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BULLETIN
OF
THE BINGHAM OCEANOGRAPHIC COLLECTION
PEABODY MUSEUM OF NATURAL HISTORY
YALE UNIVERSITY

VOLUME XI, ARTICLE 1

THE DEEP-SEA PRAWNS OF THE FAMILY
OPLOPHORIDAE IN THE BINGHAM
OCEANOGRAPHIC COLLECTION

BY FENNER A. CHACE, JR.
United States National Museum

Issued July, 1947
New Haven, Conn., U. S. A.

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*United States National Museum*¹

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¹ The manuscript for this paper was prepared while the author was a member of the staff at the Museum of Comparative Zoology.

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ABSTRACT

This report is based upon material collected in the Bahamas, supplemented by smaller collections from the Bermuda Islands, the Gulf of Mexico and the Caribbean Sea. Twenty-five species are represented. Comparison of the Bahaman specimens with similarly extensive material from the Bermuda Islands indicates that the family is fully as well represented in the Bahamas as it is off the Bermudas. The collection offers additional evidence to substantiate the validity of three species of the *Acanthephyra purpurea* group (*A. purpurea*, *A. haeckelii*, and *A. acanthitelsonis*) formerly treated as one. Of these, *A. haeckelii* apparently breeds in the Bahamas, whereas egg-bearing specimens of that species have never been recorded from the Bermudas. *Acanthephyra acutifrons* and *A. eximia*, previously considered benthonic species, are found to be bathypelagic at least part of the time. It is shown that the notch in the dorsal carina of the two previously recorded adult females of *Notostomus robustus* is not a sexual character. Evidence is presented to show that *Notostomus atlanticus* and *N. longirostris* are not the same species, as often contended; additional argument is given for the retention of *Oplophorus gracilirostris* as a species distinct from *O. typus*. Notes are included on the coloration and behavior in life of *Systellaspis affinis*, *Oplophorus gracilirostris*, and *O. grimaldii*.

INTRODUCTION

When the bulk of the present collection was received in 1936 it was tentatively planned that it be used as a nucleus around which a study of the Oplophoridae of the world might be developed. However, it has become apparent that an attempt at a monographic treatment of the family is inadvisable at a time when large collections of deep-water Caridea are being studied in Europe in preparation for the publication of final reports after the close of hostilities. Therefore, the present report is now submitted in unextended form as one more contribution toward an eventual monograph of the family.

Types of two undescribed species of Oplophoridae in the Bingham Collection, *Notostomus marptocheles* and *N. miccyllus*, are also represented in a collection of bathypelagic Caridea which were received in 1938 from the New York Zoological Society's Bermuda Oceanographic Expeditions. By arrangement with Professor A. E. Parr and with Dr. William Beebe, descriptions of these species have already been published in a report on the Bermuda collection (Chace, 1940). Many of the figures, diagnoses and keys in that report apply to species of the present collection, but they have not been repeated here.

By far the largest portion of the present material was taken in the Bahamas during the third expedition of the "Pawnee" in 1927. Some additional Bahaman material was obtained by the first expedition of the "Pawnee" in 1925, as well as from the cruise of the "Atlantis" in 1933. Also a certain amount of material from the Bermudas, the Atlantic Ocean east of the Bahamas, the Gulf of Mexico and the Caribbean Sea was collected by the above expeditions and by the "Atlantis" in 1934 and 1935.

The author takes great pleasure in thanking the members of the Bingham Oceanographic Laboratory for the opportunity to study this collection.

COMPARISON OF BAHAMAN AND BERMUDIAN FAUNAS

In an attempt to compare the Bahaman and Bermudian oplophorid faunas, only those specimens taken by the third "Pawnee" expedition in 1927 have been considered, even though two of the 25 species in the collection, *Notostomus robustus* and *Systellaspis affinis*, were not taken on that cruise. There follows a list of the species taken in the Bahamas in 1927, arranged in the order of abundance of adult specimens in the collection.

Species	Adults	Young
<i>Systellaspis debilis</i>	285	9
<i>Acanthephyra purpurea</i>	258	4
<i>Hymenodora gracilis</i>	97	63
<i>Notostomus vascus</i>	40	1
<i>Oplophorus spinicauda</i>	26	23
<i>Acanthephyra stylorostrata</i>	16	6
<i>Oplophorus grimaldii</i>	14	
<i>Oplophorus gracilirostris</i>	11	3
<i>Acanthephyra haeckelii</i>	10	
<i>Ephyrina bifida</i>	7	2
<i>Notostomus miccylus</i>	6	
<i>Notostomus mollis</i>	5	7
<i>Hymenodora glacialis</i>	4	1
<i>Notostomus atlanticus</i>	3	2
<i>Acanthephyra curtirostris</i>	3	1
<i>Acanthephyra acutifrons</i>	2	1
<i>Notostomus marptocheles</i>	1	2
<i>Acanthephyra brevirostris</i>	1	1
<i>Acanthephyra acanthitelsonis</i>	1	
<i>Acanthephyra eximia</i>	1	
<i>Ephyrina hoskynii</i>	1	
<i>Systellaspis braueri</i>	1	
<i>Notostomus perlatus</i> (?).....		1

Comparison of this table with that for the Bermudian fauna (Chace, 1940: 200) reveals that species of Opolophoridae are certainly as plentiful in the Bahamas as they are off Bermuda; 25 species of this family were represented in the latter collection, which consists of material from 1,574 nets, while 23 species were taken in 25 hauls on the "Pawnee" cruise. From these lists it will be seen that five species—*Notostomus robustus*, *N. compsus*, *N. distirus*, *Acantheephyra gracilipes*, and *Acantheephyra* sp.—which were taken off Bermuda are not present in the "Pawnee" Bahaman collection, and three species—*Oplophorus gracilirostris*, *Hymenodora glacialis*, and *Acantheephyra acanthitelsonis*—were found in the Bahamas but were not represented in the Bermuda material. However, *Notostomus robustus* may be considered a member of the Bahaman fauna as it was taken there by the "Atlantis" in 1933, and *Acantheephyra acanthitelsonis* was found in the Bermuda area by the "Pawnee" in 1927. The two young specimens in the Bermuda material which were identified as *Notostomus westergreni* (?) (Chace, 1940: 171) are now thought to be *N. atlanticus*.

In discussing the stations made by the "Pawnee" in 1927, Parr (1938: 8) has pointed out that each 100 feet of wire represents a vertical depth of approximately 11 fathoms. On this basis the Bahamas hauls were made in depths of from 385 to 1,100 fathoms, with the majority falling between 750 and 900 fathoms. In this respect the Bermudian and Bahaman hauls may be compared more or less directly, since roughly the same depth ranges were covered in each instance. It is therefore somewhat surprising to find *Systellaspis debilis* more abundant than *Acantheephyra purpurea* in the Bahamas, whereas off Bermuda the latter species appears to be much more common. *Oplophorus spinicauda* is obviously much more abundant in the Bahaman area, since only one adult specimen was taken on the Bermuda expeditions. Except for the above discrepancies and the presence of *Oplophorus gracilirostris* and *Hymenodora glacialis* in the Bahamas and not off Bermuda, the quantitative aspects of the two faunas appear to be rather similar in all cases where sufficient numbers of specimens are available to make comparison possible.

LIST OF STATIONS AND SPECIMENS

"Pawnee" Expedition, 1925.

March 20. Tongue of the Ocean, Bahamas. 300-400 fathoms.
Trawl.

2 *Systellaspis affinis* (Faxon).

April 20. North of Glover Reef, British Honduras. 484 fathoms.

2 *Oplophorus spinicauda* A. Milne Edwards.

"Pawnee" Expedition, 1927.

February 26. Station 5. 25° 56' N., 77° 37' W. 5,000 feet wire.

5 *Oplophorus spinicauda* A. Milne Edwards.

1 *O. gracilirostris* A. Milne Edwards.

February 28. Station 7. 24° 00' N., 77° 17' W. 6,000 feet wire.

15 *Systellaspis debilis* (A. Milne Edwards).

4 *Oplophorus spinicauda* A. Milne Edwards.

3 *O. gracilirostris* A. Milne Edwards.

March 1. Station 9. 23° 55' N., 77° 09' W. 4,000-7,000 feet wire.

32 *Acanthephyra purpurea* A. Milne Edwards.

1 *Notostomus vescus* Smith.

2 *N. atlanticus* Lenz.

3 *Hymenodora gracilis* Smith.

43 *Systellaspis debilis* (A. Milne Edwards).

9 *Oplophorus spinicauda* A. Milne Edwards.

1 *O. gracilirostris* A. Milne Edwards.

March 2. Station 11. 23° 58' N., 77° 26' W. 7,000 feet wire.

17 *Acanthephyra purpurea* A. Milne Edwards.

1 *A. curtirostris* Wood-Mason.

7 *Notostomus vescus* Smith.

2 *N. miccylus* Chace.

13 *Hymenodora gracilis* Smith.

13 *Systellaspis debilis* (A. Milne Edwards).

1 *Oplophorus spinicauda* A. Milne Edwards.

2 *O. gracilirostris* A. Milne Edwards.

March 9. Station 16. 23° 49' N., 76° 58' W. 7,000 feet wire.

4 *Acanthephyra purpurea* A. Milne Edwards.

1 *A. stylostrata* (Bate).

1 *A. acutifrons* Bate.

1 *Notostomus vescus* Smith.

- 1 *Ephyrina hoskynii* Wood-Mason.
 10 *Hymenodora gracilis* Smith.
 13 *Systellaspis debilis* (A. Milne Edwards).
 5 *Oplophorus spinicauda* A. Milne Edwards.
 4 *O. gracilirostris* A. Milne Edwards.
- March 10. Station 18. 23° 42' N., 76° 43' W. 7,000 feet wire.
 13 *Acantheephyra purpurea* A. Milne Edwards.
 1 *A. acutifrons* Bate.
 1 *Notostomus vescus* Smith.
 10 *Hymenodora gracilis* Smith.
 27 *Systellaspis debilis* (A. Milne Edwards).
 3 *Oplophorus spinicauda* A. Milne Edwards.
- March 11. Station 20. 23° 54' N., 77° 09' W. Depth 710-720 fathoms. Otter-trawl.
 1 *Oplophorus gracilirostris* A. Milne Edwards.
- March 12. Station 22. 23° 31' N., 77° 15' W. 7,000 feet wire.
 8 *Acantheephyra purpurea* A. Milne Edwards.
 2 *A. stylostrata* (Bate).
 1 *Notostomus vescus* Smith.
 5 *Hymenodora gracilis* Smith.
 9 *Systellaspis debilis* (A. Milne Edwards).
- March 14. Station 23. 24° 29' N., 77° 29' W. 8,000 feet wire.
 20 *Acantheephyra purpurea* A. Milne Edwards.
 1 *A. haeckelii* (von Martens).
 1 *A. acanthitelsonis* Bate
 1 *A. curtirostris* Wood-Mason.
 1 *A. acutifrons* Bate.
 2 *Notostomus vescus* Smith.
 2 *N. atlanticus* Lenz.
 1 *N. perlatus* (?) Bate.
 2 *Ephyrina bifida* Stephensen.
 5 *Hymenodora gracilis* Smith.
 16 *Systellaspis debilis* (A. Milne Edwards).
 7 *Oplophorus spinicauda* A. Milne Edwards.
 1 *O. gracilirostris* A. Milne Edwards.
- March 17. Station 25. 24° 51' N., 76° 37' W. 8,000 feet wire.
 11 *Acantheephyra purpurea* A. Milne Edwards.
 2 *A. haeckelii* (von Martens).
 1 *A. curtirostris* Wood-Mason.

- 2 *A. stylorostrata* (Bate).
 1 *Notostomus vescus* Smith.
 1 *N. miccylus* Chace.
 2 *N. mollis* (Smith).
 2 *Ephyrina bifida* Stephensen.
 9 *Hymenodora gracilis* Smith.
 13 *Systellaspis debilis* (A. Milne Edwards).
 1 *Oplophorus spinicauda* A. Milne Edwards.
 March 18. Station 27. 24° 45' N., 76° 21' W. 8,000 feet wire.
 1 *AcanthePHYra purpurea* A. Milne Edwards.
 1 *Hymenodora gracilis* Smith.
 66 *Systellaspis debilis* (A. Milne Edwards).
 2 *Oplophorus spinicauda* A. Milne Edwards.
 4 *O. grimaldii* Coutiere.
 March 21. Station 31. 24° 29' N., 75° 53' W. 7,000 feet wire.
 19 *AcanthePHYra purpurea* A. Milne Edwards.
 1 *A. eximia* Smith.
 7 *Hymenodora gracilis* Smith.
 5 *Systellaspis debilis* (A. Milne Edwards).
 2 *Oplophorus spinicauda* A. Milne Edwards.
 March 22. Station 33. 24° 11' N., 75° 37' W. 8,000 feet wire.
 6 *AcanthePHYra purpurea* A. Milne Edwards.
 4 *A. haeckelii* (von Martens).
 12 *A. stylorostrata* (Bate).
 4 *Notostomus vescus* Smith.
 2 *N. mollis* (Smith).
 1 *Ephyrina bifida* Stephensen.
 1 *Hymenodora glacialis* (Buchholz).
 11 *H. gracilis* Smith.
 9 *Systellaspis debilis* (A. Milne Edwards).
 1 *Oplophorus spinicauda* A. Milne Edwards.
 March 23. Station 35. 24° 11' N., 75° 35' W. 7,500 feet wire.
 1 *Hymenodora gracilis* Smith.
 4 *Systellaspis debilis* (A. Milne Edwards).
 March 29. Station 39. 22° 43' N., 74° 23' W. 8,000 feet wire.
 22 *AcanthePHYra purpurea* A. Milne Edwards.
 2 *Notostomus vescus* Smith.
 1 *N. mollis* (Smith).
 2 *Ephyrina bifida* Stephensen.

- 42 *Hymenodora gracilis* Smith.
 24 *Systellaspis debilis* (A. Milne Edwards).
 2 *Oplophorus grimaldii* Coutiere.
- March 30. Station 41. 22° 31' N., 74° 26' W. 10,000 feet wire.
 5 *Acanthephyra purpurea* A. Milne Edwards.
 2 *A. haeckelii* (von Martens).
 2 *A. stylorostrata* (Bate).
 1 *A. brevirostris* Smith.
 2 *Hymenodora glacialis* (Buchholz).
 5 *Systellaspis debilis* (A. Milne Edwards).
 1 *Oplophorus grimaldii* Coutiere.
- March 31. Station 43. 22° 13' N., 74° 19' W. 4,000 feet wire.
 2 *Oplophorus spinicauda* A. Milne Edwards.
- April 4. Station 46. 21° 46' N., 72° 50' W. 10,000 feet wire.
 3 *Acanthephyra purpurea* A. Milne Edwards.
 3 *A. stylorostrata* (Bate).
 1 *A. brevirostris* Smith.
 1 *Notostomus vescus* Smith.
 1 *N. marptocheles* Chace.
 1 *N. mollis* (Smith).
 1 *Ephyrina bifida* Stephensen.
 1 *Hymenodora glacialis* (Buchholz).
 4 *H. gracilis* Smith.
 1 *Systellaspis braueri* (Balss).
 7 *S. debilis* (A. Milne Edwards).
 2 *Oplophorus spinicauda* A. Milne Edwards.
 1 *O. grimaldii* Coutiere.
- April 5. Station 47. 21° 43' 55" N., 72° 41' 20" W. 3,500 feet wire.
 1 *Acanthephyra purpurea* A. Milne Edwards.
 2 *Oplophorus spinicauda* A. Milne Edwards.
- April 6. Station 48. 21° 44' N., 72° 43' W. 7,000 feet wire.
 20 *Acanthephyra purpurea* A. Milne Edwards.
 1 *A. haeckelii* (von Martens).
 1 *Notostomus vescus* Smith.
 2 *N. marptocheles* Chace.
 1 *N. miccylus* Chace.
 5 *N. mollis* (Smith).
 18 *Hymenodora gracilis* Smith.

- 3 *Systellaspis debilis* (A. Milne Edwards).
- 1 *Oplophorus spinicauda* A. Milne Edwards.
- 2 *O. grimaldii* Coutiere.

April 11. Station 52. 21° 30' N., 71° 11' W.

- 31 *Acanthephyra purpurea* A. Milne Edwards.
- 9 *Notostomus vescus* Smith.
- 2 *N. miccylus* Chace.
- 1 *N. mollis* (Smith).
- 1 *N. atlanticus* Lenz.
- 1 *Ephyrina bifida* Stephensen.
- 11 *Hymenodora gracilis* Smith.
- 6 *Systellaspis debilis* (A. Milne Edwards).
- 2 *Oplophorus spinicauda* A. Milne Edwards.
- 1 *O. grimaldii* Coutiere.
- 1 *O. gracilirostris* A. Milne Edwards.

April 12. Station 53. 21° 16' N., 71° 18' W. Bottom struck at 900-945 fathoms.

- 4 *Acanthephyra purpurea* A. Milne Edwards.

April 12. Station 54. 21° 16' N., 71° 18' W. Bottom struck at 900-945 fathoms.

- 1 *Acanthephyra curtirostris* Wood-Mason.
- 1 *Hymenodora glacialis* (Buchholz).
- 1 *H. gracilis* Smith.
- 6 *Systellaspis debilis* (A. Milne Edwards).
- 1 *Oplophorus spinicauda* A. Milne Edwards.

April 13. Station 56. 21° 20' N., 71° 13' W. 6,500 feet wire.

- 45 *Acanthephyra purpurea* A. Milne Edwards.
- 10 *Notostomus vescus* Smith.
- 3 *Hymenodora gracilis* Smith.
- 10 *Systellaspis debilis* (A. Milne Edwards).
- 3 *Oplophorus grimaldii* Coutiere.

April 20. Station 58. 32° 24' N., 64° 29' W. 10,000 feet wire.

- 242 *Acanthephyra purpurea* A. Milne Edwards.
- 38 *A. haeckelii* (von Martens).
- 1 *A. acanthitelsonis* Bate.
- 1 *A. stylorostrata* (Bate).
- 2 *Notostomus vescus* Smith.
- 1 *N. miccylus* Chace.
- 2 *N. mollis* (Smith).

4 *N. robustus* Smith.

1 *Ephyrina bifida* Stephensen.

14 *Hymenodora gracilis* Smith.

62 *Systellaspis debilis* (A. Milne Edwards).

3 *Oplophorus grimaldii* Coutiere.

April 21. Station 59. 32° 19' N., 64° 33' W. 8,000 feet wire.

216 *Acanthephyra purpurea* A. Milne Edwards.

8 *A. haeckelii* (von Martens).

2 *Notostomus vescus* Smith.

2 *N. miccylus* Chace.

1 *N. robustus* Smith.

1 *Hymenodora gracilis* Smith.

25 *Systellaspis debilis* (A. Milne Edwards).

1 *Oplophorus grimaldii* Coutiere.

"Atlantis" Cruise, 1933.²

February 20. Station 1478. 25° 29' N., 77° 18' W. Triangular trawl. 5,250 feet wire.

16 *Acanthephyra purpurea* A. Milne Edwards.

1 *A. haeckelii* (von Martens).

13 *A. stylorostrata* (Bate).

1 *A. acutifrons* Bate.

2 *Notostomus vescus* Smith.

1 *N. marptocheles* Chace.

2 *N. miccylus* Chace.

5 *N. mollis* (Smith).

5 *N. robustus* Smith.

1 *N. perlatus* (?) Bate.

5 *Ephyrina bifida* Stephensen.

2 *Hymenodora glacialis* (Buchholz).

48 *H. gracilis* Smith.

30 *Systellaspis debilis* (A. Milne Edwards).

1 *Oplophorus spinicauda* A. Milne Edwards.

3 *O. grimaldii* Coutiere.

February. Station 1479 (Haul 3). 25° 47' N., 72° 10' W. 2 m. ring-net. 82-492 feet wire.

44 *Systellaspis debilis* (A. Milne Edwards).

1 *Oplophorus grimaldii* Coutiere.

² Sponsored jointly by the Woods Hole Oceanographic Institution and the Bingham Oceanographic Laboratory.

"Atlantis" Cruise, 1934.

February 3. Station 1939. 16° 10' N., 76° 28' W. 2 m. ring-net. 450 feet wire.

1 *Systellaspis affinis* (Faxon).

1 *Oplophorus spinicauda* (A. Milne Edwards).

4 *O. gracilirostris* A. Milne Edwards.

"Atlantis" Cruise, 1935.

February 7. 26° 57' N., 67° 44' W. Sargassum dredge. Surface. 4:30 P. M. to 12:00 midnight.

1 *Acanthephyra purpurea* A. Milne Edwards.

February 8. 24° 35' N., 68° 54' W. Sargassum dredge. 8 P. M. to 6 A. M. Wire 35-40 meters.

2 *Oplophorus grimaldii* Coutiere.

March 26. Station 2381. Trawl I (not reaching bottom). 630 meters wire.

12 *Systellaspis affinis* (Faxon).

1 *Oplophorus gracilirostris* A. Milne Edwards.

March 26. Station 2381. 28° 35' N., 89° 46' W. Trawl II. Depth 180-160 fathoms, on bottom.

1 *Systellaspis affinis* (Faxon).

SYSTEMATIC ACCOUNT

Acanthephyra purpurea A. Milne Edwards

Acanthephyra purpurea A. Milne Edwards, 1881b: 933; Chace, 1940: 134, text-fig. 11.

Off Bermuda.

B. O. C. no. 1060. "Pawnee" St. 58; April 20, 1927; wire 10,000 feet.

142 ♂ (1 with an abdominal parasite); carapace length 7 to 19 mm. (av. 13.9 mm.). 28 ♀ without eggs; carapace length 7.5 to 16 mm. (av. 10.1 mm.). 57 ovigerous ♀ (11 with eyed eggs); carapace length 9.5 to 18 mm. (av. 12.8 mm.). 15 young; carapace length 4 to 7 mm. (av. 6.1 mm.).

B. O. C. no. 1061. "Pawnee" St. 59; April 21, 1927; wire 8,000 feet. 109 ♂; carapace length 6.9 to 18.8 mm. (av. 12.8 mm.). 32 ♀ without eggs; carapace length 7.5 to 15.5 mm. (av. 9.8 mm.).

59 ovigerous ♀ (3 with eyed eggs); carapace length 9.5 to 18.5 mm. (av. 13.5 mm.). 16 young; carapace length 5.3 to 7.3 mm. (av. 6.6 mm.).

Northeast Providence Channel, Bahamas.

B. O. C. no. 1062. "Atlantis" St. 1478; February 20, 1933; wire 5,250 feet.

8 ♂; carapace length 9.5 to 18 mm. (av. 12.9 mm.). 4 ♀ without eggs; carapace length 7.2 to 11 mm. (av. 8.7 mm.). 4 ovigerous ♀; carapace length 9.1 to 12 mm. (av. 10.1 mm.).

Tongue of the Ocean, Bahamas.

B. O. C. no. 1063. "Pawnee" St. 9; March 1, 1927; wire 4,000 to 7,000 feet.

20 ♂; carapace length 6.5 to 19 mm. (av. 15.1 mm.). 3 ♀ without eggs; carapace length 9.2 to 10 mm. 8 ovigerous ♀; carapace length 9.9 to 15 mm. (av. 12.5 mm.). 1 young; carapace length 6.9 mm.

B. O. C. no. 1064. "Pawnee" St. 11; March 2, 1927; wire 7,000 feet.

10 ♂; carapace length 6.5 to 19 mm. (av. 14 mm.). 4 ♀ without eggs (1 with an abdominal parasite); carapace length 9 to 17 mm. (av. 11.7 mm.). 3 ovigerous ♀ (2 with eyed eggs); carapace length 13 to 15.5 mm.

B. O. C. no. 1065. "Pawnee" St. 16; March 9, 1927; wire 7,000 feet.

2 ♂; carapace length 7.5 and 15 mm. 2 ♀ (1 with a branchial parasite); carapace length 10 and 15 mm.

B. O. C. no. 1066. "Pawnee" St. 18; March 10, 1927; wire 7,000 feet.

4 ♂; carapace length 10.5 to 17 mm. (av. 13.1 mm.). 4 ♀ without eggs; carapace length 9.5 to 16.5 mm. (av. 11.9 mm.). 5 ovigerous ♀ (1 with eyed eggs); carapace length 11 to 16.5 mm. (av. 14.8 mm.).

B. O. C. no. 1070. "Pawnee" St. 22; March 12, 1927; wire 7,000 feet.

3 ♂; carapace length 11.5 to 18 mm. 3 ♀ without eggs; carapace length 9 to 10 mm. 2 ovigerous ♀ (1 with eyed eggs); carapace length 11 and 15 mm.

B. O. C. no. 1071. "Pawnee" St. 23; March 14, 1927; wire 8,000 feet.

14 ♂; carapace length 8.5 to 19.5 mm. (av. 14.1 mm.). 3 ♀ without eggs; carapace length 8 mm. 3 ovigerous ♀ (2 with eyed eggs); carapace length 11 to 16 mm.

Exuma Sound, Bahamas.

B. O. C. no. 1072. "Pawnee" St. 25; March 17, 1927; wire 8,000 feet.

8 ♂; carapace length 12 to 20.5 mm. (av. 16.9 mm.). 2 ♀ without eggs; carapace length 12 and 14 mm. 1 ovigerous ♀; carapace length 13.5 mm.

B. O. C. no. 1073. "Pawnee" St. 27; March 18, 1927; wire 8,000 feet. 1 ♂; carapace length 20 mm.

B. O. C. no. 1074. "Pawnee" St. 31; March 21, 1927; wire 7,000 feet.

7 ♂; carapace length 9 to 18 mm. (av. 14.9 mm.). 1 ♀ with an abdominal parasite; carapace length 16.5 mm. 10 ovigerous ♀ (3 with eyed eggs); carapace length 11.5 to 18 mm. (av. 12.8 mm.). 1 young; carapace length 7 mm.

B. O. C. no. 1075. "Pawnee" St. 33; March 22, 1927; wire 8,000 feet.

4 ♂; carapace length 9.5 to 18 mm. (av. 14.6 mm.). 1 ♀ without eggs; carapace length 7.5 mm. 1 ovigerous ♀; carapace length 12 mm.

Crooked Island Passage, Bahamas.

B. O. C. no. 1076. "Pawnee" St. 39; March 29, 1927; wire 8,000 feet.

13 ♂; carapace length 8 to 17 mm. (av. 13.8 mm.). 3 ♀ without eggs (1 with an abdominal parasite); carapace length 10.5 to 11 mm. 5 ovigerous ♀ (1 with eyed eggs); carapace length 12 to 14 mm. 1 young (with but 3 pairs of telson spines); carapace length 6.5 mm.

B. O. C. no. 1077. "Pawnee" St. 41; March 30, 1927; wire 10,000 feet.

3 ♂; carapace length 12.5 to 15 mm. 2 ♀ (1 soft shelled); carapace length 8 and 12.5 mm.

Caicos Passage, Bahamas.

- B. O. C. no. 1078. "Pawnee" St. 46; April 4, 1927; wire 10,000 feet. 2 ♂; carapace length 11 mm. 1 ♀; carapace length 9.5 mm.
- B. O. C. no. 1079. "Pawnee" St. 47; April 5, 1927; wire 3,500 feet. 1 ♂; carapace length 11 mm.
- B. O. C. no. 1080. "Pawnee" St. 48; April 6, 1927; wire 7,000 feet. 10 ♂ (1 with an abdominal parasite); carapace length 7.1 to 18 mm. (av. 12.3 mm.). 3 ♀ without eggs; carapace length 9.5 to 14 mm. 7 ovigerous ♀ (1 with eyed eggs and 1 with 6 pairs of telson spines); carapace length 10 to 13 mm. (av. 11.8 mm.).

Turks Island Passage, Bahamas.

- B. O. C. no. 1081. "Pawnee" St. 52; April 11, 1927; wire 8,000 feet. 14 ♂; carapace length 8.5 to 16 mm. (av. 12.4 mm.). 8 ♀ without eggs; carapace length 8 to 15 mm. (av. 10.5 mm.). 8 ovigerous ♀ (2 with eyed eggs); carapace length 11 to 15 mm. (av. 12 mm.). 1 young; carapace length 7 mm.
- B. O. C. no. 1082. "Pawnee" St. 53; April 12, 1927; struck bottom at 900-945 fathoms. 3 ♂; carapace length 9 to 16 mm. 1 ♀ without eggs; carapace length 8 mm.
- B. O. C. no. 1083. "Pawnee" St. 56; April 13, 1927; wire 6,500 feet. 9 ♂; carapace length 9 to 16 mm. (av. 10.9 mm.). 16 ♀ without eggs; carapace length 8 to 13.5 mm. (av. 10.8 mm.). 20 ovigerous ♀ (9 with eyed eggs); carapace length 10.5 to 15 mm. (av. 12.3 mm.).

East of Bahama Islands.

- B. O. C. no. 1084. "Atlantis"; February 7, 1935; Surface (night). 1 ♀ without eggs; carapace length 12 mm.

Remarks. This series of 737 specimens (387 ♂, 315 ♀ [of which 193 are ovigerous] and 35 young) adds further support to the contention that *A. purpurea*, as restricted by Kemp, is a perfectly valid and easily recognized species. All of the specimens lack a spine on the fourth abdominal somite and practically all are armed with exactly four pairs of lateral telson spines. Except in the few cases where the

telson is obviously deformed or abnormal, as shown by the asymmetrical disposition of the lateral spines, only two specimens having more or less than four pairs of spines are noted—a young specimen from "Pawnee" station 23 which has but three pairs and an ovigerous female from "Pawnee" station 48 which has six pairs.

In contrast to the specimens in the Bermuda collection previously reported upon, the present series yields a slightly extended size range at both ends of the scale. The smallest recognizable male has a carapace length of only 6.5 mm. and the largest, 20.5 mm. The smallest ovigerous female has the carapace 9.1 mm. long and the largest female 18.5 mm.

Acanthephyra haeckelii (von Martens)

Ephyra Haeckelii von Martens, 1868; 54, pl. 1, figs. 7a-b.

Acanthephyra haeckelii Chace, 1940: 140, text-fig. 18.

Off Bermuda.

B. O. C. no. 1085. "Pawnee" St. 58; April 20, 1927; wire 10,000 feet.

22 ♂; carapace length 11 to 25.5 mm. (av. 17 mm.). 15 ♀ without eggs; carapace length 13 to 21.5 mm. (av. 17.7 mm.). 1 young; carapace length 10 mm.

B. O. C. no. 1086. "Pawnee" St. 59; April 21, 1927; wire 8,000 feet.

6 ♂; carapace length 11.5 to 22.8 mm. (av. 17.5 mm.). 1 ♀ without eggs; carapace length 15.5 mm. 1 young; carapace length 8 mm.

Northeast Providence Channel, Bahamas.

B. O. C. no. 1087. "Atlantis" St. 1478; February 20, 1933; wire 5,250 feet.

1 ♀ without eggs; carapace length 15.5 mm.

Tongue of the Ocean, Bahamas.

B. O. C. no. 1088. "Pawnee" St. 23; March 14, 1927; wire 8,000 feet.

1 ♂; carapace length 23.5 mm.

Exuma Sound, Bahamas.

B. O. C. no. 1089. "Pawnee" St. 25; March 17, 1927; wire 8,000 feet.

1 ♂; carapace length 24.5 mm. 1 ovigerous ♀ (with eyed eggs); carapace length 21 mm.

B. O. C. no. 1090. "Pawnee" St. 33; March 22, 1927; wire 8,000 feet.

2 ♂; carapace length 20.5 and 21 mm. 2 ovigerous ♀ (with eyed eggs); carapace length 19 and 23 mm.

Crooked Island Passage, Bahamas.

B. O. C. no. 1091. "Pawnee" St. 41; March 30, 1927; wire 10,000 feet.

1 ♂; carapace length 23 mm. 1 ovigerous ♀ (with eyed eggs); carapace length 20.8 mm.

Caicos Passage, Bahamas.

B. O. C. no. 1092. "Pawnee" St. 48; April 6, 1927; wire 7,000 feet.

1 ♂; carapace length 20 mm.

Remarks. In this series of specimens the number of lateral spines on the telson varies from 7 to 12 pairs, although 9 is by far the commonest number, as previously noted on Bermuda material. There is no apparent difference between the Bahaman and Bermudian specimens in this respect.

In discussing the Bermudian material of this species, previously examined (Chace, 1940), mention was made of the fact that none of the females carried eggs. The present material further emphasizes this apparent absence of ovigerous specimens in the Bermuda area, for none of the 16 females from that region have eggs. In striking contrast, four of the five females from the Bahaman area are ovigerous and in every case the eggs are eyed, indicating that they are almost ready to hatch.

Acanthephyra acanthitelsonis Bate

Acanthephyra acanthitelsonis Bate, 1888: 745; Kemp, 1939: 574.

Off Bermuda.

B. O. C. no. 1093. "Pawnee" St. 58; April 20, 1927; wire 10,000 feet.

1 ♀ without eggs; carapace length 13.5 mm.

Tongue of the Ocean, Bahamas.

B. O. C. no. 1094. "Pawnee" St. 23; March 14, 1927; wire 8,000 feet.

1 ♀ without eggs; carapace length 23 mm.

Remarks. Each of these specimens has 15 spines on one side of the telson and 16 on the other. Inasmuch as no specimens of this species were discovered in the large collections of the New York Zoological Society from off Bermuda (Chace, 1940), it must, for the present, be considered only an accidental stray in that area. Kemp has recorded its northern limit in the eastern Atlantic at about the latitude of the Cape Verde Islands; until additional collections have been made in the western Atlantic it is impossible to tell whether or not both of these specimens are strays from their normal range farther south or whether their northern limit in this area is in a somewhat higher latitude due to the influence of the Gulf Stream.

AcanthePHYra curtirostris Wood-Mason

AcanthePHYra curtirostris Wood-Mason, in Wood-Mason and Alcock, 1891: 195; Chace, 1940: 143, text-fig. 21.

Tongue of the Ocean, Bahamas.

B. O. C. no. 1095. "Pawnee" St. 11; March 2, 1927; wire 7,000 feet.

1 ♂; carapace length 19.5 mm.

B. O. C. no. 1096. "Pawnee" St. 23; March 14, 1927; wire 8,000 feet.

1 young; carapace length 9 mm.

Exuma Sound, Bahamas.

B. O. C. no. 1097. "Pawnee" St. 25; March 17, 1927; wire 8,000 feet.

1 ♀ without eggs; carapace length 15.5 mm.

Turks Island Passage, Bahamas.

B. O. C. no. 1098. "Pawnee" St. 54; April 12, 1927; struck bottom at 900-945 fathoms.

1 ♀ without eggs; carapace length 15 mm.

³ This specimen is figured by Chace (1940: text-fig. 21).

Remarks. Although *A. curtirostris* was unknown in the Atlantic until recorded within the past few years (Chace 1937: 111; 1940: 144), it is apparently well established, although not common, in the western part of the tropical Atlantic, and further exploration will probably define more clearly its distributional limits there. Comparison of this material with Pacific specimens reveals no apparent differences of taxonomic importance.

Acanthephyra stylorostrata (Bate).

Bentheocaris stylorostratis Bate, 1888: 726, pl. 123, figs. 4-4o.

Acanthephyra stylorostrata Chace, 1940: 144, text-fig. 22.

Off Bermuda.

B. O. C. no. 1099. "Pawnee" St. 58; April 20, 1927; wire 10,000 feet.

1 ♂; carapace length 11 mm.

Northeast Providence Channel, Bahamas.

B. O. C. no. 1100. "Atlantis" St. 1478; February 20, 1933; wire 5,250 feet.

6 ♂; carapace length 7.1 to 12 mm. (av. 9.2 mm.). 3 ♀ without eggs; carapace length 7.5 to 9 mm. 3 ovigerous ♀; carapace length 11 to 13 mm. 1 young; carapace length 7 mm.

Tongue of the Ocean, Bahamas.

B. O. C. no. 1101. "Pawnee" St. 16; March 9, 1927; wire 7,000 feet.

1 ♀ without eggs; carapace length 14 mm.

B. O. C. no. 1102. "Pawnee" St. 22; March 12, 1927; wire 7,000 feet.

2 ♀; carapace length 9 and 12.5 mm.

Exuma Sound, Bahamas.

B. O. C. no. 1103. "Pawnee" St. 25; March 17, 1927; wire 8,000 feet.

1 ♀ without eggs; carapace length 11.5 mm. 1 young; carapace length 6.5 mm.

B. O. C. no. 1104. "Pawnee" St. 33; March 22, 1927; wire 8,000 feet.

1 ♂; carapace length 14.5 mm. 7 ♀ without eggs; carapace length 7.5 to 14 mm. (av. 10.9 mm.). 4 young; carapace length 4.5 to 7 mm.

Crooked Island Passage, Bahamas.

B. O. C. no. 1105. "Pawnee" St. 41; March 30, 1927; wire 10,000 feet.

1 ♂; carapace length 14.5 mm. 1 ♀ without eggs; carapace length 8 mm.

Caicos Passage, Bahamas.

B. O. C. no. 1106. "Pawnee" St. 46; April 4, 1927; wire 10,000 feet.

2 ♂; carapace length 12.5 and 13 mm. 1 young; carapace length 6 mm.

Remarks. It may be noted that the smallest male from "Atlantis" station 1478 is smaller than any of those previously recorded from off Bermuda. In this specimen, which has a carapace length of only 7.1 mm., the appendix masculina on the endopod of the second pleopods is little more than a bud, indicating that this is about the minimum size at which males of this species may be recognized.

Acanthephyra acutifrons Bate

Acanthephyra acutifrons Bate, 1888 (part): 749, pl. 126, fig. 3; Chace, 1940: 146, text-fig. 23.

Northeast Providence Channel, Bahamas.

B. O. C. no. 1107. "Atlantis" St. 1478; February 20, 1933; wire 5,250 feet.

1 young; carapace length 7.5 mm.

Tongue of the Ocean, Bahamas.

B. O. C. no. 1108. "Pawnee" St. 16; March 9, 1927; wire 7,000 feet.

1 ovigerous ♀; carapace length 51 mm.

B. O. C. no. 1109. "Pawnee" St. 18; March 10, 1927; wire 7,000 feet.

1 ovigerous ♀; carapace length 48 mm.⁴

⁴ This specimen is figured by Chace (1940: text-fig. 23).

B. O. C. no. 1110. "Pawnee" St. 23; March 14, 1927; wire 8,000 feet.

1 young; carapace length 7.5 mm.

Remarks. Since there is no evidence that the net came in contact with the bottom at any of the above stations, the supposition (Chace, 1940: 147) that this species is probably benthonic for the most part must be altered. *A. acutifrons* is such a deep-bodied species that one would hardly expect to find it sufficiently buoyant to carry on a pelagic existence, but closer examination reveals that the integument is not very heavy and the animal itself is little larger than several of the larger species of *Notostomus*.

Acanthephyra eximia Smith

Acanthephyra eximea Smith, 1884: 376.

Acanthephyra eximia Chace, 1940: 147.

Exuma Sound, Bahamas.

B. O. C. no. 1111. "Pawnee" St. 31; March 21, 1927; wire 7,000 feet.

1 ♂; carapace length 18 mm.

Remarks. This is one of the very few records of the capture of this species with a mid-water net. The fact that practically all of the previously recorded specimens were taken with bottom trawls or dredges would indicate that the species is but an occasional visitor to the mid-depths.

Acanthephyra brevirostris Smith

Acanthephyra brevirostris Smith, 1885: 504; Chace, 1940: 148, text-fig. 25.

Crooked Island Passage, Bahamas.

B. O. C. no. 1112. "Pawnee" St. 41; March 30, 1927; wire 10,000 feet.

1 young; carapace length 9 mm.

Caicos Passage, Bahamas.

B. O. C. no. 1113. "Pawnee" St. 46; April 4, 1927; wire 10,000 feet.

1 ♀ without eggs; carapace length 21 mm.

Notostomus vescus Smith.

Notostomus vescus Smith, 1887: 677; Chace, 1940: 153, text-fig. 29.

Off Bermuda.

B. O. C. no. 1114. "Pawnee" St. 58; April 20, 1927; wire 10,000 feet.

1 ♀ without eggs; carapace length 10 mm. 1 young; carapace length 7 mm.

B. O. C. no. 1115. "Pawnee" St. 59; April 21, 1927; wire 8,000 feet.

1 ♂; carapace length 14 mm. 1 ♀ without eggs; carapace length 12 mm.

Northeast Providence Channel, Bahamas.

B. O. C. no. 1116. "Atlantis" St. 1478; February 20, 1933; wire 5,250 feet.

2 ovigerous ♀; carapace length 12.5 and 15 mm.

Tongue of the Ocean, Bahamas.

B. O. C. no. 1117. "Pawnee" St. 9; March 1, 1927; wire 4,000-7,000 feet.

1 ♀ without eggs; carapace length 9 mm.

B. O. C. no. 1118. "Pawnee" St. 11; March 2, 1927; wire 7,000 feet.

4 ♂; carapace length 9.5 to 14 mm. 1 ♀ without eggs; carapace length 10 mm. 2 ovigerous ♀; carapace length 11 and 14 mm.

B. O. C. no. 1119. "Pawnee" St. 16; March 9, 1927; wire 7,000 feet.

1 ♀ without eggs; carapace length 12 mm.

B. O. C. no. 1120. "Pawnee" St. 18; March 10, 1927; wire 7,000 feet.

1 ♂; carapace length 11 mm.

B. O. C. no. 1121. "Pawnee" St. 22; March 12, 1927; wire 7,000 feet.

1 ♂; carapace length 12 mm.

B. O. C. no. 1122. "Pawnee" St. 23; March 14, 1927; wire 8,000 feet.

2 ovigerous ♀; carapace length 11 and 12 mm.

Exuma Sound, Bahamas.

B. O. C. no. 1123. "Pawnee" St. 25; March 17, 1927; wire 8,000 feet.

1 ♂; carapace length 13 mm.

B. O. C. no. 1124. "Pawnee" St. 33; March 22, 1927; wire 8,000 feet.

2 ♂; carapace length 13 and 15 mm. 1 ♀ without eggs; carapace length 10 mm. 1 young; carapace length 6.5 mm.

Crooked Island Passage, Bahamas.

B. O. C. no. 1125. "Pawnee" St. 39; March 29, 1927; wire 8,000 feet.

1 ♂; carapace length 13.5 mm. 1 ♀ without eggs; carapace length 9 mm.

Caicos Passage, Bahamas.

B. O. C. no. 1126. "Pawnee" St. 46; April 4, 1927; wire 10,000 feet. 1 young; carapace length 7 mm.

B. O. C. no. 1127. "Pawnee" St. 48; April 6, 1927; wire 7,000 feet. 1 ♀ without eggs; carapace length 12 mm.

Turks Island Passage, Bahamas.

B. O. C. no. 1128. "Pawnee" St. 52; April 11, 1927; wire 8,000 feet. 4 ♂; carapace length 9 to 12 mm. 2 ♀ without eggs; carapace length 8.5 mm. 3 ovigerous ♀; carapace length 13 to 14 mm.

B. O. C. no. 1129. "Pawnee" St. 56; April 13, 1927; wire 6,500 feet. 2 ♂; carapace length 9 and 10 mm. 4 ♀ without eggs; carapace length 8 to 13 mm. 4 ovigerous ♀; carapace length 9.5 to 15 mm.

Notostomus marptocheles Chace

Notostomus marptocheles Chace, 1940: 158, text-figs. 33 and 34.

Northeast Providence Channel, Bahamas.

B. O. C. no. 1130. "Atlantis" St. 1478; February 20, 1933; wire 5,250 feet.

1 ♀ without eggs, HOLOTYPE; carapace length 17.2 mm.

Caicos Passage, Bahamas.

B. O. C. no. 1131. "Pawnee" St. 46; April 4, 1927; wire 10,000 feet.
1 young, paratype; carapace length 9.7 mm.

B. O. C. no. 1132. "Pawnee" St. 48; April 6, 1927; wire 7,000 feet.
1 ovigerous ♀ (with eyed eggs), paratype; carapace length 20.1 mm.
1 young, paratype; carapace length 13.8 mm.

Notostomus miccylus Chace

Notostomus miccylus Chace, 1940; 161, text-figs. 35 and 36.

Off Bermuda.

B. O. C. no. 1133. "Pawnee" St. 58; April 20, 1927; wire 10,000 feet.

1 ♀ without eggs, paratype; carapace length 8.8 mm.

B. O. C. no. 1134. "Pawnee" St. 59; April 21, 1927; wire 8,000 feet.
1 ♂; carapace length 8 mm. 1 ♀ without eggs; carapace length 9.5 mm.

Northeast Providence Channel, Bahamas.

B. O. C. no. 1135. "Atlantis" St. 1478; February 20, 1933; wire 5,250 feet.

1 ♀ without eggs, paratype; carapace length 6.8 mm. 1 ovigerous ♀, paratype; carapace length 7.8 mm.

Tongue of the Ocean, Bahamas.

B. O. C. no. 1136. "Pawnee" St. 11; March 2, 1927; wire 7,000 feet.

2 ♂, paratypes; carapace length 7.1 and 8 mm.

Exuma Sound, Bahamas.

B. O. C. no. 1137. "Pawnee" St. 25; March 17, 1927; wire 8,000 feet.

1 ♀ without eggs, paratype; carapace length 8.9 mm.

Caicos Passage, Bahamas.

B. O. C. no. 1138. "Pawnee" St. 48; April 6, 1927; wire 7,000 feet.

1 ♀ without eggs, HOLOTYPE; carapace length 9.2 mm.

Turks Island Passage, Bahamas.

B. O. C. no. 1139. "Pawnee" St. 52; April 11, 1927; wire 8,000 feet.

1 ♀ without eggs, paratype; carapace length 8.2 mm. 1 ovigerous ♀ (with eyed eggs), paratype; carapace length 7.1 mm.

Notostomus mollis (Smith)

Meningodora mollis Smith, 1882: 74, pl. 11, figs. 8-9, pl. 12, figs. 5-9.

Notostomus mollis Chace, 1940; 164, text-fig. 38.

Off Bermuda.

B. O. C. no. 1140. "Pawnee" St. 58; April 20, 1927; wire 10,000 feet.

2 young; carapace length 10 and 17 mm.

Northeast Providence Channel, Bahamas.

B. O. C. no. 1141. "Atlantis" St. 1478; February 20, 1933; wire 5,250 feet.

1 ♀ without eggs; carapace length 19.5 mm. 4 young; carapace length 13 to 14.5 mm.

Exuma Sound, Bahamas.

B. O. C. no. 1142. "Pawnee" St. 25; March 17, 1927; wire 8,000 feet.

1 ♂; carapace length 24 mm. 1 ovigerous ♀; carapace length 25 mm.

B. O. C. no. 1143. "Pawnee" St. 33; March 22, 1927; wire 8,000 feet.

1 ♀ without eggs; carapace length 21.5 mm. 1 young; carapace length 17 mm.

Crooked Island Passage, Bahamas.

B. O. C. no. 1144. "Pawnee" St. 39; March 29, 1927; wire 8,000 feet.

1 young; carapace length 11 mm.

Caicos Passage, Bahamas.

B. O. C. no. 1145. "Pawnee" St. 46; April 4, 1927; wire 10,000 feet.

1 young; carapace length 9 mm.

B. O. C. no. 1146. "Pawnee" St. 48; April 6, 1927; wire 7,000 feet.
1 ♀ without eggs; carapace length 26.5 mm. 4 young; carapace length 7.5 to 16 mm.

Turks Island Passage, Bahamas.

B. O. C. no. 1147. "Pawnee" St. 52; April 11, 1927; wire 8,000 feet.

1 ♀ without eggs; carapace length 22 mm.

Remarks. The integument of this species is so extremely fragile that it is frequently difficult to restore preserved specimens to their true form; consequently several of the measurements given above, particularly those of young specimens, are only approximate. On the contrary, the adult male and ovigerous female from "Pawnee" station 25 are beautifully preserved and have retained their form unusually well.

Notostomus robustus Smith

Notostomus robustus Smith, 1884: 377, pl. 7, fig. 2; Chace, 1940: 168, text-fig. 41.

Off Bermuda.

B. O. C. no. 1148. "Pawnee" St. 58; April 20, 1927; wire 10,000 feet.

1 ♂; carapace length 50 mm. 1 ovigerous ♀; carapace length 53 mm. 2 young; carapace length 13 and 28 mm.

B. O. C. no. 1149. "Pawnee" St. 59; April 21, 1927; wire 8,000 feet.
1 young; carapace length 7.8 mm.

Northeast Providence Channel, Bahamas.

B. O. C. no. 1150. "Atlantis" St. 1478; February 20, 1933; wire 5,250 feet.

1 ♂; carapace length 41 mm. 4 young; carapace length 10.5 to 23 mm.

Remarks. The three adults in this collection bring to seven the total number of adult specimens recorded in the literature. Unfortunately the rostrum in the ovigerous female from "Pawnee" station 58 is severed at the level of the hind margin of the orbits, but it is quite apparent that there was no excavation in the dorsal carina at that

point, so this curious abnormality which occurred in both other adult females recorded must be regarded as the result of injury in both cases rather than to any sexual dimorphism in the species. In the male from "Atlantis" station 1478 the appendix masculina on the endopod of the second pleopods is slightly shorter than the appendix interna, indicating that specimens of this species must attain a carapace length of nearly 40 mm. before reaching maturity; therefore, the seven specimens, ranging in size from carapace lengths of 19 to 34 mm., previously recorded from off Bermuda (Chace, 1940: 169), must be regarded as immature rather than female specimens.

Notostomus atlanticus Lenz

Figures 1, 2.

Notostomus atlanticus Lenz, in Lenz and Strunck, 1914: 330; Stephensen, 1923: 61, text-fig. 20.

Notostomus longirostris Chace, 1936: 28 (part). Not *N. longirostris* Bate, 1888.

? *Notostomus westergreni* ? Chace, 1940: 171, text-fig. 43.

Tongue of the Ocean, Bahamas.

B. O. C. no. 1151. "Pawnee" St. 9; March 1, 1927; wire 4,000-7,000 feet.

2 ♀ without eggs; carapace length 21 and 23.5 mm.

B. O. C. no. 1152. "Pawnee" St. 23; March 14, 1927; wire 8,000 feet.

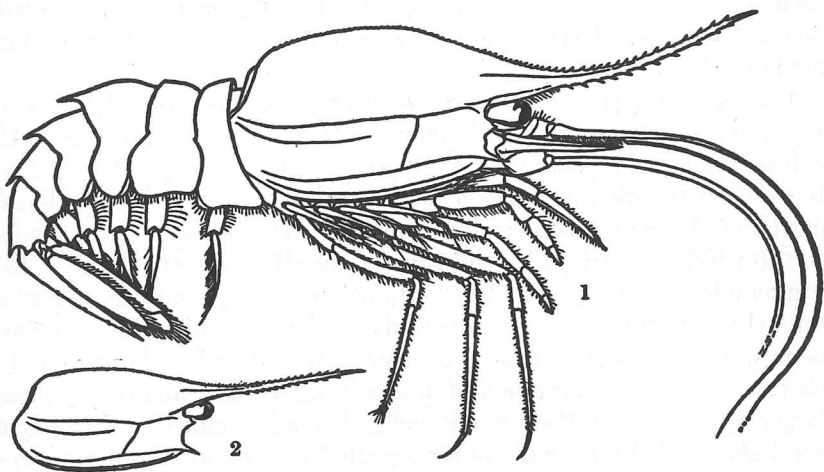
1 ♀ without eggs; carapace length 23.5 mm. 1 young; carapace length 14.1 mm.

Turks Island Passage, Bahamas.

B. O. C. no. 1153. "Pawnee" St. 52; April 11, 1927; wire 8,000 feet. 1 young; carapace length 14.1 mm.

Remarks. Kemp (1913: 66) has pointed out that so few specimens of the larger species of *Notostomus* have been recorded and so little is known of the variation with growth in these species, that it is likely to be a long time before many of them are known by their correct names. Since the only apparent difference between *N. atlanticus* (as described by Lenz and by Stephensen) and Bate's *N. longirostris* is the presence

in the former of a median lateral carina at the base of the rostrum, and since there are two specimens in the U. S. National Museum which were collected by the "Albatross" in the Philippines which agree in every respect with *N. atlanticus*, the author came to the conclusion that the failure to mention the lateral rostral carina in the description of *N. longirostris* could be explained as one of Bate's not infrequent errors of omission. Therefore, in 1936 *N. atlanticus* was synonymized with *N. longirostris*.



Figures 1-2. *Notostomus atlanticus* Lenz. 1. Female of car. 23.5 mm. ("Pawnee" St. 9). 2. Carapace of immature specimen of car. 14 mm. ("Pawnee" St. 23).

In the large collection of bathypelagic Caridea from off Bermuda, reported upon in 1940, there were two young specimens of a species probably belonging to either *N. westergreni*, *N. patentissimus* or *N. atlanticus* (the last of these three being considered a synonym of *N. longirostris*). As these two Bermudian specimens, with carapace lengths of 7.8 and 9 mm., had the dorsal carina of the carapace very little arched, they were tentatively assigned to *N. westergreni*. Now there is found in the Bingham Oceanographic Collection from the Bahamas two slightly larger immature specimens (one of them taken at the same station with a specimen which doubtless belongs to *N. atlanticus*) which appear to be intermediate between the young from off Bermuda and adult specimens of *N. atlanticus*. In these two specimens from the Bahamas the dorsal carina of the carapace is somewhat

more elevated than in the young specimens previously examined from Bermuda, but much less so than in apparently mature specimens of *N. atlanticus*. The only other difference of importance between these specimens of approximately three different sizes is the fact that the rostrum is proportionately shortest in the smallest specimens, longest in the two intermediate forms and of moderate length in the three specimens with carapace lengths exceeding 20 mm. As previous authors have often pointed out, this is apparently the normal development of the rostrum in the Oplophoridae—very short in postlarval stages, very long at the subadult size and then diminishing somewhat again in the adult.

It seems quite plausible, therefore, that all of these immature specimens are *N. atlanticus*, but if they are, then that species cannot be considered synonymous with *N. longirostris*, for the type of the latter is a specimen with a carapace length of only 8 mm., and yet the dorsal carina of the carapace is strongly vaulted. In his text, Bate referred to this specimen as a male, but in the explanation of his figure he called it a female. If the type of *N. longirostris* is in reality a male, as seems unlikely, then that species is much smaller than any other known members of the genus which have the carapace inflated. Unfortunately there is at present no method of determining whether any of the three larger specimens in the present collection are females or immature specimens. The only male so far reported was described by Stephensen as having a carapace length of 36 mm., which is considerably larger than any of the present lot.

Distribution. The type was taken by the "Gauss" west of the Cape Verde and Canary Islands, and the large male recorded by Stephensen was found by the "Thor" outside of the entrance to the Mediterranean. In addition there are the two above mentioned female or immature specimens (carapace lengths 18.2 and 22 mm.) which were taken by the "Albatross" in the Philippines. Apparently the "Valdivia" male (Balss, 1925: 268), which was taken from an albatross in the Indian Ocean, belongs to the true *N. longirostris*, for Balss notes its agreement with Bate's description and figure.

Notostomus perlatus Bate ?

? *Notostomus perlatus* Bate, 1888: 831, pl. 134, fig. 2.

Notostomus perlatus ? Chace, 1940: 170, text-fig. 42.

Northeast Providence Channel, Bahamas.

B. O. C. no. 1154. "Atlantis" St. 1478; February 20, 1933; wire 5,250 feet.

1 young; carapace length 20 mm.

Tongue of the Ocean, Bahamas.

B. O. C. no. 1155. "Pawnee" St. 23; March 14, 1927; wire 8,000 feet.

1 young; carapace length 14 mm.

Remarks. Although these two specimens undoubtedly belong to the same species as the Bermuda specimen which was previously assigned to *N. perlatus* tentatively, they fail to furnish any further clue as to whether or not these specimens with long rostra are correctly referred to *N. perlatus*. It may be noted here that immature specimens of this species have the carapace much more strongly arched dorsally than individuals of *N. atlanticus* of similar size.

Ephyrina hoskynii Wood-Mason

Ephyrina hoskynii Wood-Mason, in Wood-Mason and Alcock, 1891: 194; Chace, 1940: 173, text-fig. 44.

Tongue of the Ocean, Bahamas.

B. O. C. no. 1156. "Pawnee" St. 16; March 9, 1927; wire 7,000 feet.

1 ovigerous ♀; carapace length 25.2 mm.

Remarks. The telson of this specimen is armed on the left side with nine lateral spinules and on the right side with eight. Although this number is within the range of variation found in *E. bifida*, there is little doubt that additional records will show that the modal number of telson spines is quite distinct for *E. hoskynii* and *bifida*, and that the total absence of a median spine on the third abdominal somite distinguishes the present species at a glance.

Ephyrina bifida Stephensen

Ephyrina bifida Stephensen, 1923: 58, fig. 18; Chace, 1940: 174, text-fig. 45.

Off Bermuda.

✓ B. O. C. no. 1157. "Pawnee" St. 58; April 20, 1927; wire 10,000 feet.

1 young; carapace length 9.5 mm.

Northeast Providence Channel, Bahamas.

B. O. C. no. 1158. "Atlantis" St. 1478; February 20, 1933; wire 5,250 feet.

2 ♂; carapace length 17 mm. 2 ♀ without eggs; carapace length 19 and 36.5 mm. 1 ovigerous ♀; carapace length 32 mm.

Tongue of the Ocean, Bahamas.

✓ B. O. C. no. 1159. "Pawnee" St. 23; March 14, 1927; wire 8,000 feet.

2 ♂; carapace length 17 and 20 mm.

Exuma Sound, Bahamas.

✓ B. O. C. no. 1160. "Pawnee" St. 25; March 17, 1927; wire 8,000 feet.

1 ♂; carapace length 15.5 mm. 1 ♀ without eggs; carapace length 13 mm.

✓ B. O. C. no. 1161. "Pawnee" St. 33; March 22, 1927; wire 8,000 feet.

1 ♂; carapace length 22 mm.

Crooked Island Passage, Bahamas.

✓ B. O. C. no. 1162. "Pawnee" St. 39; March 29, 1927; wire 8,000 feet.

1 ♀ without eggs; carapace length 17 mm. 1 young; carapace length 8.2 mm.

Caicos Passage, Bahamas.

✓ B. O. C. no. 1163. "Pawnee" St. 46; April 4, 1927; wire 10,000 feet.

1 ♀ without eggs; carapace length 32 mm.

Turks Island Passage, Bahamas.

✓ B. O. C. no. 1164. "Pawnee" St. 52; April 11, 1927; wire 8,000 feet.

1 young; carapace length 7.5 mm.

Remarks. This relatively large collection of adult specimens reveals the fact that there is no appendix masculina on the endopod of the second pleopods of adult males in this species. However, in these males the endopod of the first pleopods is provided with a well defined papilla which extends beyond the main portion of that segment. In the absence of an appendix masculina there is no ready method of determining the size of young males, but the smallest male has a carapace length of only 15.5 mm., so it is very possible that some of the five specimens having a carapace length of more than 15 mm., which were referred to as females in the report on the Bermuda carideans, are in reality males. In the present specimens the number of lateral telson spines varies from five to seven, with six the number most frequently observed.

Hymenodora glacialis (Buchholz)

Pasiphae glacialis Buchholz, 1874: 279, pl. 1, fig. 2.

Hymenodora glacialis Stephensen, 1923: 59.

Northeast Providence Channel, Bahamas.

✓ B. O. C. no. 1165. "Atlantis" St. 1478; February 20, 1933; wire 5,250 feet.

2 ♂; carapace length 11 and 13.5 mm.

Exuma Sound, Bahamas.

✓ B. O. C. no. 1166. "Pawnee" St. 33; March 22, 1927; wire 8,000 feet.

1 ovigerous ♀; carapace length 12 mm.

Crooked Island Passage, Bahamas.

✓ B. O. C. no. 1167. "Pawnee" St. 41; March 30, 1927; wire 10,000 feet.

1 ♀ without eggs; carapace length 11 mm. 1 young; carapace length 8 mm.

✓ Caicos Passage, Bahamas.

B. O. C. no. 1168. "Pawnee" St. 46; April 4, 1927; wire 10,000 feet.

1 ♀ without eggs; carapace length 10 mm.

Turks Island Passage, Bahamas.

- ✓ B. O. C. no. 1169. "Pawnee" St. 54; April 12, 1927; struck bottom at 900-945 fathoms.

1 ♂; carapace length 14 mm.

Remarks. Preserved specimens of the two Atlantic species of *Hymenodora*, *H. glacialis* and *H. gracilis*, are probably more difficult to distinguish from one another than any other two species in the family, not only because of the slight differences separating them, but also due to the poor condition of the specimens in many cases. However, by using the characters which Dr. Stanley Kemp has kindly passed on to me, and which it is hoped he will publish shortly, the two species can be separated much more readily than formerly. Even though they appear superficially alike, there is little doubt that the species are distinct; previous authors have noted that in life there is a marked difference in color, and this is partially borne out by the present material, for the specimens of *H. glacialis* are of a lighter color in alcohol than those of *H. gracilis*, indicating that the pigment in the former is highly soluble in alcohol. This material also shows the fallacy of using a parallel of latitude as the limit of range of a species; *H. glacialis*, presumably a boreal species, was not found among nearly 2,000 specimens of the genus taken off Bermuda by the New York Zoological Society Expeditions, but it appears in the Bahamas nearly ten degrees farther south.

Hymenodora gracilis Smith

Hymenodora gracilis Smith, 1887: 681, pl. 12, fig. 6; Chace, 1940: 175, text-fig. 46.

Off Bermuda.

- ✓ B. O. C. no. 1170. "Pawnee" St. 58; April 20, 1927; wire 10,000 feet.

5 ♀ without eggs; carapace length 9 to 9.5 mm. 9 young; carapace length 6 to 8.5 mm. (av. 7 mm.).

- ✓ B. O. C. no. 1171. "Pawnee" St. 59; April 21, 1927; wire 8,000 feet. 1 young; carapace length 8 mm.

Northeast Providence Channel, Bahamas.

- ✓ B. O. C. no. 1172. "Atlantis" St. 1478; February 20, 1933; wire 5,250 feet.

6 ♂; carapace length 9 to 13.5 mm. (av. 12.1 mm.). 16 ♀ without eggs; carapace length 9 to 11 mm. (av. 9.6 mm.). 6 ovigerous ♀; carapace length 8.5 to 11 mm. (av. 9.6 mm.). 20 young; carapace length 3.7 to 8.5 mm. (av. 6.8 mm.).

Tongue of the Ocean, Bahamas.

✓ B. O. C. no. 1173. "Pawnee" St. 9; March 1, 1927; wire 4,000 to 7,000 feet.

3 young; carapace length 5.5 to 8 mm.

✓ B. O. C. no. 1174. "Pawnee" St. 11; March 2, 1927; wire 7,000 feet.

2 ♂; carapace length 9.5 and 12 mm. 4 ♀ without eggs; carapace length 9 to 10 mm. 7 young; carapace length 6 to 8.5 mm. (av. 8 mm.).

✓ B. O. C. no. 1175. "Pawnee" St. 16; March 9, 1927; wire 7,000 feet.

2 ♂; carapace length 10 and 11 mm. 2 ♀ without eggs; carapace length 9 and 10 mm. 1 ovigerous ♀; carapace length 9.5 mm. 5 young; carapace length 6.5 to 7 mm.

✓ B. O. C. no. 1176. "Pawnee" St. 18; March 10, 1927; wire 7,000 feet.

2 ♂; carapace length 9 and 9.5 mm. 5 ♀ without eggs; carapace length 9 to 10 mm. 3 young; carapace length 7.5 to 8 mm.

✓ B. O. C. no. 1177. "Pawnee" St. 22; March 12, 1927; wire 7,000 feet.

2 ♂; carapace length 9 and 12.5 mm. 1 ♀ without eggs; carapace length 9.5 mm. 2 ovigerous ♀; carapace length 8.5 and 10 mm.

✓ B. O. C. no. 1178. "Pawnee" St. 23; March 14, 1927; wire 8,000 feet.

1 ♂; carapace length 10 mm. 1 ♀ without eggs; carapace length 10 mm. 3 young; carapace length 5 to 8 mm.

Exuma Sound, Bahamas.

✓ B. O. C. no. 1179. "Pawnee" St. 25; March 17, 1927; wire 8,000 feet.

3 ♂; carapace length 8 to 11.5 mm. 2 ♀ without eggs; carapace length 9 and 10 mm. 1 ovigerous ♀; carapace length 9.5 mm. 3 young; carapace length 7.5 to 8.5 mm.

- ✓ B. O. C. no. 1180. "Pawnee" St. 27; March 18, 1927; wire 8,000 feet.
1 ♀ without eggs; carapace length 11 mm.
- ✓ B. O. C. no. 1181. "Pawnee" St. 31; March 21, 1927; wire 7,000 feet.
3 ♀ without eggs; carapace length 9 to 10 mm. 1 ovigerous ♀; carapace length 8.5 mm. 3 young; carapace length 8 to 8.5 mm.
- ✓ B. O. C. no. 1182. "Pawnee" St. 33; March 22, 1927; wire 8,000 feet.
3 ♂; carapace length 10 to 13 mm. 6 ♀ without eggs; carapace length 9 to 10 mm. 2 young; carapace length 6 and 6.5 mm.
- ✓ B. O. C. no. 1184. "Pawnee" St. 35; March 23, 1927; wire 7,500 feet.
1 ♂; carapace length 9 mm.
- Crooked Island Passage, Bahamas.
- ✓ B. O. C. no. 1185. "Pawnee" St. 39; March 29, 1927; wire 10,000 feet.
7 ♂; carapace length 8.5 to 13.5 mm. (av. 10.8 mm.). 12 ♀ without eggs; carapace length 9 to 10.5 mm. 2 ovigerous ♀; carapace length 9.5 and 10 mm. 21 young; carapace length 6.5 to 8.5 mm. (av. 7.7 mm.).
- Caicos Passage, Bahamas.
- ✓ B. O. C. no. 1186. "Pawnee" St. 46; April 4, 1927; wire 10,000 feet.
1 ♂; carapace length 14 mm. 1 ♀ without eggs; carapace length 10 mm. 2 young; carapace length 8 and 8.5 mm.
- ✓ B. O. C. no. 1187. "Pawnee" St. 48; April 6, 1927; wire 7,000 feet.
7 ♂; carapace length 9 to 14 mm. (av. 11.4 mm.). 4 ♀ without eggs; carapace length 9 to 10 mm. 1 ovigerous ♀; carapace length 11 mm. 6 young; carapace length 6 to 8.5 mm.
- Turks Island Passage, Bahamas.
- ✓ B. O. C. no. 1188. "Pawnee" St. 52; April 11, 1927; wire 8,000 feet.
3 ♂; carapace length 9.5 to 12 mm. 2 ♀ without eggs; carapace length 9 mm. 2 ovigerous ♀; carapace length 9 and 10.5 mm. 4 young; carapace length 6 to 8.5 mm.

✓ B. O. C. no. 1189. "Pawnee" St. 54; April 12, 1927; struck bottom at 900-945 fathoms.

1 ♂; carapace length 10 mm.

✓ B. O. C. no. 1190. "Pawnee" St. 56; April 13, 1927; wire 6,500 feet.

1 ♂; carapace length 10.5 mm. 1 ♀ without eggs; carapace length 9.5 mm. 1 young; carapace length 6.5 mm.

Remarks. It may be noted from the above measurements that an occasional male with a carapace length of only 8 mm. is recognizable as such, but usually the appendix masculina on the endopod of the second pleopods is more or less vestigial even in specimens having a carapace length of 9 mm., so this measurement has been accepted as the point of demarcation between mature and immature specimens. As noted in the Bermuda collection previously reported upon, females apparently mature at a smaller size than males; the present collection contains two ovigerous specimens which have a carapace length of only 8.5 mm.

Systellaspis braueri (Balss)

Acanthephyra braueri Balss, 1914: 594.

Systellaspis braueri Chace, 1940; 180, text-fig. 50.

Caicos Passage, Bahamas.

B. O. C. no. 1191. "Pawnee" St. 46; April 4, 1927; wire 10,000 feet.

1 ♀ (abdomen only).

Systellaspis debilis (A. Milne Edwards)

Acanthephyra debilis A. Milne Edwards, 1881a: 13.

Systellaspis debilis Chace, 1940: 181, text-fig. 51.

Off Bermuda

✓ B. O. C. no. 1192. "Pawnee" St. 58; April 20, 1927; wire 10,000 feet.

23 ♂; carapace length 7.6 to 13 mm. (av. 10.1 mm.). 13 ♀ without eggs; carapace length 7.7 to 13 mm. (av. 9.6 mm.). 7 ovigerous ♀ (2 with eyed eggs); carapace length 12 to 14.2 mm. (av. 13.1 mm.). 19 young; carapace length 4 to 7.2 mm. (av. 5.2 mm.).

✓ B. O. C. no. 1195. "Pawnee" St. 59; April 21, 1927; wire 8,000 feet.

16 ♂; carapace length 8 to 13 mm. (av. 11 mm.). 2 ♀ without eggs; carapace length 9 and 11 mm. 5 ovigerous ♀; carapace length 11 to 14 mm. (av. 12.3 mm.). 2 young; carapace length 6 mm.

Northeast Providence Channel, Bahamas.

✓ B. O. C. no. 1196. "Atlantis" St. 1478; February 20, 1933; wire 5,250 feet.

15 ♂; carapace length 9 to 12.5 mm. (av. 10.2 mm.). 11 ♀ without eggs; carapace length 8.5 to 12 mm. (av. 10 mm.). 3 ovigerous ♀ (2 with eyed eggs); carapace length 11.5 to 12 mm. 1 young; carapace length 4.2 mm.

Tongue of the Ocean, Bahamas.

✓ B. O. C. no. 1197, "Pawnee" St. 7; February 28, 1927; wire 6,000 feet.

8 ♂; carapace length 9 to 11 mm. (av. 10.4 mm.). 4 ♀ without eggs; carapace length 9 to 11 mm. (av. 10 mm.). 1 ovigerous ♀ (with eyed eggs); carapace length 13 mm. 2 young; carapace length 7 mm.

✓ B. O. C. no. 1198. "Pawnee" St. 9; March 1, 1927; wire 4,000 to 7,000 feet.

27 ♂; carapace length 7.2 to 13.5 mm. (av. 11.1 mm.). 6 ♀ without eggs; carapace length 8 to 11.5 mm. (av. 10.7 mm.). 10 ovigerous ♀; carapace length 11.5 to 13 mm. (av. 12.4 mm.).

✓ B. O. C. no. 1199. "Pawnee" St. 11; March 2, 1927; wire 7,000 feet.

8 ♂; carapace length 9 to 12 mm. (av. 10.7 mm.). 4 ovigerous ♀; carapace length 12 to 13 mm. (av. 12.4 mm.). 1 young; carapace length 7 mm.

✓ B. O. C. no. 1201. "Pawnee" St. 16; March 9, 1927; wire 7,000 feet.

6 ♂; carapace length 10.5 to 12 mm. (av. 11.2 mm.). 2 ♀ without eggs; carapace length 11.5 and 12 mm. 4 ovigerous ♀; carapace length 12 to 13 mm. (av. 12.7 mm.). 1 young; carapace length 5 mm.

✓ B. O. C. no. 1202. "Pawnee" St. 18; March 10, 1927; wire 7,000 feet.

14 ♂; carapace length 9 to 13.5 mm. (av. 11.6 mm.). 7 ♀ without eggs; carapace length 8.5 to 12.5 mm. (av. 10.7 mm.). 6 ovigerous

♀ (1 with eyed eggs); carapace length 11.5 to 13 mm. (av. 12.3 mm.).

✓ B. O. C. no. 1203. "Pawnee" St. 22; March 12, 1927; wire 7,000 feet.

4 ♂; carapace length 9.5 to 11 mm. (av. 10.5 mm.). 2 ♀ without eggs; carapace length 10 and 11.5 mm. 3 ovigerous ♀; carapace length 12 to 13 mm.

✓ B. O. C. no. 1204. "Pawnee" St. 23; March 14, 1927; wire 8,000 feet.

8 ♂; carapace length 8.5 to 13 mm. (av. 10.9 mm.). 5 ♀ without eggs; carapace length 8.5 to 11.5 mm. (av. 10.5 mm.). 3 ovigerous ♀ (1 with eyed eggs); carapace length 12.5 to 13 mm.

Exuma Sound, Bahamas.

✓ B. O. C. no. 1205. "Pawnee" St. 25; March 17, 1927; wire 8,000 feet.

4 ♂; carapace length 9 to 12 mm. (av. 10.7 mm.). 6 ♀ without eggs; carapace length 9 to 12 mm. (av. 10.4 mm.). 3 ovigerous ♀ (1 with eyed eggs); carapace length 11 to 11.5 mm.

✓ B. O. C. no. 1206. "Pawnee" St. 27; March 18, 1927; wire 8,000 feet.

13 ♂; carapace length 10 to 13 mm. (av. 11.5 mm.). 22 ♀ without eggs; carapace length 9 to 12.5 mm. (av. 10.8 mm.). 30 ovigerous ♀ (4 with eyed eggs); carapace length 11.2 to 12.5 mm. (av. 12.1 mm.). 1 young; carapace length 6.5 mm.

✓ B. O. C. no. 1207. "Pawnee" St. 31; March 21, 1927; wire 7,000 feet.

1 ♂; carapace length 12 mm. 1 ♀ without eggs; carapace length 11.5 mm. 3 ovigerous ♀ (1 with eyed eggs); carapace length 11.5 to 12 mm.

✓ B. O. C. no. 1208. "Pawnee" St. 33; March 22, 1927; wire 8,000 feet.

5 ♂; carapace length 11.5 to 12 mm. (av. 11.7 mm.). 1 ♀ without eggs; carapace length 10.5 mm. 2 ovigerous ♀ (1 with eyed eggs); carapace length 12 mm. 1 young; carapace length 5 mm.

✓ B. O. C. no. 1209. "Pawnee" St. 35; March 23, 1927; wire 7,500 feet.

3 ♂; carapace length 10 to 12 mm. (av. 11.2 mm.). 1 ♀ without eggs; carapace length 8 mm.

Crooked Island Passage, Bahamas.

✓ B. O. C. no. 1210. "Pawnee" St. 39; March 29, 1927; wire 8,000 feet.

13 ♂; carapace length 7.2 to 12 mm. (av. 10.6 mm.). 5 ♀ without eggs; carapace length 8 to 12 mm. (av. 10.9 mm.). 6 ovigerous ♀ (3 with eyed eggs); carapace length 11 to 12 mm. (av. 11.5 mm.).

✓ B. O. C. no. 1211. "Pawnee" St. 41; March 30, 1927; wire 10,000 feet.

3 ♂; carapace length 7.2 to 10.5 mm. (av. 8.7 mm.). 1 ♀ without eggs; carapace length 11 mm. 1 ovigerous ♀; carapace length 11.3 mm.

Caicos Passage, Bahamas.

B. O. C. no. 1212. "Pawnee" St. 46; April 4, 1927; wire 10,000 feet.

✓ 4 ♂; carapace length 8 to 11 mm. (av. 9.4 mm.). 2 ♀ without eggs; carapace length 9 and 10 mm. 1 ovigerous ♀; carapace length 12 mm.

✓ B. O. C. no. 1213. "Pawnee" St. 48; April 6, 1927; wire 7,000 feet.

3 ♂; carapace length 8.5 to 12 mm. (av. 10.5 mm.).

Turks Island Passage, Bahamas.

✓ B. O. C. no. 1214. "Pawnee" St. 52; April 11, 1927; wire 8,000 feet.

4 ♂; carapace length 9 to 10.5 mm. (av. 9.7 mm.). 2 young; carapace length 6.2 and 6.7 mm.

✓ B. O. C. no. 1215. "Pawnee" St. 54; April 12, 1927; struck bottom at 900-945 fathoms.

3 ♂; carapace length 9 to 12 mm. (av. 10.6 mm.). 3 ♀ without eggs; carapace length 9 to 10 mm. (av. 9.3 mm.).

✓ B. O. C. no. 1216. "Pawnee" St. 56; April 13, 1927; wire 6,500 feet.

6 ♂; carapace length 9 to 11.5 mm. (av. 10. mm.). 2 ♀ without eggs; carapace length 9 and 10.5 mm. 1 ovigerous ♀; carapace length 11 mm. 1 young; carapace length 5.7 mm.

East of Bahamas Islands.

B. O. C. no. 1217. "Atlantis" St. 1479 (Haul 3); February 27, 1933; wire 82-492 feet.

20 ♂; carapace length 7.5 to 11 mm. (av. 9.1 mm.). 18 ♀ without eggs; carapace length 7.5 to 12 mm. (av. 9.7 mm.). 2 ovigerous ♀; carapace length 12 mm. 4 young; carapace length 3.2 to 6.5 mm. (av. 4.4 mm.).

Remarks. Except for slightly extending the size range of the species, this series of 455 specimens (211 ♂, 209 ♀, of which 95 are ovigerous, and 35 young) confirms the conclusions already drawn from the Bermuda collection previously studied. As in the latter, the carapace length of young males, in which the appendix masculina of the endopod of the second pleopods is little more than a bud, varies from 7.2 to 7.8 mm. The largest male has a carapace length of 13.5 mm. and the largest female 14.2 mm.; the smallest ovigerous female has a carapace length of 11 mm.

Systellaspis affinis (Faxon)

Figure 3.

AcanthePHYra affinis Faxon, 1896: 162, pl. 2, figs. 1-3.

Systellaspis affinis de Man, 1920: 43; Chace, 1936: 29; Calman, 1939: 190.

AcanthePHYra purpurea Boone, 1927: 104 (part).

Tongue of the Ocean, Bahamas.

B. O. C. no. 1762. "Pawnee"; March 20, 1925; 300-400 fathoms; trawl.

1 ♂; carapace length 7.3 mm. 1 ♀ or young; carapace length 5 mm.

Gulf of Mexico west of Mississippi Delta.

B. O. C. no. 1919. "Atlantis" St. 2381 (Trawl I); March 26, 1935; depth 165 fathoms, on bottom.

5 ♂; carapace length 12.5 to 15.5 mm. (av. 14.2 mm.). 2 ♀ without eggs; carapace length 13 mm. 5 ovigerous ♀ (1 with eyed eggs); carapace length 13.5 to 16.5 mm. (av. 14.9 mm.).

B. O. L. no. 1220. "Atlantis" St. 2381 (Trawl II); March 26, 1935; depth 180-160 fathoms, on bottom.

1 ♂; carapace length 12.2 mm.

Caribbean.

B. O. C. no. 1221. "Atlantis" St. 1939; February 3, 1934; wire 450 feet. 1 specimen.

*Remarks.*⁵ This species can be distinguished from *S. debilis*, the only closely related species so far recorded from the western Atlantic, by the much larger eyes, more inflated carapace, and the absence of a lateral row of denticles on the hind margins of the fourth and fifth

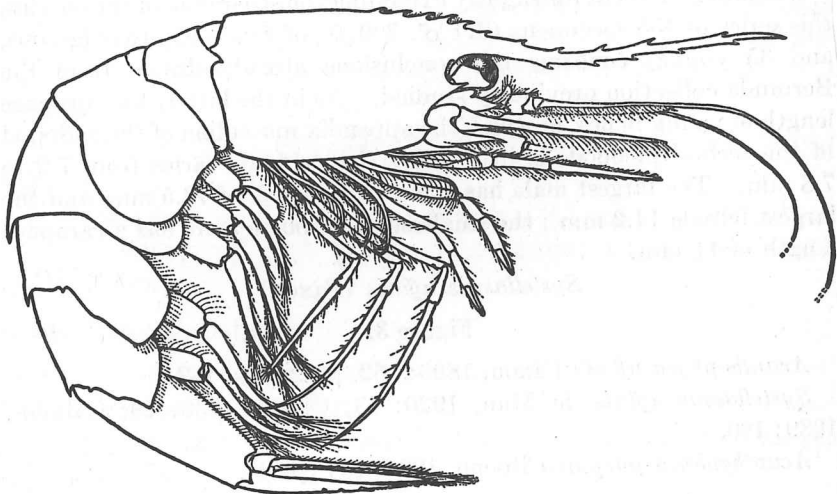


Figure 3. *Systellaspis affinis* (Faxon). Male of car. 15 mm. ("Atlantis" St. 2381).

abdominal somites. Based on the present series, it appears to be a somewhat larger species than *S. debilis*, but it may be noted that the appendix masculina on the endopod of the second pleopods is not so rudimentary in the male from the Tongue of the Ocean as it is in males

⁵ Coloration and behavior of living specimens at "Atlantis" St. 2381, from field notes of M. D. Burkenroad: General appearance, transparent marked with red bands. Scattered vermilion chromatophores over entire body except on anterodorsal surface of carapace and, in some of the specimens, on proximal part of uropod. A band of vermilion in middle of dorsum of carapace, at postero-lateral edge of each pleonic tergite, and at tip of telson. Patches of vermilion at bases of pleopods, on walking legs, and on antennular and antennal peduncles. Eye golden-red. Eggs, ovary and stomach brilliant vermilion. Although these prawns swam about actively for some time, they were not observed to discharge luminescent material as did *Oplophorus gracilirostris* which were taken in the same haul.

of *S. debilis* of comparable size, so maturity is apparently reached in *S. affinis* at an early age.

Distribution. For many years after its description this species was known only from the holotype female taken by the "Blake" in 1878-79 off Grenada. Calman records 45 specimens taken by the John Murray Expedition at one station off Zanzibar, and I have been privileged to examine 26 specimens in the U. S. National Museum, collected near the Virgin Islands by the "Caroline" and in the Philippines and the Malay Archipelago by the "Albatross."

Oplophorus spinicauda A. Milne Edwards

Oplophorus spinicauda A. Milne Edwards, 1883; Chace, 1940: 184, text-fig. 54.

Acantheephyra anomala Boone, 1927: 104.

Northwest Providence Channel, Bahamas.

B. O. C. no. 1222. "Pawnee" St. 5; February 26, 1927; wire 5,000 feet.

2 ♂; carapace length 6.2 and 8.4 mm. 1 ♀ without eggs; carapace length 7 mm. 2 ovigerous ♀ (1 with eyed eggs); carapace length 8.2 and 9 mm.

Northeast Providence Channel, Bahamas.

B. O. C. no. 1223. "Atlantis" St. 1478; February 20, 1933; wire 5,250 feet.

1 ♀ without eggs; carapace length 8.9 mm.

Tongue of the Ocean, Bahamas.

B. O. C. no. 1224. "Pawnee" St. 7; February 28, 1927; wire 6,000 feet.

1 ♂; carapace length 6.3 mm. 3 young; carapace length 3.5 to 5.6 mm.

B. O. C. no. 1225. "Pawnee" St. 9; March 1, 1927; wire 4,000-7,000 feet.

4 ♂; carapace length 6.1 to 7.5 mm. 5 young; carapace length 4.8 to 5.9 mm.

B. O. C. no. 1227. "Pawnee" St. 11; March 2, 1927; wire 7,000 feet.

1 ♂; carapace length 7.3 mm.

B. O. C. no. 1228. "Pawnee" St. 16; March 9, 1927; wire 7,000 feet.
2 ♂; carapace length 6.2 mm. 3 young; carapace length 4.1 to 5.8 mm.

B. O. C. no. 1229. "Pawnee" St. 18; March 10, 1927; wire 7,000 feet.

1 ♂; carapace length 6.8 mm. 2 young; carapace length 5.3 to 5.7 mm.

B. O. C. no. 1230. "Pawnee" St. 23; March 14, 1927; wire 8,000 feet.

1 ♂; carapace length 6.2 mm. 6 young; carapace length 3.9 to 4.9 mm.

Exuma Sound, Bahamas.

B. O. C. no. 1231. "Pawnee" St. 25; March 17, 1927; wire 8,000 feet.

1 young; carapace length 5.3 mm.

B. O. C. no. 1232. "Pawnee" St. 27; March 18, 1927; wire 8,000 feet.

2 young; carapace length 4 and 4.1 mm.

B. O. C. no. 1233. "Pawnee" St. 31; March 21, 1927; wire 7,000 feet.

2 ♂; carapace length 7 and 7.9 mm.

B. O. C. no. 1234. "Pawnee" St. 33; March 22, 1927; wire 8,000 feet.

1 ♂; carapace length 8 mm.

Crooked Island Passage, Bahamas.

B. O. C. no. 1235. "Pawnee" St. 43; March 31, 1927; wire 4,000 feet.

2 ♀ without eggs; carapace length 6.1 and 7 mm.

Caicos Passage, Bahamas.

B. O. C. no. 1236. "Pawnee" St. 46; April 4, 1927; wire 10,000 feet.

1 ovigerous ♀; carapace length 9 mm. 1 young; carapace length 4.2 mm.

B. O. C. no. 1237. "Pawnee" St. 47; April 5, 1927; wire 3,500 feet. 1 ♀ without eggs; carapace length 6.2 mm. 1 young; carapace length 4.2 mm.

B. O. C. no. 1238. "Pawnee" St. 48; April 6, 1927; wire 7,000 feet. 1 ♂; carapace length 7.6 mm.

Turks Island Passage, Bahamas.

B. O. C. no. 1239. "Pawnee" St. 52; April 11, 1927; wire 8,000 feet. 1 ♂; carapace length 8.8 mm. 1 ovigerous ♀ (with eyed eggs); carapace length 9 mm.

B. O. C. no. 1240. "Pawnee" St. 54; April 12, 1927; struck bottom at 900-945 fathoms.

1 ovigerous ♀; carapace length 8.7 mm.

Caribbean.

B. O. C. nos. 1763 and 1764. "Pawnee"; April 20, 1925 (north of Glover Reef, British Honduras); 484 fathoms.

1 ♀ without eggs (HOLOTYPE of *AcanthePHYRA anomala* Boone); carapace length 7.7 mm. 1 young (paratype of *A. anomala*); carapace length 5.5 mm.

B. O. C. no. 1242. "Atlantis" St. 1939; February 3, 1934; wire 450 feet. 1 specimen.

Remarks. The facts that no less than 50 specimens of this species were taken by the "Pawnee" and "Atlantis" in the Bahaman area and that few hauls were made in that region without capturing at least one specimen indicate that the species is much more prevalent there than in the Bermuda area studied.

In the previous paper it was pointed out that there is no appendix masculina on the endopod of the second pleopods in males of *O. spinicauda*, but that males can be distinguished from females and young by the more concave or sinuous lower margin of the first abdominal pleura. The sex of the present specimens has been determined by that method, but it is by no means certain that this is always a reliable secondary sex character. In young specimens, less than 5.5 mm. in carapace length, the first abdominal pleuron is quite distinctly convex; in all larger specimens without eggs the lower border of this segment is almost always more or less concave, but apparently it is

distinctly more strongly so in males than in females; in ovigerous females there is scarcely a trace of this concavity, whereas in males of comparable size the margin of this somite is strongly indented near the middle. Until additional material is available for study it is nearly impossible to determine whether or not the character noted in ovigerous females is to be expected in all fully mature females or whether it is present only during the moult when eggs are carried. As a more or less arbitrary line of demarcation, a carapace length of 6 mm. has been chosen as the size of the smallest adult specimens, although it will be noted that the smallest ovigerous females have a carapace length of 8.2 mm.

Oplophorus gracilirostris A. Milne Edwards

Figures 4-7.

Oplophorus gracilirostris A. Milne Edwards, 1881a: 6; A. Milne Edwards, 1883.

Oplophorus longirostris Bate, 1888: 765, pl. 127, fig. 2.

Hoplophorus smithii Wood-Mason and Alcock, 1891: 194.

? *Hoplophorus typus* Balss, 1925: 248, text-figs. 21-23.

Oplophorus gracilirostris Chace, 1936: 30.

? *Hoplophorus typus* Calman, 1939: 188.

Northwest Providence Channel, Bahamas.

B. O. C. no. 1243. "Pawnee" St. 5; February 26, 1927; wire 5,000 feet.

1 young; carapace length 2.9 mm.

Tongue of the Ocean, Bahamas.

B. O. C. no. 1244. "Pawnee" St. 7; February 28, 1927; wire 6,000 feet.

1 ♀ without eggs; carapace length 8.5 mm. 2 young; carapace length 6 mm.

B. O. C. no. 1246. "Pawnee" St. 9; March 1, 1927; wire 4,000-7,000 feet.

1 ♀ without eggs; carapace length 8.5 mm.

B. O. C. no. 1247. "Pawnee" St. 11; March 2, 1927; wire 7,000 feet.

1 ♂; carapace length 16.2 mm. 1 ♀ without eggs; carapace length 9 mm.

B. O. C. no. 1248. "Pawnee" St. 16; March 9, 1927; wire 7,000 feet.
4 ♀ without eggs; carapace length 7.2 to 10 mm.

B. O. C. no. 1249. "Pawnee" St. 20 (otter trawl); March 11, 1927;
depth 710-720 fathoms.

1 ♀ without eggs; carapace length 13 mm.

B. O. C. no. 1250. "Pawnee" St. 23; March 14, 1927; wire 8,000
feet.

1 ♀ without eggs; carapace length 8.5 mm.

Turks Island Passage, Bahamas.

B. O. C. no. 1251. "Pawnee" St. 52; April 11, 1927; wire 8,000 feet.

1 ♂; carapace length 12.5 mm.

Gulf of Mexico, off Mississippi Delta.

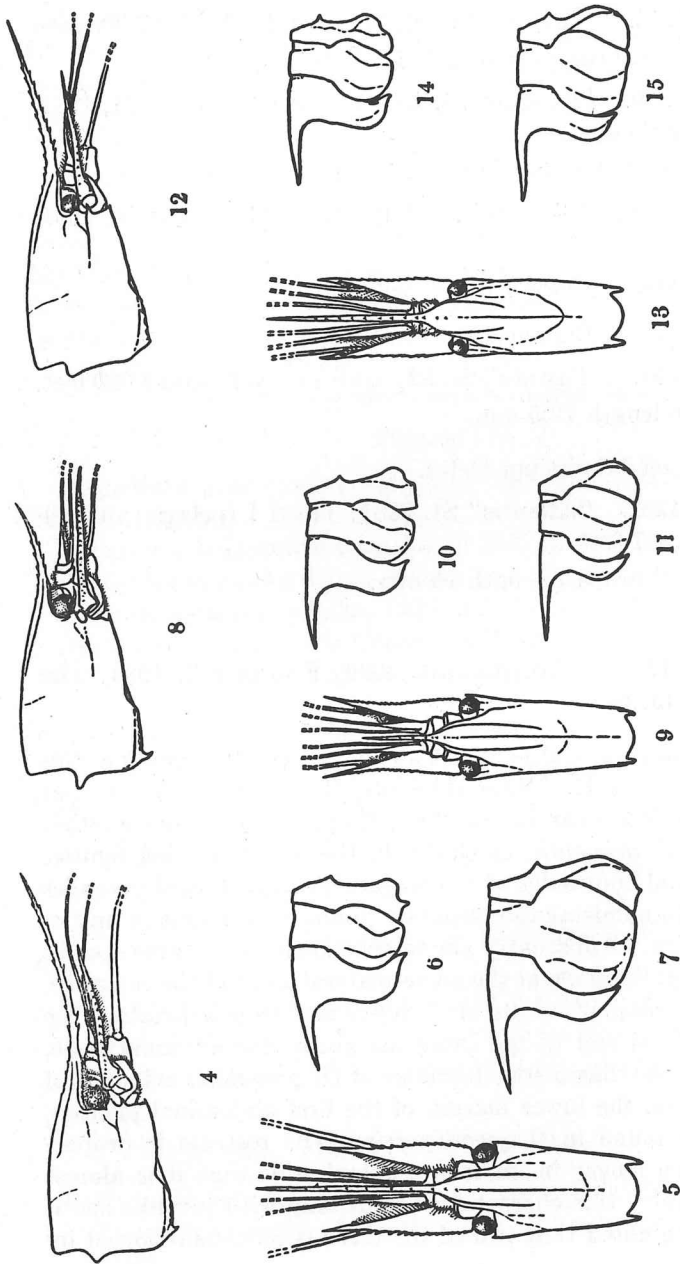
B. O. C. no. 1252. "Atlantis" St. 2381; Trawl I (pelagic); March
26, 1935; wire 2,067 feet.

1 ovigerous ♀; carapace length 15 mm.

Caribbean.

B. O. C. no. 1253. "Atlantis" St. 1939; February 3, 1934; wire
450 feet. 4 specimens.

Remarks. Although Balss and Calman prefer to combine this species with *O. typus* H. Milne Edwards, the author believes that adults of the two forms can be readily distinguished from one another as well as from *O. grimaldii*, as shown in the accompanying figures. Without additional knowledge of the diagnostic characters of juveniles it is impossible to unmistakably separate young individuals of any of these three species. Apparently young specimens of all three species lack the following: the spine at the posterolateral angle of the carapace, which is characteristic of adults of *O. typus* and *O. gracilirostris*; the barb near the distal end of the inner margin of the antennal scale, which is usually the diagnostic character of *O. grimaldii*; evidence of a spine or tooth on the lower margin of the first abdominal pleuron, which is usually found in *O. gracilirostris*. The rostrum is proportionately so much longer in immature oplophorids that it is almost impossible to employ this character when dealing with juvenile specimens. It may be noted that two of the three specimens reported by



Figures 4-15. *Ophiophorus gracitirostris* A. Milne Edwards. 4. Lateral view of carapace of ♂ of car. 16.2 mm. ("Fawnee" St. 11). 5. Dorsal view of carapace of same specimen. 6. First three abdominal somites of same specimen. 7. First three abdominal somites of ovigerous ♀ of car. 18 mm. ("Atlantis" St. 1934A).
O. typus H. Milne Edwards. 8. Lateral view of carapace of ♂ of car. 16.2 mm. ("Albatross" St. 5630). 9. Dorsal view of carapace of same specimen. 10. First three abdominal somites of same specimen. 11. First three abdominal somites of ovigerous ♀ of car. 12 mm. ("Albatross" St. 5621).
O. grimaldii Coutière. 12. Lateral view of carapace of ♂ of car. 16.2 mm. ("Fawnee" St. 27). 13. Dorsal view of carapace of same specimen. 14. First three abdominal somites of same specimen. 15. First three abdominal somites of ovigerous ♀ of car. 15 mm. ("Fawnee" St. 58).

Balss, and 16 of the 23 specimens from the John Murray Expedition, which Calman studied, were young, and this fact may well have influenced those workers' conclusions. As was pointed out previously, the barb on the antennal scale is sometimes missing even in adults of *O. grimaldii*, possibly through injury, and since the posterolateral angle of the carapace in that species is at times more or less produced, the characters separating *O. grimaldii* and *O. gracilirostris* are certainly no more marked than they are between the latter and *O. typus*. It may be shown eventually that the distinguishing structures of these three species are of a purely environmental order, but until they are so proved it seems best to keep the species separate as far as possible.

The present series of *O. gracilirostris* offers no clue to the size of specimens at maturity, and the carapace length of the smallest identifiable males of *O. grimaldii* (about 7 mm.) was used again in this case as an arbitrary dividing line between immature and mature specimens. As the largest specimen of *O. gracilirostris* has a carapace length of 18 mm., somewhat longer than in any specimen of *O. grimaldii*, it may well be that this species is slightly larger than the latter, and maturity might not be reached at such a small size. In specimens with a carapace length of about 7 mm. the posterolateral spine on the carapace is just discernible as a low angle; it gradually increases in size and acuteness but does not become sharp until a carapace length of about 10 mm. has been reached.

M. D. Burkenroad,⁶ who was a member of the expedition in 1935, has noted that the ovigerous female taken at "Atlantis" Station 2381, March 26, 1935, threw off jets of blue luminescence in the branchial current; he was unable to locate any external photophores in this form, whereas they are quite obvious in fresh material of *O. grimaldii*.⁷

Oplophorus grimaldii Coutiere

Figures 12-15.

Hoplophorus grimaldii Coutiere, 1905: 1114.

Oplophorus grimaldii Chace, 1940: 187, text-fig. 55.

⁶ Burkenroad, 1936: 100.

⁷ Coloration of living specimen at "Atlantis" St. 2381, from field notes of M. D. Burkenroad: General appearance entirely red, there being a dense scarlet wash over the entire body, deepest on the mouthparts. Eggs and gut deep scarlet, gastric glands pale, eye reddish.

Off Bermuda.

B. O. C. no. 1254. "Pawnee" St. 58; April 20, 1927; wire 10,000 feet.
1 ♂; carapace length 8 mm. 1 ♀ without eggs; carapace length
8.5 mm. 1 ovigerous ♀; carapace length 15 mm.

B. O. C. no. 1255. "Pawnee" St. 59; April 21, 1927; wire 8,000 feet.
1 ♀ without eggs; carapace length 10.5 mm.

Northeast Providence Channel, Bahamas.

B. O. C. no. 1256. "Atlantis" St. 1478; February 20, 1933; wire
5,250 feet.

3 ♂; carapace length 13 to 14 mm.

Exuma Sound, Bahamas.

B. O. C. no. 1257. "Pawnee" St. 27; March 18, 1927; wire 8,000
feet.

3 ♂; carapace length 14.5 to 16.2 mm. 1 ovigerous ♀; carapace
length 11.8 mm.

Crooked Island Passage, Bahamas.

B. O. C. no. 1258. "Pawnee" St. 39; March 29, 1927; wire 8,000
feet.

2 ♂; carapace length 13 and 14 mm.

B. O. C. no. 1259. "Pawnee" St. 41; March 30, 1927; wire 10,000
feet.

1 ♂; carapace length 15.5 mm.

Caicos Passage, Bahamas.

B. O. C. no. 1260. "Pawnee" St. 46; April 4, 1927; wire 10,000 feet.
1 ♀ without eggs; carapace length 9 mm.

B. O. C. no. 1261. "Pawnee" St. 48; April 6, 1927; wire 7,000 feet.
1 ♂; carapace length 11 mm. 1 ovigerous ♀ (with eyed eggs);
carapace length 12.5 mm.

Turks Island Passage, Bahamas.

B. O. C. no. 1263. "Pawnee" St. 52; April 11, 1927; wire 8,000 feet.

1 ♂; carapace length 14.5 mm.

B. O. C. no. 1262. "Pawnee" St. 56; April 13, 1927; wire 6,500 feet. 1 ♂; carapace length 13 mm. 1 ♀ without eggs; carapace length 11 mm. 1 ovigerous ♀; carapace length 12 mm.

East of Bahama Islands.

B. O. C. no. 1264. "Atlantis" St. 1479 (Haul 3); February 27, 1933; wire 82-492 feet.

1 ovigerous ♀; carapace length 11.5 mm.

B. O. C. no. 1265. "Atlantis"; February 8, 1935; night; wire 35-40 meters.

1 ♂; carapace length 9 mm. 1 young; carapace length 6.5 mm.

*Remarks.*⁸ This series of specimens bears out the conclusions reached in the previous report on the Bermuda collection; as in that material, the smallest ovigerous female has a carapace length of approximately 11.5 mm. and all females larger than that are carrying eggs. For a discussion of the relationships of this species, see the remarks under *O. gracilirostris*.

⁸ Coloration of a living specimen in "Atlantis" sargassum-haul of February 8, 1935, from field notes of M. D. Burkenroad: Cephalothorax and pleon with coarse red stipple of chromatophores; metallic green-gold lustre over-all, particularly marked in branchial region. Posterolateral region of each pleonic segment orange-red. Uropods, telson, antennulae, and antennae and scales transparent. Eyes black with glowing yellowish central reflection. Internal thoracic organs bright red. A small purple spot at bases of pleopods, and a row of four on posterolateral surfaces of carapace.

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