposed points of difference. Our largest measured specimen of *S. neptunus* from Australia was 26 mm long; the largest measured specimen of *S. theano* (also from Australia) was 16 mm long. In the following comparisons, we have taken the proportions from text or figures from the original descriptions of the three authors and compared them with our range of variation.

1. Length of lateral spine of scaphocerite in relation to antennular articles. — Dana figures the lateral spine as reaching slightly past the end of the antennular peduncle. Coutière states the lateral spine "does not reach the middle of the third antennular article". De Man states that in *S. theano* the lateral spine "reaches to the distal third of the third antennular article." In our specimens of *S. neptunus* the lateral spine varies from reaching the end of the second antennular article to three-fourths the length of the third article. In *S. theano* it varies from one-half the third antennular article to the end of the third article. We have not seen a specimen with the lateral spine of the scaphocerite as long as that shown by Dana.

2. Squamous portion of the scaphocerite in relation to antennular peduncle. — Dana shows that in his specimens the squame reaches to the middle of the third antennular article. In Coutière's specimens the squame does not reach the middle of the second antennular article (judging from the plate). In De Man's species the squame "reaches to the fourth distal part of the median antennular article." In our specimens of *S. neptunus* the squame was most variable. In a collection of 20 specimens from one locality near Thursday Island in the Torres Straits we found specimens in which the squamous portion of the scaphocerite varies from vestigial to reaching the end of the second antennular article. A few specimens from both Australia and the Philippines have the squame entirely lacking. In *S. theano* the squame reaches from three-fourths the length to the end of the second antennular article.

3. The stylocerite in relation to the first antennular article. — In *S. neptunus* Dana states the stylocerite is “a little longer than the first joint.” In Coutière’s specimens the stylocerite is “shorter than the basal antennular article.” In *S. theano* the stylocerite is “a little shorter than the basal antennular article.” In our specimens of *S. neptunus* the stylocerite varies from reaching three-fourths the length of the first antennular article to a little past its end. In *S. theano* we find the same variation.

4. The inferior spine of the basicerite. — Dana states for his specimen “Basal spine of inner antennae [stylocerite] a little longer than the first joint and extending about as far forward as the apex of the spine of outer antennae [inferior spine of basicerite]. . . .” In Coutière’s specimens the inferior spine reaches “the proximal third of the median antennular article.” In *S. theano* the inferior spine of the basicerite is “very large, extending to the distal extremity of the second antennular article.” In our specimens of *S. neptunus* the lateral spine of the basicerite varies from reaching the end of the first antennular article to three-fourths the length of the second. In our specimens of *S. theano* it varies from reaching one-half the length of the second article to its end.

5. Ratio of fingers of small chela to palm. — In Dana’s specimens the fingers are only a little shorter than the palm (judging from the plate), in Coutière’s specimens the fingers are “almost as long as the palm” and in *S. theano* the fingers are 0.8 as long as the palm (judging from the plate). The variation in our specimens of both species encompasses this range.

6. Ratio of the carpus to the chela of the small cheliped. — Dana depicts his specimens with the carpus 0.25 the length of the chela. In *S. neptunus* Coutière also figures the carpus 0.25 of the chela. We measured the type of *S. theano* and found the carpus to be 0.30 the length of the chela. The carpus of the small chela in our specimens of *S. neptunus* varies from 0.20 to 0.50 the length of the chela. In our specimens of *S. theano* the ratio varies from 0.27 to 0.33. We contrasted the total length of both species with the ratio of the carpus of the chela (fig. 1) and found the length of the carpus to be roughly correlated with the size of the specimen.

7. Ratio of the articles of the second leg. — We have followed the system of ratios used by Coutière in his discussion of *S. neptunus* to compare the carpal articles and chelae of the second leg, the formula being: (a) the length of the first article: (b) the combined lengths of the four following articles: (c) the length of the chela. To standardize we have assigned the length of the first article to the value of 10.

*S. neptunus* (Dana) 10:15:10 (taken from the plate)

*S. neptunus* sensu Coutière 10:20:20

*S. theano* De Man 10:14:10

In our specimens of *S. neptunus* this ratio varies from 10:11:0.9 to 10:20:20;

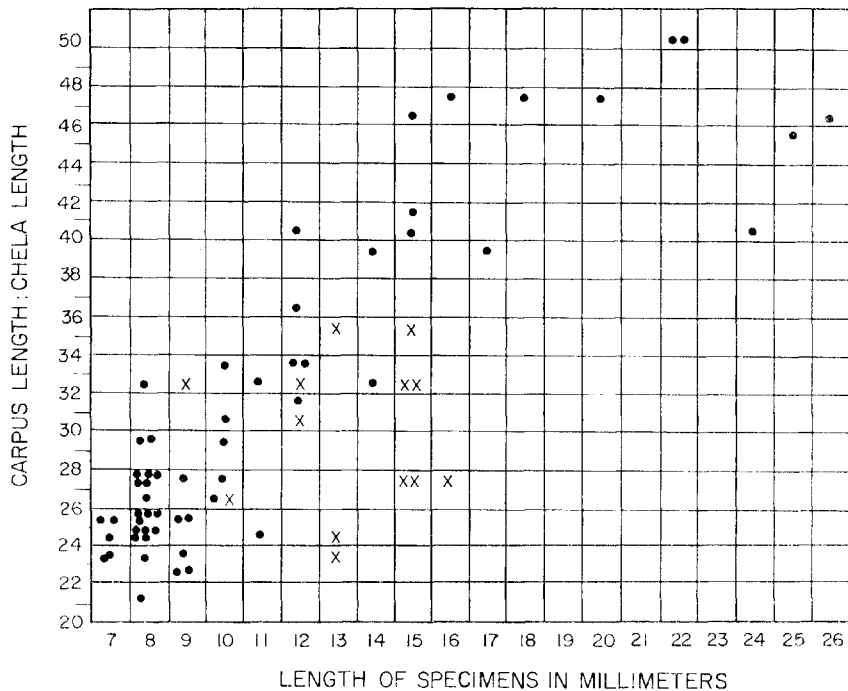


Fig. 1. Comparison of length of carpus of small chela to total length of chela. Circles represent individual specimens of *Synalpheus neptunus* (Dana). Crosses represent individual specimens of *Synalpheus theano* De Man.

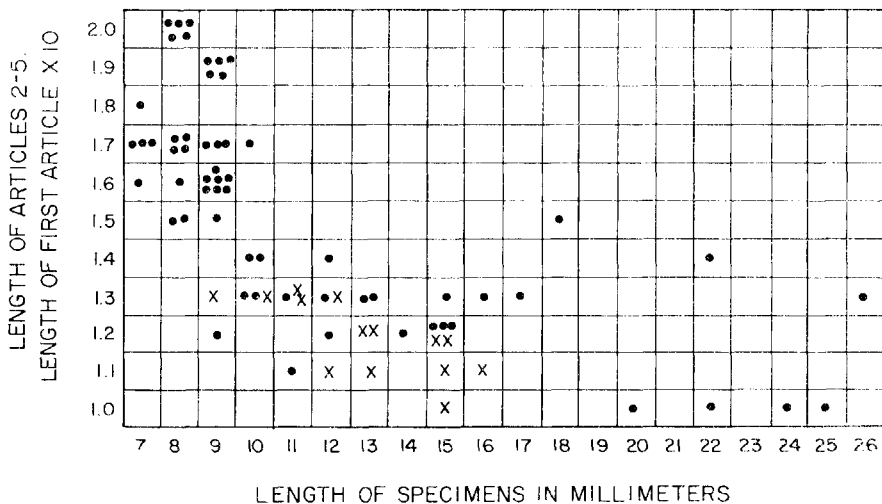


Fig. 2. Comparison of relative lengths of carpal articles of second legs to total length of specimens. Circles represent individual specimens of *Synalpheus neptunus* Dana. Crosses represent individual specimens of *Synalpheus theano* De Man.

in our specimens of *S. theano* from 10:11:10 - 10:13:13. We have found this variation in ratio to be linked with size in both species; it appears to be an example of disharmonious growth (fig. 2). As a specimen grows the first carpal article increases in length more rapidly than do the four following.

It is true that in some of these characters we have found a bimodal curve, but in none have we found a clear cut separation except in the spinules as opposed to setae at the apex of the distal article of the third maxilliped.

### *Synalpheus neptunus* (Dana, 1852) <sup>2)</sup>

*Alpheus neptunus* Dana, 1852: 553, pl. 35 fig. 5.

*Alpheus minor neptunus* Miers, 1884: 288, 562 [*S. neptunus*].

*Alpheus minor neptunus* De Man, 1888: 272 [*S. ucomeris* De Man].

*Synalpheus neptunus* Coutière, 1909: 87, fig. 53; De Man, 1911: 291, pl. 13 fig. 60; Verrill, 1922: 121, pl. 25 fig. 2.

Nec *Alpheus neptunus* Bate, 1888: 563, pl. 101 fig. 2. [*S. ucomeris* De Man].

Nec *Synalpheus neptunus* Coutière, 1899. [*S. spinifrons* (H. Milne-Edwards) according to Holt-huis 1952: 36].

Nec *Synalpheus neptunus* Rathbun, 1902: 110.

*Synalpheus theano* Banner & Banner, 1966: 69, fig. 24. [Nec De Man].

**Neotype.** -- 12 mm female from Tictabon Island, near Zamboanga, Philippines (Sulu Sea). Collected from scattered coral heads in water from 4 to 20 feet deep.

**Additional material.** -- One male, 10 mm, from same location, as neotype. Four males and 1 female, 8-12 mm, from scattered coral heads in 10 feet of water off Big Santa Cruz Island, near Zamboanga, Philippines.

**Diagnosis.** --- Rostrum with rounded tip reaching well past middle of visible part of first antennular article; orbital teeth slightly shorter and broader at base. First two antennular articles subequal, third a little shorter than second. Second antennular article a little longer than broad. Stylocerite almost as long as first antennular article. Lateral spine of scaphocerite reaching a little beyond end of second antennular article. Squamous portion reduced, reaching to first quarter of second antennular article. Carpocerite longer than antennular peduncles, approximately 5.0 times as long as wide.

Distal article of third maxilliped 4.5 times as long as broad and 0.7 as long as first article. Apex of distal article beset with a circlet of 6-7 short heavy spines. Inner face beset with a series of 9 marked ridges, each bearing a row of short stiff setae, outer face without setae. Median article 0.3 as long as proximal, disto-inferior and distosuperior margins bearing setae. Proximal article 4 times as long as broad at its widest point, inferior and superior margins beset with many heavy setae. Exopod slender, slightly longer than proximal article, and bearing on its tip a brush of long setae.

Large chela 2.7 times as long as wide, with fingers occupying distal 0.3. Palm terminated above dactylar articulation in a subacute tooth. Merus 2.5 times as long as broad with only a blunt prominence on the distal end of the inferointernal and inferoexternal margins. Small chela 2.4 times as long as wide with fingers and

<sup>2)</sup> In synonymy, only references with descriptions and known synonyms are listed; omitted are references giving only localities.

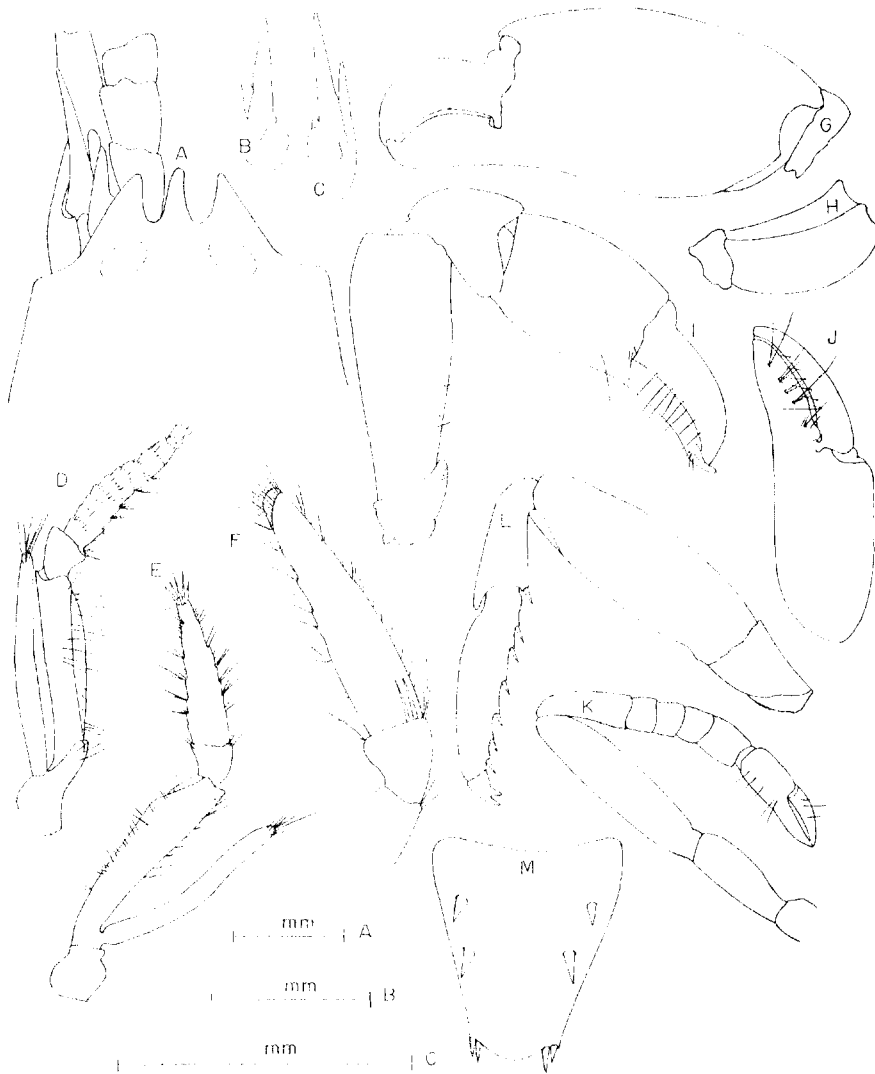


Fig. 3. *Synalpheus neptunus* (Dana), neotype. A, anterior region, dorsal aspect; B, C, scaphocerites of 2 paratypes; D, inner face of third maxilliped of paratype; E, outer face of third maxilliped of paratype; F, distal end of third maxilliped of specimen of *S. theano* De Man; G, H, large chela, outer face and merus; I, small cheliped, outer face; J, small chela, inner face; K, second leg; L, third leg; M, telson.

A, G, H: scale A. B, C, D, E, I, J, K, L, M: scale B. F: scale C.

palm almost equal. Dactylus broadened laterally, opposing surfaces of dactylus spatulate, lateral margin of outer face of dactylus armed with 7-9 regularly placed setae. Lateral margins of dactylus on inner face also armed with setae and crossing similar setae on the fixed finger in a regular fashion. Setae directed distally. Carpus cup-shaped, 0.38 as long as chela.



Second leg with first carpal article slightly shorter than sum of 4 following. Chela almost as long as the sum of the last 4 articles.

Merus of third leg 3 times as long as broad, inermis. Carpus 0.4 as long as merus, distoinferior margin armed with a solitary spinule, distosuperior margin extended into a rounded tooth. Propodus 0.7 as long as merus, inferior margin armed with 6-9 spinules. Dactylus biunguiculate, two unguis equal in length, but inferior unguis slightly thicker at base.

Telson 2.3 times as long as broad, posterolateral margins forming right angles; posterior margin slightly convex. Spines on upper surface prominent.

The neotype has been deposited in the U. S. National Museum cat. no. 135645. An additional series will be deposited at the Bernice P. Bishop Museum, Honolulu, Hawaii.

Discussion. --- We reexamined our specimens from Thailand described as *S. theano* (1966: 72) and found they do have spines on the distal end of the third maxilliped, thus they are *S. neptunus*. We also examined at the British Museum the specimen from the Challenger Expedition that Bate (1888: 563, pl. 101 fig. 2) called *S. neptunus* and found it to be *S. neomeris* (De Man). The specimens from Bermuda and Porto Rico discussed by Rathbun (1902: 110) are lost; however from her description of these specimens we feel certain that they could not have been *S. neptunus*. She described the dactyls of the third to fifth thoracic legs as triunguiculate, the fingers of the large chela longer in relation to the palm, and, in one specimen, the squame reaching to the end of the antennular peduncle; none of these characteristics are found in the Pacific specimens. Indeed, Dr. F. A. Chace found two specimens from Bermuda originally called *S. neptunus* by Rathbun (although it is not certain that these are the same specimens as Rathbun reported); in the bottle was a note in her handwriting revising the identification of the smaller specimen to *S. minus* (Say). Dr. Chace has identified the two specimens, the larger as *S. hemphilli* Coutière, and the second as *S. minus*. Verrill (1922: 121) based his remarks on descriptions he had read, and the specimens reported upon were those of Miss Rathbun. Miers' specimens, obtained at Thursday Island, Port Jackson and the western Indian Ocean, are undoubtedly *S. neptunus*.

Biological Notes. --- This species is commonly found in sponges. It has been collected from broken up coral heads and has been dredged from 70 meters (De Man).

Distribution. --- Our specimens from the Philippines ranged from central Mindanao to Zamboanga and Jolo in the Sulu Sea. Our Malaysian specimens came from Singapore. In our collections we have specimens from central Western Australia, and ranging on the Barrier Reef from Thursday Island to Central Queensland. Many of the earlier records cannot be relied upon because of the confusion of this species with many closely related species. In addition to the confusion between *S. neptunus* and *S. theano*, other authors appear to have confused it with *S. minus*, but *S. minus* lacks the broadened dactylus of the small chela.

## ACKNOWLEDGEMENTS

We wish to thank Dr. L. B. Holthuis of the Rijksmuseum van Natuurlijke Historie in Leiden who read an early draft of this paper and gave us valuable advice and Dr. F. A. Chace of the United States National Museum for his help in examining specimens. The Zoölogisch Museum of Amsterdam graciously loaned the type specimen of *S. theano*. Some of the Australian specimens were loaned by the Australian Museum and the Western Australian Museum.

The work in this paper was accomplished in part under National Science Foundation Grants GB6386 and GB25020 for the study of the alpheid shrimp of Australia.

## RÉSUMÉ

Une étude est présentée ici sur la parenté entre *Synalpheus neptunus* (Dana) et *S. theano* de Man, basée en grande partie sur des spécimens de la mer Sulu et de l'Australie, avec une revue des descriptions déjà publiées; les deux espèces sont considérées comme valides. Un néotype pour *S. neptunus* est décrit de la mer de Sulu, localité-type de Dana.

## REFERENCES

- BANNER, ALBERT H. & DORA M. BANNER, 1966. The alpheid shrimp of Thailand. Siam Soc. Monogr. Ser., **3**: 1-168, figs. 1-62.
- BATE, C. SPENCE, 1888. Report on the Crustacea Macrura dredged by H. M. S. Challenger during the years 1873-76. Challenger Rep., (Zool.) **24**: i-xc, 1942, pls. 1-157.
- COUÛTÈRE, HENRI, 1899. Les Alpheidae, morphologie externe et interne, formes larvaires, bionomie. Thèse Fac. Sci. Paris, (A) **321** (no. d'ordre 980): 1-559, 409 text figs., 6 pls. (Masson et Cie Paris). [Also in: Ann. Sci. nat. Zool. (8) **9**: 1-560].
- , 1909. The American species of snapping shrimp of the genus *Synalpheus*. Proc. U. S. nation. Mus., **36** (1659): 1-93, textfigs. 1-54.
- DANA, JAMES D., 1852. Crustacea. In: United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U. S. N., **13**: i-viii, 1-685. [Folio Atlas of 96 plates published in 1855].
- HOLTHUIS, L. B., 1952. The Crustacea Decapoda Macrura of Chile. Reports Lund Univ. Chile Exped. 1948, 5. Lund Univ. Årsskr., (n. ser.) (2) **47** (10): 1-110, figs. 1-19.
- MAN, J. G. DE, 1888. Report on podophthalmous Crustacea of the Mercui Archipelago, collected for the trustees of the Indian Museum, Calcutta. Journ. Linn. Soc. London, (Zool.), **22**: 1-312, pls. 1-19.
- , 1911. The Decapoda of the Siboga Expedition, 2. Family Alpheidae. Siboga Exped. Monogr., **39a**<sup>1</sup> (2): 133-465 [Livr. 60].
- , 1915. Supplement [Plates and explanations]. Siboga Exped. Monogr., **39a**<sup>1</sup> (2): 23 pls. [Livr. 74].
- MILERS, E. J. 1884. Crustacea. In: Report on the zoological collections made in the Indo-Pacific Ocean during the voyage of H. M. S. "Alert", 1881-2: i-xxv, 1-684, 54 pls. (British Museum (Natural History), London).
- RATHBUN, M. J., 1902. The Brachyura and Macrura of Porto Rico. Bull. U. S. Fish. Comm., **20** (2): 1-127, figs. 1-24, pls. 1-2.
- VERRILL, A. E., 1922. Decapod Crustacea of Bermuda, 2, Macrura. Trans. Connecticut Acad. Arts Sci., **26**: 1-179, pls. 1-48, text figs. 1-12.



