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Station	No. 39.	Profond.	14	brasses.	À 16 milles N. des iles Jolbos.
"	No. 79.	"	175	"	À 1 mille près de la Havane.
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"	No. 277.	"	106	"	" "

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Station No. 10. Profond. 37 brasses. Lat. 24° 44′ N., Long. 83° 26′ O.

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Station	No. 10.	Profond.	37	brasses.	Lat. 24° 44′ N., Long. 83° 26′ O.
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"	No. 65.	"	127	"	Près de la Havane.
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Expéd. du Hassler. Profond. 100 brasses. Barbades.

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Station No. 39. Profond. 14 brasses. À 16 milles N. des iles Jolbos.

13. **Mithraculus sculptus** (Lamark).

Bahia Honda. Tortugas.

14. **Mithraculus cinctimanus** (Stimpson).

Station	No. 10.	Profond.	37	brasses.	Lat. 24° 44′ N., Long. 83° 26′ O.
"	No. 39.	"	14	"	Aux environs des iles Jolbos, Key West.

15. **Mithraculus sculptus** (Lamark).

Récifs de la Floride. Bahia Honda.

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Station No. 127. Profond. 38 brasses. Santa Cruz.

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Station	No. 58.	Profond.	242	brasses.	Lat. 22° 9′ 30″ N., Long. 82° 11′ 30″ O.
"	No. 148.	"	208	"	St. Kitts.
"	No. 208.	"	213	"	Martinique.
"	No. 218.	"	164	"	Ste. Lucie.

Station No. 232.	Profond.	88	brasses.	St. Vincent.
" No. 269.	"	124	"	St. Vincent.
" No. 280.	"	221	"	Barbades.
" No. 291.	"	200	"	Barbades.
" No. 295.	"	180	"	Barbades.

18. **Amathia crassa** (A. M.-Edwards, *op. cit.*, p. 203, pl. 28, fig. 2).

Station No. 5. Profond. 152 brasses. Lat. 24° 15′ N., Long. 82° 13′ O.

TRACHYMAIA (nov. gen.).

La carapace est courte, large et bombée en arrière. Le rostre est petit et formé de deux cornes légèrement divergentes. L'espace interorbitaire est de largeur médiocre, les orbites sont très ouvertes en dessus et en dessous. L'œil, dont la cornée est un peu comprimée d'avant en arrière, se replie dans une fossette creusée à la base d'une épine postorbitaire. L'article basilaire des antennes est très étroit, comme chez les *Amathia*, et il ne cloisonne pas l'orbite en dessous, la tigelle mobile est inserée à découvert de chaque côté du rostre, les deux premiers articles atteignent l'extrémité de celui-ci sa portion multiarticulée est très courte. Le plancher de l'orbite est armé d'une épine sur son bord. Les doigts des pinces sont terminés par des doigts aigus. Les pattes ambulatoires diminuent graduellement de longueur de la première à la dernière et la différence de taille est très considérable entre celles-ci. Les doigts ne sont pas préhensiles, leur bord inférieur est lisse.

Ce genre doit prendre place à côté des *Halimus* et des Amathia.

19. **Trachymaia cornuta** (nov. sp.).

La carapace est granuleuse et porte quelques épines. Sur la région gastrique, il en existe quatre disposées en croix. Le lobe cardiaque antérieur en présente deux situées sur la ligne médiane. Les régions branchiales sont surmontées de quatre ou cinq spinules. Les bords latéraux postérieurs sont garnis d'une ceinture de courtes épines, le bord sourcilier est armé d'une épine dirigée en avant. L'article basilaire des antennes externes est orné de trois petites épines l'une terminale les deux autres situées le long du bord orbitaire. Le bras et l'avant bras des pattes antérieures sont spinuleux, la main est lisse. Les pattes ambulatoires sont revêtues de quelques poils courts et très rares. L'abdomen et le plastron sternal présentent quelques très fines granulations.

Largeur de la carapace d'un mâle	0.010
Longueur	0.012

Station No. 134.	Profond.	248	brasses.	Santa Cruz.
" No. 291.	"	200	"	Barbades.
" No. 299.	"	140	"	Barbades.
" No. 300.	"	82	"	Barbades.

20. **Nibilia armata** (nov. sp.).

La carapace est pyriforme, peu élargie en arrière et couverte d'épines aiguës et inégales dont la disposition est fort regulière mais trop compliquée pour pouvoir se comprendre facilement à l'aide d'une description, mais une figure suffit pour s'en rendre parfaitement compte. Les cornes rostrales sont plus grêles et plus divergentes que chez le *Nibilia erinacea* il existe une longue épine præorbitaire suivie d'une autre épine beaucoup plus petite. L'article basilaire de l'antenne externe est terminé par une épine plus courte que la præorbitaire.

Les pattes antérieures du mâle sont courtes et la portion palmaire de la pince n'est pas allongée comme chez la *Nibilia erinacea ;* deux ou trois épines se voient en dessus près de l'articulation avec l'avant bras ; celui-ci et le bras portent quelques épines. Les pattes ambulatoires sont grêles, leur cuisse est armée en dessus de trois épines dont la dernière surmonte l'articulation de la jambe.

Le corps et les pattes portent des poils courts, raides et espacés.

Largeur de la carapace (avec les épines) d'un exemplaire mâle	0.017
Largeur sans les épines	0.013
Longueur (le rostre compris)	0.025
Longueur (sans le rostre)	0.020

Cette espèce ne se rencontre qu'a une assez grande profondeur elle a été draguée par M. A. Agassiz dans les localités suivantes : —

Station No. 232.	Profond. 88 brasses.	St. Vincent.
" No. 224.	" 114 "	St. Vincent.
" No. 241.	" 163 "	Grenadines.
" No. 269.	" 124 "	St. Vincent.
" No. 295.	" 180 "	Barbades.
" No. 297.	" 123 "	Barbades.
" No. 299.	" 140 "	Barbades.

21. **Sphenocarcinus corrosus** (A. M.-Edwards, Crust. du Mexique, T. I. p. 136, pl. 17, fig. 5).

Expéd. du Hassler. Profond. 100 brasses. Barbades.

22. **Lambrus Pourtalesii** (Stimpson).

	Profond. 54 brasses.	Sombréro.
Station No. 26.	" 110 "	Lat. 24° 37′ 30″ N., Long. 83° 36′ O.
" No. 32.	" 95 "	Lat. 23° 32′ N., Long. 88° 5′ O.
" No. 142.	" 27 "	Flannegan Passage.
" No. 253.	" 92 "	Grenade.

23. **Lambrus agonus** (Stimpson, A. M.-Edwards, Crust. du Mexique).

Station No. 36.	Profond. 84 brasses.	Lat. 23° 13′ N., Long. 89° 16′ O.
" No. 132.	" 115 "	Santa Cruz.
" No. 293.	" 82 "	Barbades.

24. **Platylambrus serratus** (DE SAUSSURE).

Station No. 142. Profond. 27 brasses. Flannegan Passage.
Coll. par Stimpson à Sombréro.

25. **Pisolambrus nitidus** (A. M.-EDWARDS, Crust. du Mexique, T. I. p. 158, pl. 30, fig. 4).

Expéd. du Hassler, 30 Déc., 1871. Profond. 100 brasses. Barbades.

Station	No. 132.	Profond.	115	brasses.	Santa Cruz.
"	No. 232.	"	88	"	St. Vincent.
"	No. 272.	"	76	"	Barbades.
"	No. 273.	"	103	"	Barbades.
"	No. 292.	"	56	"	Barbades.
"	No. 293.	"	82	"	Barbades.

26. **Solenolambrus typicus** (STIMPSON).

Station	No. 32.	Profond.	95	brasses.	Lat. 23° 32′ N., Long. 88° 5′ O.
"	No. 134.	"	248	"	Santa Cruz.
"	No. 167.	"	175	"	Guadeloupe.
"	No. 220.	"	116	"	Ste. Lucie.
"	No. 232.	"	88	"	St. Vincent.

27. **Solenolambrus fastigatus** (A. M.-EDWARDS, Crust. du Mexique, T. I. p. 163, pl. 29, fig. 5).

Coll. par Stimpson à 13 brasses à Sombréro.
Station No. 142. Profond. 27 brasses. Flannegan Passage.

28. **Heterocrypta granulata** (GIBBES).

Coll. par Stimpson. Floride.

29. **Crytopodia concava** (STIMPSON, A. M.-EDWARDS, Crust. du Mexique, T. I. p. 168, pl. 29, fig. 1 et 2).

Coll. par Stimpson à 14 et 19 brasses à l'ouest de la Floride.

30. **Mesorhœa cristatipes** (nov. sp.).

La carapace de cette espèce est lisse, de forme presque triangulaire. Les régions gastrique et cardiaque sont très élevées, et forment sur la ligne médiane de la carapace une cime élevée; trois tubercules, l'un postérieur et médian les deux autres antérieurs et disposés symétriquement, ornent la région gastrique; deux élévations obtuses et médianes surmontent la région cardiaque. Les régions branchiales sont très renflées, et elles se terminent en dehors par une crête aigüe qui s'étend jusqu'à l'angle latéral. Le front est trilobé et très avancé sur la ligne médiane. Les bords latéro-antérieurs sont découpés en un grand nombre de petites dents et garnis de poils courts. Les pattes antérieures sont longues et fortes, le bras porte en arrière deux ou trois gros tubercules comprimés et surmontés de quelques poils; il est garni en avant d'une crête aiguë. Une crête dentée suit le bord interne de la main; le bord externe est aigu et découpé en quatre dents bien séparées; deux crêtes garnissent le bord supérieur du doigt mobile. La cuisse des pattes ambulatoires est en dessous et en dessus munie de crêtes; la jambe et le pied sont crissiformes en dessus. Les pattes machoires externes sont remarquables par l'existence d'une crête très découpée qui occupe toute leur longueur et de petites proéminences lamelleuses et irrégulières situées sur le mérognathe.

Largeur de la carapace d'un mâle	0.017
Longueur	0.014
Largeur totale les pinces étendues	0.074

Station No. 269. Profond. 124 brasses. St. Vincent.

31. **Leptopodia sagittaria** (Fabricius).

Station	No. 10.	Profond. 37	brasses.	Lat. 24° 44′ N., Long. 83° 26′ O.
"	No. 12.	" 36	"	Lat. 24° 34′ N., Long. 83° 16′ O.
"	No. 127.	" 38	"	Santa Cruz.
"	No. 132.	" 115	"	Santa Cruz.
"	No. 142.	" 27	"	Flannegan Passage.
"	No. 276.	" 94	"	Barbades.

32. **Collodes depressus** (A. M.-Edwards, Crust. du Mexique, T. I. p. 176, pl. 32, fig. 4).

Coll. par Stimpson à 20 brasses près de Sombréro.

33. **Collodes obesus** (A. M.-Edwards, Crust. du Mexique, T. I. p. 177, pl. 32, fig. 3).

Coll. par Stimpson à 54 brasses près de Sombréro.

34. **Collodes rostratus** (A. M.-Edwards, Crust. du Mexique, T. I. p. 179, pl. 32, fig. 2).

Expéd. du Hassler. Profond. 30 brasses. Lat. 41° 40′ S., Long. 63° 13′ O.

35. **Collodes inermis** (A. M.-Edwards, Crust. du Mexique, T. I. p. 179, pl. 32, fig. 1).

Expéd. du Hassler. Profond. 17 brasses. Lat. 11° 49′ S., Long. 37° 27′ O.

36. **Arachnopsis filipes** (Stimpson, A. M.-Edwards, Crust. du Mexique, T. I. p. 181, pl. 33, fig. 1).

Station	No. 177.	Profond. 118	brasses.	Dominique.
"	No. 178.	" 130	"	Dominique.
"	No. 272.	" 76	"	Barbades.
"	No. 290.	" 73	"	Barbades.

37. **Euprognatha rastellifera** (STIMPSON, A. M.-EDWARDS, Crust. du Mexique, T. I. p. 181, pl. 33, fig. 2).

Expéd. du Hassler. Profond. 110 brasses. Barbades.

Station	No. 26.	Profond.	110	brasses.	Lat. 24° 37′ 30″ N., Long. 83° 36′ O.
"	No. 32.	"	95	"	Lat. 23° 32′ N., Long. 88° 5′ O.
"	No. 132.	"	115	"	Santa Cruz.
"	No. 134.	"	248	"	Santa Cruz.
"	No. 206.	"	170	"	Martinique.
"	No. 210.	"	191	"	Martinique.
"	No. 232.	"	88	"	St. Vincent.
"	No. 253.	"	92	"	Grenade.
"	No. 272.	"	76	"	Barbades.
"	No. 273.	"	103	"	Barbades.
"	No. 290.	"	73	"	Barbades.

38. **Euprognatha inermis** (A. M.-EDWARDS, Crust. du Mexique, T. I. p. 183, pl. 35, fig. 2).

Station	No. 142.	Profond.	27	brasses.	Flannegan Passage.
"	No. 238.	"	127	"	Grenadines.

39. **Euprognatha gracilipes** (A. M.-EDWARDS, Crust. du Mexique, T. I. p. 184, pl. 35, fig. 3).

Station	No. 32.	Profond.	95	brasses.	Lat. 23° 32′ N., Long. 88° 5′ O.
"	No. 132.	"	115	"	Santa Cruz.
"	No. 177.	"	118	"	Dominique.
"	No. 272.	"	76	"	Barbades.
"	No. 278.	"	69	"	Barbades.

40. **Euprognatha acuta** (nov. sp.).

Cette espèce se distingue de toutes les précédentes par la longueur de l'apophyse épistomienne, par le développement des épines latérales et par l'existence de quelques épines crochues sur le bord supérieur de la cuisse des pattes ambulatoires. L'épine qui porte le premier anneau de l'abdomen est très réduite.

Station	No. 148.	Profond.	208	brasses.	St. Kitts.
"	No. 241.	"	163	"	Grenadines.
"	No. 269.	"	124	"	St. Vincent.
"	No. 296.	"	84	"	Barbades.

41. **Aprocremnus septemspinosus** (A. M.-EDWARDS, Crust. du Mexique, T. I. p. 185, pl. 35, fig. 5).

Station No. 11. Profond. 37 brasses. Lat. 24° 43′ N., Long. 83° 25′ O.

42. **Anomalopus furcillatus** (Stimpson, A. M.-Edwards, p. 188, pl. 35, fig. 4).

Station No. 32.	Profond. 95 brasses.	Lat. 23° 32′ N., Long. 88° 5′ O.
" No. 45.	" 101 "	Lat. 25° 33′ N., Long. 84° 21′ O.
" No. 50.	" 119 "	Lat. 26° 31′ N., Long. 85° 53′ O.
" No. 132.	" 115 "	Santa Cruz.
" No. 189.	" 84 à 120 "	Dominique.
" No. 232.	" 88 "	St. Vincent.
" No. 249.	" 262 "	Grenade.

43. **Anomalopus frontalis** (A. M.-Edwards, *op. cit.*, p. 189, pl. 36, fig. 1).

Expéd. du Hassler.	Profond. 100 brasses.	Barbades.
Station No. 79.	" 175 "	Havane.
" No. 155.	" 88 "	Montserrat.
" No. 171.	" 183 "	Guadeloupe.
" No. 177.	" 118 "	Dominique.
" No. 272.	" 76 "	Barbades.
" No. 276.	" 94 "	Barbades.
" No. 290.	" 73 "	Barbades.

44. **Podochela macrodera** (Stimpson, A. M.-Edwards, *op. cit.*, p. 191, pl. 34, fig. 3).

Coll. par Stimpson. Profond. 50 brasses. Floride occidentale.

45. **Podochela gracilipes** (Stimpson, A. M.-Edwards, *op. cit.*, p. 192, pl. 35, fig. 1).

Station No. 10.	Profond. 37 brasses.	Lat. 24° 44′ N., Long. 83° 26′ O.
" No. 11.	" 37 "	Lat. 24° 43′ N., Long. 83° 25′ O.

LISPOGNATHUS (nov. gen.)

La carapace est pyriforme et les yeux n'ont pas de cavité orbitaire dans laquelle ils puissent se reployer. Le rostre est bifide, peu allongé; la portion interorbitaire de la carapace est étroite et pourvue de chaque coté d'une épine au dessus de l'insertion du pédoncule oculaire; il existe aussi une épine postorbitaire. L'article basilaire des antennes externes est très étroit et terminé en dehors par une petite épine; la tigelle mobile est beaucoup plus longue que les pointes du rostre et insérée à découvert sur les cotés de celles-ci. Les fossettes antennulaires sont très allongées; elles se continuent au dessous de la base des cornes rostrales. L'éxognathe des pattes machoires externes est très long; le mérognathe est beaucoup plus étroit que l'ischiognathe, il est très retréci à sa base et arrondi à son extrémité. Les pattes ambulatoires sont longues et très grêles. L'abdomen de la femelle est très large. Ce genre relie les *Euprognatha* aux *Anisonotus*.

46. **Lispognathus furcatus** (nov. sp.).

La carapace porte en dessus sur la ligne médiane deux épines dressées, l'une gastrique et l'autre cardiaque; les lobes protogastriques et les régions branchiales portent une épine. Le sillon gastrique est profond et semble étrangler la carapace au dessous des régions hépatiques. Celles-ci sont renflées et armées de deux ou trois petites épines, les bords des régions branchiales portent aussi quelques spinules. Les cornes rostrales sont cylindriques, pointues, légèrement divergentes et légèrement relevées. Le pédoncule oculaire est pourvu en avant d'une petite épine. Les pattes antérieures de la femelle sont ornées de quelques épines et revêtues de poils raides. Les mains sont arquées en dedans et leurs doigts sont très élevés et en contact dans toute leur étendue. La cuisse des pattes ambulatoires présente une épine terminale au dessus de l'articulation de la jambe; les doigts sont longs et légèrement courbés vers leur extrémité.

Largeur de la carapace	0.007
Longueur	0.010

Station No. 260. Profond. 291 brasses. Grenade.

ANASIMUS (nov. gen.).

La carapace est pyriforme et bombée en dessus elle se retrécit beaucoup dans la région interorbitaire. Le rostre est pointu et dirigé en avant et en haut. Les yeux sont grands, et ne peuvent se replier dans des fossettes orbitaires. Une épine postorbitaire se voit de chaque côté. L'article basilaire des antennes externes est très allongé et très étroit comme chez les *Podochela;* il porte en dessous un tubercule au niveau des yeux; la tigelle mobile est grande et inserée à découvert. Ses deux premiers articles dépassent en longueur le rostre. Les antennules sont longues et repliées longitudinalement dans des fossettes creusées à la base du rostre. La cloison frontale antennulaire se prolonge en une forte dent triangulaire comme chez les *Pyromaia* et les *Anisonotus.* L'éxognathe des pattes machoires externes se rétrécit vers son extrémité. Le mérognathe est étroit à sa base, échancré profondément à son angle antéro-interne pour l'insertion du palpe et fortement auriculé au dessous de cette insertion. Les pattes ambulatoires sont très grêles, les deux premières paires sont de même longueur, la troisième et la quatrième sont un peu plus courtes. Les doigts sont allongés et faibles, et ne constituent pas des crochets comme chez les *Podochela.* La disposition de la région fronto-antennaire, et celle des pattes ambulatoires distingue nettement ce genre des *Anisonotus.*

47. **Anasimus fugax** (nov. sp.).

La carapace porte sur la ligne médiane trois épines dressées, la première occupe la région gastrique, la seconde de même taille est placée sur le lobe cardiaque antérieur, la troisième plus petite surmonte le lobe cardiaque postérieur. Le premier article de l'abdomen porte une quatrième épine. Les lobes protogastriques sont armés chacun d'une épine, trois épines ou tubercules disposés en série longitudinale existent sur les régions branchiales. La surface de la carapace est irrégulièrement granuleuse, le rostre est court et spinuleux en dessus. Le bord sourcilier est armé d'une épine. Les pattes antérieures du mâle sont faibles, elles sont revêtues de poils raides et espacés. Le bras porte quelques petites épines et les doigts des pinces sont en contact dans toute leur longueur. Les pattes ambulatoires sont formées d'articles cylindriques et lissés. Le plastron sternal et l'abdomen sont granuleux.

L'abdomen de la femelle est très large.

Largeur de la carapace d'un mâle	0.009
Longueur	0.013
Largeur totale les pattes étendues	0.075

Station No. 132.	Profond. 115 brasses.		Santa Cruz.
" No. 292.	"	56 "	Barbades.

48. **Anisonotus curvirostris** (A. M.-Edwards, *op. cit.*, p. 196, pl. 36, fig. 3).

Expéd. du Hassler.	Profond.	100 brasses.	Barbades.
Station No. 65.	"	127 "	Havane.
" No. 157.	"	120 "	Montserrat.
" No. 241.	"	163 "	Grenadines.
" No. 269.	"	124 "	St. Vincent.
" No. 290.	"	73 "	Barbades.

49. **Pyromaia cuspidata** (Stimpson, A. M.-Edwards, *op. cit.*, p. 197, pl. 36, fig. 2).

Station No. 26.	Profond.	110 brasses.	Lat. 24° 37′ 30″ N., Long. 83° 36′ O.
" No. 50.	"	119 "	Lat. 26° 31′ N., Long. 85° 53′ O.

50. **Eurypodius Latreillei** (Guérin).

Expéd. du Hassler. No. 33. Profond. 58 brasses. Lat. 51° 26′ S., Long. 68° 5′ O.

51. **Salacia tuberculosa** (A. M.-Edwards et Lucas).

Expéd. du Hassler. Rio de la Plata.

FAMILLE DES PORTUNIENS.

52. **Neptunus sulcatus** (A. M.-Edwards, *op. cit.*, p. 216, pl. 29, fig. 3).

Expéd. du Hassler, 18 Janvier, 1872. Profond 17 brasses. Lat. 11° 49′ S., Long. 37° 27′ O.

53. **Neptunus (Hellenus) spinicarpus** (Stimpson, A. M.-Edwards, *op. cit.*, p. 221, pl. 40, fig. 1).

Station No. 12.	Profond. 36 brasses.	Lat. 24° 34′ N., Long. 83° 16′ O.
" No. 36.	" 84 "	Lat. 23° 13′ N., Long. 89° 16′ O.
" No. 116.	" 150 "	Lat. 17° 55′ N., Long. 76° 41′ 20″ O.
" No. 132.	" 115 "	Santa Cruz.
" No. 144.	" 21 "	Saba-Bank (individu très jeune).
" No. 148.	" 208 ".	St. Kitts.
" No. 253.	" 92 "	Grenade.
" No. 290.	" 73 "	Barbades.
" No. 292.	" 56 "	Barbades.
" No. 293.	" 82 "	Barbades.

54. **Neptunus cribrarius** (Lamark).

"Bache." Profond. 47 brasses. Sombréro.

55. **Neptunus Sayi** (Gibbes).

Coll. Stimpson. Profond. ? Sombréro.

56. **Achelous spinimanus** (Latreille).

Coll. Stimpson. Profond. ? Sombréro.

57. **Achelous depressifrons** (Stimpson, A. M.-Edwards, *op. cit.*, p. 230, pl. 40, fig. 4).

Coll. Stimpson. Profond. ? Key West.

58. **Cronius ruber** (Lamark).

Expéd. du Hassler. Profond. 12–17 brasses. Lat. 11° 49′ S., Long. 37° 27′ O.

59. **Bathynectes longispina** (Stimpson, A. M.-Edwards, *op. cit.*, p. 231, pl. 42, fig. 1).

Station No. 6. Profond. 137 brasses. Lat. 24° 17′ 30″ N., Long. 82° 9′ O.

60. **Cœnophthalmus tridentatus** (A. M.-Edwards, *op. cit.*, p. 237, pl. 42, fig. 2).

Expéd. du Hassler. Lat. 41° 17′ S., Long. 63° O. Lat. 41° 40′ S., Long. 63° 18′ O.

FAMILLE DES CANCÉRIENS.

61. **Actæa nodosa** (Stimpson).

Station No. 11.	Profond. 37 brasses.	Lat. 24° 43′ N., Long. 83° 25′ O.
" No. 132.	" 115 "	Santa Cruz.
" No. 142.	" 27 "	Flannegan Passage.
" No. 276.	" 94 "	Barbades.

62. **Carpoporus granulosus** (Stimpson, A. M.-Edwards, *op. cit.*, p. 247, pl. 44, fig. 1).

Station No. 10. Profond. 37 brasses. Lat. 24° 44′ N., Long. 83° 26′ O.
" No. 12. " 36 " Lat. 24° 34′ N., Long. 83° 16′ O.

63. **Medæus spinimanus** (A. M.-Edwards, Crust. du Mexique, p. 250, pl. 44, fig. 3).

Station No. 287. Profond. $7\frac{1}{2}$ à 50 brasses. Barbades.

64. **Glyptoxanthus erosus** (Stimpson, A. M.-Edwards, *op. cit.*, p. 254, pl. 43, fig. 3 et 44, fig. 4).

Station No. 12. Profond. 36 brasses. Lat. 24° 34′ N., Long. 83° 16′ O.

65. **Xanthodes bidentatus** (nov. sp.).

Le corps est entièrement lisse et nu. Les régions gastriques et hépatiques sont à peine marquées; la surface dorsale est presque plate transversalement et peu bombée d'avant en arrière. Le front est formé de deux lobes tronqués, et finement granuleux, séparés sur la ligne médiane par une petite échancrure. Les angles orbitaires internes sont moins avancés que le front. Les bords latéro-antérieurs sont minces. L'angle postorbitaire constitue un petit lobe à peine saillant, en arrière duquel existent deux dents; la première est lobiforme et à contour arrondi, la seconde est grosse et obtuse. L'orbite est très faiblement échancrée en dessous et en dehors. L'article basilaire des antennes externes est grêle, et il se joint au front par son angle antéro-interne. Les pattes antérieures du mâle sont courtes et inégales; le bras est caché sous la carapace; l'avant bras est armé en dedans d'une dent obtuse. La main est arrondie, et le pouce porte à sa base une grosse dent arrondie. Les pattes ambulatoires sont faibles et légèrement pubescentes vers leur extrémité. Le plastron sternal et l'abdomen du mâle sont revêtus d'un duvet court et peu serré.

Largeur de la carapace d'un mâle . . . . . 0.014.
Longueur . . . . 0.011.

Station No. 262. Profond. 92 brasses. Grenade.

66. **Menippe Rumphii** (Fabricius, A. M.-Edwards, *op. cit.*, p. 263, pl. 48, fig. 4).

Station No. 10. Profond. 37 brasses. Lat. 24° 44′ N., Long. 83° 26′ O.

67. **Leptodius Agassizii** (A. M.-Edwards).

Coll. Stimpson. Profond. 12–18 brasses. Récifs de la Floride.

68. **Melybia forceps** (A. M.-Edwards).

Expéd. du Hassler. No. 16. Profond. 30 brasses. Abrolhos (Brésil).

69. **Pilumnus aculeatus** (Say).

Station No. 12. Profond. 36 brasses. Lat. 24° 34′ N., Long. 83° 16′ O.
" No. 142. " 27 " Flannegan Passage.

70. **Pilumnus vinaceus** (A. M.-Edwards).
Station No. 10. Profond. 37 brasses. Lat. 24° 44′ N., Long. 83° 26′ O.
Coll. par Stimpson. Woman Key.

71. **Pilumnus gracilipes** (A. M.-Edwards).
Expéd. du Hassler. Profond. 100 brasses. Barbades.

72. **Pilumnus gemmatus** (Stimpson).
Station No. 10. Profond. 37 brasses. Lat. 24° 44′ N., Long. 83° 25′ O.
Coll. par Stimpson à 17 brasses. Key West, Woman Key, Tortugas.

73. **Pilumnus lactæus** (Stimpson).
Station No. 11. Profond. 37 brasses. Lat. 24° 43′ N., Long. 83° 25′ O.

74. **Pilumnus urinator** (A. M.-Edwards).
Station No. 134. Profond. 248 brasses. Santa Cruz.

75. **Pilumnus nudifrons** (Stimpson).
Station No. 273. Profond. 103 brasses. Barbades.

76. **Lobopilumnus Agassizii** (Stimpson).
Coll. par Stimpson. Profond. 19 brasses. Sombréro.

77. **Lobopilumnus pulchellus** (A. M.-Edwards).
Coll. par Stimpson. Profond. 12 brasses. Mujeres Id., Contoy, Yucatan.

78. **Pilumnoides Hassleri** (A. M.-Edwards).
Expéd. du Hassler. Profond. 30 brasses. Lat. 40° 22′ S., Long. 60° 35′ O.
" " " Embouchure de la Bermeja. Lat. 41° 17′ S., Long. 63° O.

79. **Panopeus Herbstii** (M.-Edwards).
Bahia.

80. **Panopeus Harrisii** (Stimpson).
Coll. par Stimpson. Great Egg Harbor.

81. **Panopeus serratus** (de Saussure).
Coll. par Stimpson. Key West.

82. **Panopeus occidentalis** (de Saussure).
Coll. par Stimpson. Cuba.

83. **Panopeus xanthiformis** (nov. sp.).

Cette espèce ressemble beaucoup par son aspect général à un *Xanthodes*. La carapace est déprimée, peu élargie et granuleuse près des bords latéro-antérieurs. Le front est formé de deux lobes séparés sur la ligne médiane par une fissure étroite. Les orbites sont larges, et leur bord inférieur est finement crénelé ; leur bord supérieur est interrompu en dessus par deux fissures, et leur bord inférieur est entamé en dehors par une échancrure petite et triangulaire, en arrière de laquelle se voit une dent subhépatique très petite. Les bords latéro-antérieurs sont divisés en quatre dents, la première est très petite, arrondie et située en arrière de l'angle postorbitaire; la seconde et la troisième sont grandes et granuleuses sur leurs bords; la dernière est très petite et pointue. Les régions latéro-inférieures sont couvertes de granulations. Les pattes antérieures sont rendues rugueuses par de très fines granulations.

Largeur de la carapace d'un mâle	0.013
Longueur	0.009

Station	No. 177.	Profond.	118 brasses.	Dominique.
"	No. 253.	"	92 "	Grenade.
"	No. 290.	"	73 "	Barbades.

84. **Micropanope spinipes** (A. M.-Edwards).

Expéd. du Hassler. Profond. 30 brasses. Abrolhos (Brésil).

85. **Micropanope sculptipes** (Stimpson).

Station	No. 45.	Profond.	101 brasses.	Lat. 25° 33′ N., Long. 84° 21′ O.
"	No. 290.	"	73 "	Barbades.

86. **Micropanope pusillus** (A. M.-Edwards).

Station No. 12. Profond. 36 brasses. Lat. 24° 34′ N., Long. 83° 16′ O.
Coll. par Stimpson. Profond 17 brasses. Floride.

87. **Micropanope pugilator** (A. M.-Edwards).

Station	No. 11.	Profond.	37 brasses.	Lat. 24° 43′ N., Long. 83° 25′ O.
"	No. 45.	"	101 "	Lat. 25° 33′ N., Long. 84° 21′ O.
"	No. 132.	"	115 "	Santa Cruz.
"	No. 247.	"	170 "	Grenade.
"	No. 278.	"	69 "	Barbades.

88. **Micropanope lobifrons** (A. M.-Edwards).

Station	No. 247.	Profond.	170 brasses.	Grenade.
"	No. 276.	"	94 "	Barbades.

89. **Neopanope lobipes** (A. M.-Edwards).

Station No. 10. Profond. 37 brasses. Lat. 24° 44′ N., Long. 83° 26′ O.

90. **Neopanope Pourtalesii** (A. M.-Edwards).

Coll. par Stimpson. Woman Key.
Station No. 10. Profond. 37 brasses. Lat. 24° 44′ N., Long. 83° 26′ O.

91. **Glythoplax Smithii** (A. M.-Edwards).

Key West.

92. **Eucratodes Agassizii** (A. M.-Edwards).

Coll. par Stimpson. Profond. 100 brasses. Lat. 21° 14′ N.

FAMILLE DES CARCINOPLACIDES.

FREVILLEA (nov. gen.).

Ce genre doit prendre place dans la famille des Carcinoplacides dont le premier article de l'abdomen est large et cache complètement le dernier segment sternal. Les verges du mâle naissent directement sur l'article coxal des pattes de la cinquième paire. La disposition du front, des pédoncules oculaires et des orbites rapproche d'autre part ce genre des *Gonoplax* et de certains Macrophthalmiens. Le cadre buccal est plus large en avant qu'en arrière et son bord antérieur présente de chaque côté deux fissures. L'épistome est grand. L'article basilaire des antennes externes est large et court. Celui des antennes internes est gros et arrondi, les deux premiers articles de la tigelle mobile sont très longs et dépassent le front lorsqu'ils sont repliés. Les pattes antérieurs sont subégales et terminées par des doigts pointus ; le bras ne déborde guère la carapace. Les pattes ambulatoires sont longues, grèles et comprimées.

93. **Frevillea barbata** (nov. sp.).

La carapace est glabre, lisse, et quadrilatère, elle est plus large en avant qu'en arrière. Le front est avancé très légèrement décliné et plus avancé sur les côtés qu'au milieu. Les orbites occupent tout le reste de la largeur de la carapace ; leur bord supérieur est sinueux ; il porte vers son extrémité une étroite fissure et l'orbite est limitée en dehors par une forte épine latéro-antérieure. Le bord orbitaire inférieur est très échancré en dessous. En arrière de l'épine ou dent post-orbitaire dont il vient d'être question se trouve une seconde épine beaucoup plus petite. Les pattes antérieures sont lisses, la main est comprimée. La portion palmaire est de la même longueur que les doigts. L'avant bras est arrondi en dehors et armé en dedans d'une épine un peu crochue. Une autre courte épine existe vers le milieu du bord postérieur du bras, à la jonction de la main, et de l'avant bras et en dehors se trouve un espace arrondi, légèrement déprimé et revêtu de poils très doux, touffus et d'un jaune très clair.

Largeur de la carapace d'un mâle	0.026
Longueur	0.017
Largeur totale les pattes étendues	0.096

Station No. 36. Profond. 84 brasses. Lat. 23° 13′ N., Long. 89° 16′ O.

94. **Frevillea rosæa** (nov. sp.).

Cette espèce se distingue de la précédente par sa carapace plus épaisse et moins élargie en avant ; les bords latéraux étant presque parallèles. Le front est plus large et à bord plus droit. Les pédoncules oculaires sont plus gros et plus courts. L'angle postorbitaire est formé par une dent pointue, en arrière de laquelle existe un petit renflement tuberculiforme puis une épine hépatique courte mais acérée. Les pinces et les pattes ambulatoires sont disposées comme chez le *Frevillea barbata.*

Largeur de la carapace d'un femelle	0.020
Longueur	0.015

Station No. 232. Profond. 88 brasses. St. Vincent.

95. **Frevillea Sigsbei** (nov. sp.).

Chez cette espèce les pinces sont dépourvues de bouquets de poils; le front est presque droit, les bords latéro-antérieurs portent deux dents comme chez la *Frevillea barbata*, mais la première est moins longue. Le dernier article des pattes de la cinquième paire est beaucoup plus élargi que chez les espèces précédentes.

Largeur de la carapace d'une femelle chargée d'œufs .	0.014
Longueur	0.009

Station No. 253. Profond. 92 brasses. Grenade.

96. **Frevillea tridentata** (nov. sp.).

Chez cette espèce il y a trois dents latéro-antérieures au lieu de deux; les pinces sont dépourvues de bouquets de poils; les doigts des pattes de la cinquième paire sont styliformes et l'avant bras des pattes antérieures est armé de deux épines, l'une en dedans, l'autre en dehors.

Largeur de la carapace d'une femelle	0.008
Longueur	0.005

Station No. 287. Profond. 7½–50 brasses. Barbades.

BATHYPLAX (nov. gen.).

Ce genre se place à côté des *Carcinoplax*, il en diffère par son front plus avancé, par ses pédoncules oculaires très petits, immobiles et dépourvus de corneules, l'animal étant par conséquent aveugle, par ses orbites rudimentaires, par la largeur du cadre buccal en avant et par ses pinces beaucoup plus courtes.

97. **Bathyplax typhlus** (nov. sp.).

La carapace est plane transversalement mais très bombée d'avant en arrière, sa surface est couverte de granulations très fines, peu élevées ce qui lui donne un aspect rugueux. Les régions sont peu marquées surtout en avant, en arrière il existe des sillons branchio-cardiaques très distincts et deux saillies surmontent en dehors les régions branchiales. Le front est droit, large et très avancé. Les bords latéro-antérieurs sont arqués, épais et armés de deux épines, l'une hépatique et l'autre terminale. Les pédoncules oculaires ont la forme de deux petits bontons saillants; ils sont enchassés à leur base dans les orbites qui ne leur laissent aucune mobilité. L'article basilaire des antennes externes est large et serré entre le bord orbitaire et le prolongement sous frontal; sa tigelle mobile, insérée dans l'angle de l'orbite est longue. L'article basilaire des antennes internes est remarquablement gros. Le cadre buccal est très ouvert et très échancré en avant. L'éxognathe des pattes machoires externes est large, le mérognathe est arrondi à son angle antéro-externe.

Les pattes antérieures sont dissemblables et de longueur médiocre, le bras ne déborde pas la carapace, il porte en dessous une épine et en dessus une sorte de bourrelet transversal disposé de manière à frotter contre les granulations des régions pterygostomiennes et à rendre un ton facilement perceptible. L'avant bras porte du côté droit une épine et du côté gauche un simple tubercule ou une épine plus faible. La pince gauche est plus courte que l'autre elle présente en dedans une très forte dilatation triangulaire qui n'est qu'en prolongement de son bord supérieur. La face externe de la main est déprimée et le bord inférieur très mince est très arqué. Les doigts sont comprimés, pointus et en contact dans toute leur étendue. La pince droite est plus grande, plus épaisse; elle ne présente pas d'apophyse interne, les doigts sont longs et en contact par leur extrémité seulement. Ces caractères existent dans les deux sexes, mais ils sont plus accusés chez le mâle que chez la femelle. Les pattes ambulatoires sont longues, grêles et hérissées de petits poils très courts. L'abdomen du mâle est court divisé en 7 articles, et il s'étend latéralement jusqu'à la base de l'article coxal des pattes de la cinquième paire.

Largeur de la carapace d'un mâle (avec les épines) . .	0.022
Longueur	0.017
Largeur de la carapace d'une femelle	0.024
Longueur	0.020

Station No. 130.	Profond. 451	brasses.	Frederickstadt.
" No. 221.	" 423	"	Ste. Lucie.

EUCRATOPLAX (nov. gen.).

Ce genre établit en passage entre les Panopéens et les *Euryplax* ou les *Panoplax*. En effet la carapace est un peu arrondie en avant et les bords latéro-antérieurs sont divisés en quatre dents, mais le cinquième article de l'abdomen du mâle laisse à découvert une grande partie du dernier segment sternal, et il existe un canal pour le passage du tube déferént. Le cadre buccal, et la région orbitaire sont disposés comme chez les Panopéens.

Le 3^e^, 4^e^, et 5^e^ articles de l'abdomen du mâle sont soudés en une seule pièce.

98. **Eucratoplax guttata** (nov. sp.).

La carapace est lisse et peu bombée; les régions y sont faiblement marquées. Le front est un peu décliné, à bord arrondi et échancré sur la ligne médiane. Les orbites sont grandes. Les quatres dents latéro-antérieures sont à peu près égales, la première est un peu plus large et la dernière plus petite que les autres. Les pattes antérieures sont fortes et finement ponctuées. La main est renflée, son bord supérieur porte au dessus de l'articulation avec l'avant bras, une proéminence aplatie. Les doigts sont légèrement contournés en dedans; leur extrémité est pointue, et le pouce est armé à sa base d'une grosse dent. L'avant bras et pourvu en dedans d'une courte épine et en dehors d'une courte crête longitudinale. Le bras est surmonté d'une dent spiniforme située vers le milieu de son bord postérieur. Les pattes ambulatoires sont grêles et pourvues de quelques poils sur leurs bords.

Largeur de la carapace d'une femelle	0.014
Longueur	0.012

Coll. par Stimpson à Sombréro.

La carapace est du couleur jaunâtre tachetée de brun.

99. **Eucratoplax elata** (nov. sp.).

Cette espèce dont je ne connais que la femelle, diffère de la précédente par sa carapace plus large, plus épaisse, par la disposition des dents latéro-antérieures dont deux seulement sont bien développées, les autres étant rudimentaires. Les pinces ne présentent ni dents ni épines ni apophyses. Enfin les pattes ambulatoires sont plus aplaties que chez *l'Eucratoplax guttata.*

Largeur de la carapace d'une femelle	0.010
Longueur	0.007

Coll. par Stimpson. Profond. 13 brasses. Floride occidentale.

100. **Euchirograpsus americanus** (nov. sp.).

La carapace est très aplatie et les bords latéraux sont parallèles; la surface est très légèrement granuleuse et hérissée de poils très courts, clairsemés et visibles seulement à la loupe. Le front est droit, lamelleux, avancé et échancré sur la ligne médiane. Les orbites sont larges et profondes. L'angle orbitaire externe est spiniforme. En arrière le bord latéral est armé de trois épines la 1er et la 3ème plus petites que la seconde. Chez *l'Euchirograpsus liguricus,* ces épines sont remplacées pour de véritables dents. Les pinces sont granuleuses et armées de crêtes longitudinales, les pattes ambulatoires ressemblent beaucoup à celles de *l'Euchirograpsus liguricus.*

Largeur de la carapace d'un mâle	0.011
Longueur	0.105

Station No. 278. Profond. 69 brasses. Barbades.

FAMILLE DES OXYSTOMES.

(CALAPPIENS.)

101. **Calappa angusta** (nov. sp.).

La carapace est plus étroite en arrière que chez toutes les autres espèces de ce genre, les expansions latéro-postérieures ne s'étendent guère plus loin en dehors que les bords latéro-antérieurs. Les bords sont finement granuleux, les expansions sont dentées et elles se rattachent au bord postérieur par une ligne oblique, légèrement découpée. Le front est profondément échancré sur la ligne médiane, et vu en dessus, il semble bilobé. La surface de la carapace est couverte de protubérances.

Largeur de la carapace d'un mâle (mesurée au de niveau l'articulation des pinces)	0.010
Largeur mesurée au niveau des expansions latéro-postérieures .	0.010
Longueur	0.010

Station No. 132.	Profond. 115 brasses.	Santa Cruz.
" No. 32.	" 95 "	Lat. 23° 32′, Long. 88° 5′ W.
" No. 36.	" 84 "	Lat. 23° 13′, Long. 89° 16′.
" No. 262.	" 92 "	Grenade.

Stimpson, "Bache."	Profond.	54	brasses.	Sombréro.
Expéd. du Hassler.	"	100	"	Barbades.
Station No. 273.	"	103	"	Barbades.

102. **Calappa galloides** (Stimpson).

Coll. par Stimpson. Profond. 12–18 brasses. Contoy.

103. **Acanthocarpus Alexandri** (Stimpson).*

Station No. 36.	Profond.	84	brasses.	Lat. 23° 13′ N., Long. 89° 16′ O.
" No. 143.	"	150	"	Saba Bank.
" No. 220.	"	116	"	Ste. Lucie.
" No. 238.	"	127	"	Grenadines.

104. **Acanthocarpus bispinosus.**

Plate I. Fig. 1.

Le genre *Acanthocarpus* de Stimpson diffère des *Mursia* et des *Thealia* par l'absence d'une épine latérale, il est caractérisé par l'existence d'une longue épine armant l'avant bras et dirigée en dehors. L'*A. bispinosus* devrait peut-être prendre place dans un genre nouveau, il se rapproche plus de la *Thealia acanthophora*, car il porte une épine latérale très développée, mais il présente à l'avant bras une épine très longue, la carapace est beaucoup plus circulaire que celle de l'*A. Alexandri*, dont l'angle latéral est arrondi, la dent rostrale est plus longue, et le bord latéro-postérieur au lieu de ne porter qu'une forte dent est garni d'une série de tubercules pointus, le bord postérieur s'avance moins sur la ligne médiane, et il est orné de granulations. Le plastron sternal est dépourvu sur son premier article de saillie latérale. Les pattes mâchoires externes portent en dehors une frange de poils, les pattes antérieures n'offrent rien de particulier à noter, elles sont pourvues à leur face interne, de même que celles de l'*A. Alexandri* d'une saillie transversale striée qui en frottant contre une crête correspondante de la région latéro-inférieure de la carapace, peut produire un bruit assez fort. Les pattes ambulatoires sont plus faibles que chez l'autre espèce du même genre.

Largeur de la carapace d'un mâle mésurée sans les épines	0.040
Largeur de la carapace d'un mâle mésurée avec les épines	0.084
Longueur de la carapace	0.039
Largeur totale mésurée au niveau des pointes des épines antibrachiales	0.110

Station No. 240. Trouvée à 140 brasses aux récifs de Grenadines.

105. **Peltarion magellanicus** (Lucas).

Expéd. du Hassler.	Profond.	58	brasses.	Lat. 51° 26′ S., Long. 68° 5′ O.
" " "	"	44	"	Lat. 37° 42′ S., Long. 56° 20′ O.

TRICHOPELTARION (nov. gen.).

Ce genre ne diffère du *Peltarion* que par sa carapace très bombée et velue comme celle des *Dromia* et par la remarquable inégalité de ses pinces.

* Voyez Pl. I. Fig. 2.

106. **Trichopeltarion nobile** (nov. sp.).*

Carapace aussi longue que large beaucoup plus bombée que celle du *Peltarion magellanicus* couverte d'un revêtement duveteux épais, front formé de trois épines dont la médiane est plus courte que les latérales. Bord orbitaire supérieur coupé par une échancrure et armé en dedans d'une épine élargie à sa base et de petites épines dans le reste de son étendue, orbite peu profonde et œil très grêle, très réduit et arqué, angle sous-orbitaire interne spiniforme. Bords latéro-antérieurs armés d'épines souvent bifurquées ou trifurquées. La plus forte occupe le milieu de la région branchiale, le bord postérieur est orné de tubercules pointus. D'autres tubercules semblables existent sur le lobe métabranchial et cardiaque postérieur, ainsi que le long des bords latéro-postérieurs. Les impressions branchio-cardiaques sont très profondes. Les pattes antérieures sont très inégales, celle de droite est énorme et presque complètement glabre, quelques spinules surmontent le bord postérieur du bras, le bord interne de l'avant bras et le bord supérieur de la main. Celle de gauche est très petite, comprimée poilue et épineuse. Les pattes ambulatoires sont poilues et assez longues.

Largeur de la carapace d'un mâle (sans les épines).	0.065
Largeur avec les épines	0.077
Longueur	0.066
Longueur de la patte antérieure droite	0.096
Longueur de la patte antérieure gauche . . .	0.055

Station No. 219. Ste. Lucie à une profondeur de 151 brasses.

107. **Corystoides abbreviatus** (nov. sp.).

Dans le genre *Corystoides* les antennes externes sont soudées au front et ferment complètement l'orbite en dedans, la tigelle mobile est remarquablement petite et appliquée sous le bord frontal de manière à rester cachée. C'est ce qui a trompé M. Lucas qui donne comme caractère à ce genre l'absence d'une paire d'antennes. Les antennes internes sont au contraire très développées.

Le *Corystoides abbreviatus* diffère du *C. Chilensis* par sa carapace plus courte, plus tronquée en avant, plus bombée et par ses bords latéro-antérieurs plus courts. Les caractères généraux de ces deux espèces sont d'ailleurs les mêmes.

Largeur de la carapace d'un mâle	0.018
Longueur	0.020

Expéd. du Hassler. Rio de la Plata au dessous de Montevideo à 7 brasses de profondeur.

108. **Osachila tuberosa** (Stimpson).

Coll. par Stimpson.	Profond.	54	brasses.	Sombréro.
Station No. 132.	"	115	"	Santa Cruz.
" No. 155.	"	88	"	Montserrat.
" No. 156.	"	88	"	Montserrat.
" No. 177.	"	118	"	Dominique.

* Voyez Pl. II.

Station No. 192.	Profond. 138 brasses.		Dominique.
" No. 232.	" 88	"	St. Vincent.
" No. 253.	" 92	"	Grenade.
" No. 254.	" 164	"	Grenade.
" No. 272.	" 76	"	Barbades.

FAMILLE DES LEUCOSIENS.

MYROPSIS.

Stimpson indique tous les articles de l'abdomen du mâle comme soudés en une seule pièce, chez tous les exemplaires que j'ai étudiés le premier et second et le septième articles sont libres les 3, 4, 5, et 6 sont soudés.

109. **Myropsis quinquespinosa** (Stimpson).

Station No. 36.	Profond. 84 brasses.		Lat. 23° 13′ N., Long. 89° 16′ O.
" No. 45.	" 101	"	Lat. 25° 33′ N., Long. 84° 21′ O.
" No. 206.	" 170	"	Martinique.
" No. 262.	" 92	"	Grenade.

110. **Myropsis constricta** (nov. sp.).

La carapace, au lieu d'être globuleuse, est rétrécie en avant, et les granulations, au lieu d'être très régulières, sont très petites, sur les portions moyenne et postérieure, et plus courtes que chez l'espèce précédente.

Largeur de la carapace	0.021
Longueur	0.026

Expéd. du Hassler. Profond. 100 brasses. Barbades.

111. **Myropsis goliath** (nov. sp.).

Cette espèce atteint une taille très considérable, c'est le plus grand Leucosien que j'aie vu. La carapace est globuleuse comme chez le *Myropsis quinquespinosa*, mais les granulations sont beaucoup plus grosses, surtout sur les parties latéro-inférieures et antérieures du bouclier céphalothoracique et sur les pinces. Le sillon branchio-cardiaque est profond, et deux dépressions circulaires, situées de chaque côté, bornent la région gastrique.

Largeur de la carapace d'une femelle	0.056
Longueur	0.062
Largeur les pinces étendues	0.230

Station No. 241. Profond. 163 brasses. Cariacou.

112. **Iliacantha subglobosa** (Stimpson).

Station No. 155.	Profond. 88 brasses.		Montserrat.
" No. 177.	" 118	"	Dominique.
" No. 272.	" 76	"	Barbades.
" No. 276.	" 94	"	Barbades.
" No. 278.	" 69	"	Barbades.
" No. 292.	" 56	"	Barbades.

113. **Callidactylus asper** (Stimpson).

Coll. par Stimpson. Profond. 19 brasses. Sombréro.

114. **Lithadia rotundata** (nov. sp.).

La carapace est subglobuleuse, peu élargie et déprimée dans la région hépatique, renflée dans tout le reste de son étendue. Un fossé profond et dont le fond est fortement corrodé entoure la région cardiaque de tous les côtés sauf en avant. Les bords latéraux présentent trois renflements à peine marqués. Les pattes sont courtes et couvertes de granulations aplaties mais peu saillantes. Le plastron sternal du mâle est excavé et marqué de sillons corrodés au niveau des lignes de suture, l'abdomen porte une épine sur son cinquième article.

Longueur de la carapace d'un mâle	0.010
Largeur	0.010

Expéd. du Hassler. Embouchure de la Bermeja. Lat. 41° 17′ S., Long. 63° O.

115. **Lithadia granulosa** (nov. sp.).

Le corps et les pattes sont couverts de granulations aplaties et très serrées.

La carapace est beaucoup moins renflée latéralement que chez la *Lithadia cadaverosa*. Les sillons latéraux sont remplacés par des dépressions, et il n'existe pas de sillon médian. Les régions branchiales portent en dedans une saillie pyramidiforme et en dehors et en arrière une crête mousse qui part de la naissance du sillon branchio-cardiaque et se dirige vers le bord latéral. Ce dernier est decoupé en trois dents, l'une hépatique et les deux autres branchiales. La région cardiaque forme une saillie arrondie et limitée latéralement et en arrière par un sillon profond.

Largeur de la carapace d'une femelle	0.008
Longueur	0.007

Station No. 132. Profond. 115 brasses. Santa Cruz.

116. **Lithadia cadaverosa** (Stimpson).

Coll. par Stimpson. Profond. 20 brasses. Floride O.

117. **Ebalia Stimpsonii** (nov. sp.).

Carapace héxagonale, couverte de granulations aplaties et très rapprochées, plus grosses sur les parties postérieures, front échancré. Lobe cardiaque postérieur saillant et cerclé par un sillon profond. Bords latéro-postérieurs portant une dilatation lobiforme au niveau du sillon cardiaque antérieur. Le bord postérieur terminé latéralement par des angles lobiformes et arrondis. Pattes antérieures assez longues entièrement couvertes de granulations semblables à celles de la carapace. Pattes ambulatoires petites et revêtues de granulations plus fines. Parties inférieures granuleuses.

Largeur de la carapace d'une femelle	0.006
Longueur	0.0065

Chez les mâles la carapace est plus retrécie et les lobes latéro-postérieurs sont plus saillants.

Station No. 287. Profond. 7 à 50 brasses. Barbades.

118. **Spelæophorus triangulus** (nov. sp.).

La carapace, au lieu d'être semi-circulaire, est élargie en arrière et très rétrécie en avant. Les bords latéro-antérieurs sont concaves, les bords latéro-postérieurs portent deux saillies, l'antérieure plus avancée et plus étroite que la postérieure. Lobe cardiaque postérieur limité de chaque côté par une anfractuosité profonde. Région subhépatique surmontée d'une saillie pointue. Corps et pattes entièrement couverts de granulations. Bras des pinces portant en arrière deux fortes dents triangulaires; mains garnies d'une crête qui prend naissance au dessus du pouce et s'étend jusqu'à l'avant bras.

Largeur de la carapace	0.0065
Longueur	0.0050

Chez les exemplaires adultes la carapace est bosselée, profondément corrodée à sa surface tandis qu'elle est beaucoup plus lisse chez les jeunes.

Coll. par Stimpson. Un jeune trouvé à Charlotte Harbor par 11 brasses.
" " " Un adulte trouvé à Sand Key par 125 brasses.

FAMILLE DES DORIPPIENS.

CORYCODUS (nov. gen.) *

Je n'ai entre les mains qu'un exemplaire mutilé de ce genre, mais il est tellement différent de tous les Crustacés connus qu'il sera toujours facile de le reconnaitre aux caractères suivants. La carapace est subpentagonale et extrêmement renflée et épaisse surtout en avant où la région faciale représente l'angle antérieur d'un pentagone. La carapace est globuleuse et intimement soudée au plastron sternal *il existe une espace considérable entre l'insertion des pattes de la première paire et celle des pattes de la seconde.* Le corps semble tronqué en arrière à cause de la position très reculée occupée par l'abdomen (chez la femelle) qui ne recouvre que les trois derniers anneaux du sternum. L'éxognathe est court et ne dépasse pas l'extrémité de l'ischiognathe.

119. **Corycodus bullatus** (nov. sp.).

La carapace est couverte de tubercules à extrémité aplatie dont quelques uns se développent de manière à ressembler à de petits batonnets. Ces tubercules tendent à disparaitre sur la ligne médiane et en arrière; ils sont très grands le long des bords antérieurs. Les régions sont à peine marquées, à l'exception de la région cardiaque qui est petite mais limitée par des sillons profonds, très rapprochés en avant et très divergents en arrière. Les bords latéro-antérieurs sont un peu

* de χωρυχώδης semblable à un ballon.

plus longs que les latéro-postérieurs. Le front est très déclive et sa pointe se ploie entre les yeux pour se joindre à l'épistome. Les yeux sont petits. Les parties inférieures de la carapace, le plastron sternal et les pattes ambulatoires sont couvertes de petits tubercules semblables à ceux de la face dorsale. Une forte saillie existe sur la ligne médiane, entre la base des pattes-mâchoires externes. Une saillie analogue se voit à la base de chacune des pattes antérieures. La région subhépatique est excavée. Les pattes ambulatoires manquent.

Largeur de la carapace	0.0085
Longueur	0.0053

Station No. 101 de 175 à 250 brasses. Phare de Morro.

CYCLODORIPPE (nov. gen.).

Ce genre ainsi que les deux suivants établit un lien entre les Dorippes et les Brachyures anormaux. Il est nettement caractérisé par la forme de la carapace et en particulier de la région faciale. Le bouclier céphalo-thoracique est étroit en avant et en arrière et ses bords latéraux sont régulièrement arrondis, leur maximum de largeur existe vers la partie moyenne. Les yeux sont plus courts que ceux des Dorippes et ils se replient dans des orbites plus complètes et dont le plancher n'est pas échancré. Le cadre buccal, comme chez les Dorippes, se prolonge en un canal qui atteint le niveau du front, mais il est cloisonné presque jusqu'à son extrémité, en dessous par les pattes mâchoires externes dont le mérognathe est fort allongé. Il n'existe pas d'échancrure ptérygostomienne destinée à l'entrée de l'eau dans la chambre branchiale au dessus de l'insertion des pattes antérieures, par ce caractère les *Cyclodorippes* se rapprochent des *Leucosiens.* L'abdomen du mâle est très petit, composé de six segments et reçu dans une profonde échancrure du sternum il ne s'avance pas sur le deuxième article sternal. L'abdomen de la femelle est formé de six pièces, il est large, à bords parallèles; son dernier segment est très grand et s'avance jusqu'à la base des pattes antérieures. Les pattes ambulatoires sont disposées comme celles des *Dorippes.* Les orifices génitaux de la femelle sont creusés dans l'article basilaire des pattes de la troisième paire.

120 Cyclodorippe nitida (nov. sp.).

La carapace est entièrement lisse, épaisse et non bombée elle est légèrement déprimée transversalement, en arrière du front. Les sillons branchio-cardiaques sont seuls distincts, le front est profondément déprimé et échancré dans sa partie médiane, ses angles latéraux sont au contraire au même niveau que la face dorsale de la carapace et s'avancent comme deux petites dents rostrales. Les antennes sont courtes et se replient sous le front, un tubercule subspiniforme existe de chaque côté, au dessus et en avant de la région branchiale. Les pattes antérieures du mâle sont très grandes, le bras déborde de beaucoup la carapace, il est lisse, l'avant bras porte en dedans une petite dent obtuse. La main est aplatie en dessus et très épaisse; les doigts sont plus courts que la portion palmaire, ils portent quelques poils sur leur face interne, les pattes ambulatoires de la 2^e et de la

3e paires sont longues, lisses et terminées par un doigt légèrement arqué et styliforme.

Les pinces de la femelle sont courtes.

Largeur de la carapace d'un mâle	0.008
Longueur	0.008

Cette espèce est très commune à une profondeur du 50 à 120 brasses.

Station	No. 5.	Profond.	152	brasses.	Lat. 24° 15′ N., Long. 82° 13′ O.
	No. 6.		137		Lat. 24° 17′ 30″ N., Long. 82° 9′ O.
	No. 9.		111		Sand Key. 3057
	No. 254.		164		Grenade.

121. Cyclodorippe antennaria (nov. sp.).

La carapace est plus ovalaire que celle de l'espèce précédente; elle est finement granulée surtout latéralement. Le front s'avance beaucoup au delà des angles orbitaires il est arrondi et à peine déprimé sur la ligne médiane; son bord est très finement serratulé. L'angle postorbitaire est spiniforme; une petite épine arme en dehors et en avant la région branchiale. La région gastrique porte trois saillies longitudinales, l'une médiane, les autres latérales. La région cardiaque est proéminente. Les antennes internes sont très longues et très grêles, elles ne peuvent se reployer entièrement sous le front. Le plancher de l'orbite est peu avancé. Le mérognathe des pattes-mâchoires externes est plus large et plus arrondi en avant. Les pattes antérieures du mâle sont courtes et granuleuses, le bras ne déborde guère la carapace; les doigts sont très hauts et égalent en longueur la portion palmaire. Les pattes ambulatoires sont longues et légèrement comprimées dans leur partie terminale. Les pattes des deux dernières paires sont très grêles mais plus allongées que chez le *Cyclodorippe nitida*. La portion médiane de l'abdomen est renflée en une sorte de bourrelet.

Largeur de la carapace d'un mâle	0.0072
Longueur	0.0070

Expéd. du Hassler. Profond. 100 brasses. Barbades.

Station	No. 20.	Profond.	220	brasses.	Lat. 23° 2′ 30″ N., Long. 83° 11′ O.
	No. 21.		287		Lat. 23° 2′ N., Long. 83° 13′ O.
	No. 32.		95		Lat. 23° 32′ N., Long. 88° 5′ O.
	No. 53.		242		Havane. 6676
	No. 54.		175		Havane.
	No. 192.		138		Dominique.
	No. 210.		191		Martinique. 2621
	No. 232.		88		St. Vincent.
	No. 291.		200		Barbades.

122. Cyclodorippe Agassizii (nov. sp.).

La carapace est plus circulaire que chez le *C. antennaria* et elle est surmontée de quatre saillies coniques; l'une plus élevée sur la région cardiaque; une autre sur le lobe mésogastrique et une plus petite sur chacun des lobes protogastriques. Le front est plus étroit à sa base et plus triangulaire. Les autres caractères sont d'ailleurs les mêmes que chez l'espèce précédente.

Largeur de la carapace d'une femelle	0.008
Longueur	0.0075

Station No. 241. Profond. 163 brasses. Cariacou.

CYMONOMUS (nov. gen.).

La carapace est étroite et terminée en avant par un rostre pointu, de chaque côté duquel s'insèrent les pédoncules oculaires grêles, de grosseur uniforme et dépourvus de cornecules. Les antennes internes sont grandes et ne peuvent se reployer sous le front. Les antennes externes prennent naissance au dessous et en dehors des antennules et elles sont notablement plus courtes qu'elles, le tubercule auditif se développe en une saillie spiniforme. Le cadre buccal porte en avant, sur la ligne médiane une large échancrure; il est entièrement caché par les pattes mâchoires qui s'avancent beaucoup de manière à recouvrir la base des antennes. L'éxognathe est très allongé; le mérognathe est étroit et son extrémité déborde de beaucoup le peu d'insertion du palpe. Les pattes antérieures sont courtes et terminées par des doigts pointus. Les pattes de la 2e et de la 3e paire ressemblent à celles du *Cyclodorippe,* celles de la 4e et 5e paire sont très petites, relevées sur le dos et terminées par un petit ongle crochu, mais elles ne sont pas chiliformes. L'abdomen du mâle est très court. Le dernier article de l'abdomen de la femelle est triangulaire et arrondi à son extrémité. Les œufs sont très gros et en petit nombre. Les orifices génitaux de la femelle s'ouvrent sur l'article basilaire des pattes de la 3e paire.

123. Cymonomus quadratus (nov. sp.).

La carapace a une forme subquadrilatère, les bords latéro-antérieurs étant placés presque sur la même ligne transversale que la région faciale qui est fort étroite, la surface est très peu bosselée et finement granuleuse, le rostre est grêle et pointu les bords latéro-antérieurs sont armés de quelques petites épines les bords latéro-postérieurs sont parallèles et inermes, le bord postérieur est large. Les pattes antérieures sont faibles et granuleuses; leurs doigts sont aussi longs que la portion palmaire. Les pattes ambulatoires sont longues et lisses.

Largeur de la carapace d'une femelle . . .	0.004
Longueur	0.0045

Station	No. 51.	Profond.	243–450	brasses.	Havane.
"	No. 58.	"	242	"	Havane.
"	No. 136.	"	508	"	Santa Cruz.
"	No. 167.	"	175	"	Guadeloupe.
"	No. 188.	"	372	"	Dominique.
"	No. 260.	"	291	"	Grenade.

CYMOPOLUS (nov. gen.).

Ce genre doit prendre place à côté des *Cymonomus;* il s'en distingue par ses yeux normalement développés, par ses pattes mâchoires dont le mérognathe ne dépasse pas le palpe, par les antennes internes plus petites et susceptibles de se replier sous le front et par ses pattes plus courtes et plus fortes.

124. **Cymopolus asper** (nov. sp.).

La carapace est épaisse, plus large en avant qu'en arrière et hérissée, ainsi que les pattes, de tubercules élevés et d'épines tronquées. La pointe rostrale est plus large que chez le *Cymonomus quadratus,* elle est un peu déclive et découpée sur les bords. Les pattes antérieures sont égales, assez grandes et très épineuses. Les pattes ambulatoires sont plus courtes et plus fortes que celles de l'espèce précédente; elles sont entièrement revêtues d'épines, il en est de même des pattes mâchoires externes, du plastron sternal et de l'abdomen.

Largeur de la carapace d'un mâle	0.007
Longueur	0.009

Station No. 158. Profond. 148 brasses. Montserrat.
"Bibb." Profond. 75 et 134 brasses. Sand Key.

CYMOPOLIA (Roux).

Dans ce genre les orifices génitaux de la femelle au lieu d'être placés sur le troisième anneau sternal, existent sur le second près de la suture du premier.

125. **Cymopolia obesa** (nov. sp.).

La carapace est épaisse, élargie en arrière et bosselée, les bosselures sont arrondies et finement granuleuses. Dans la partie postérieure de la carapace elles sont disposées sur une ligne transversale légèrement arquée on en compte environ quatre sur chacun des lobes métabranchiaux et deux sur le lobe cardiaque antérieur. Ces dernières sont les plus grosses. Le lobe cardiaque postérieur est surmonté d'une protubérance, et le bord postérieur est surmonté de six tubercules. Le front est avancé et divisé en quatre petites dents obtuses, dont les médianes sont les plus longues. L'angle orbitaire interne est arrondi. Le bord sourcilier porte deux dents triangulaires. L'angle postorbitaire est fort saillant, pointu et dirigé en avant. Deux échancrures entament le bord sous-orbitaire; l'angle sous-orbitaire interne est fort avancé et arrondi à son extrémité. Les bords latéraux sont armés de deux dents écartées l'une de l'autre, la dernière plus saillante que la première. Les pattes antérieures sont très faibles dans les deux sexes. Les pattes ambulatoires sont de grandeur médiocre, celles de la 3^e et de la 4^e paire sont à peu près de même longueur. La cuisse est rugueuse et porte en dessus à son extrémité une dent en forme de pointe. Les pattes de la 5^e paire sont très grêles.

Largeur de la carapace d'un mâle	0.016
Longueur	0.0125

Largeur les pattes étendues	0.058
Largeur de la carapace d'une femelle	0.022
Longueur	0.017

Station No. 36 à la profondeur de 84 brasses. Lat. 23° 13′ N., Long. 89°16′ O.

126. **Cymopolia dilatata** (nov. sp.).

Cette espèce se rapproche beaucoup du *C. obesa,* elle s'en distingue cependant facilement par sa carapace, plus élargie et moins bosselée, les bosselures étant moins étendues et ressemblent plutôt à des tubercules, par le développement du plancher de l'orbite, dont le lobe médian s'avance de manière à déborder le pédoncule oculaire lorsque celui-ci est replié, par la brièveté de l'angle postorbitaire et par l'existence de trois dents latérales peu saillantes au lieu de deux. Enfin le premier segment sternal est fort élargi et porte une crête transversale réunissant la base des pattes de la deuxième paire ; elle est découpée de manière à présenter une saillie en arrière de chacune des pattes mâchoires externes et des pattes antérieures. Les pattes manquaient sur l'exemplaire unique que j'ai pu observer.

Station No. 148. Profond. 208 brasses. St. Kitts.

127. **Cymopolia dentata** (nov. sp.).

La carapace est plus étroite que celle des deux espèces précédentes, elle est couverte de bosselures et de tubercules granulés. Le front est très avancé et les deux dents médianes sont séparées par une échancrure profonde. L'angle postorbitaire est grand et aigu, le bord latéral est armé de deux dents à peine séparées l'une de l'autre, la première est triangulaire et aplatie, la seconde est plus arrondie à sa base. Le plancher de l'orbite est peu avancé, son lobe médian est tronqué en avant. L'angle sous-orbitaire interne est obtus et très court. Les pattes antérieures du mâle sont inégales et plus grosses que chez les autres Cymopolies américaines. La plus grosse pince est renflée, granuleuse en dessus et les doigts en sont forts et racourcis. Les pattes ambulatoires sont de longueur médiocre, la cuisse est granuleuse, terminée en dessus par un angle spiniforme, la jambe est surmontée d'une crête armée de deux dents plus ou moins marquées, le pied et le doigt sont carenés. L'abdomen du mâle est très allongé et le 7^{e} article s'avance entre la base des pattes mâchoires externes, il se rétrécit notablement à partir du milieu du sixième article.

Largeur de la carapace d'un mâle	0.014
Longueur	0.013

Stimpson, "Bache" à 50 brasses près de Charlotte Harbor.

Station	No. 132.	Profond.	115	brasses.	Santa Cruz.
"	No. 272.	"	76	"	Barbades.
"	No. 278.	"	69	"	Barbades.

128. **Cymopolia cristatipes** (nov. sp.).

Cette espèce se distingue de la précédente par sa carapace plus élargie, par son front moins profondement découpé, par la disposition du bord postérieur de la carapace surmonté d'une carène transversale à six festons, par la crête fortement dentée qui règne en dessus de la cuisse des pattes de 3e et de la 4e paire. Le 4e article du sternum porte une crête transversale.

Largeur de la carapace d'un mâle	0.011
Longueur	0.009

Station No. 253. Profond. 92 brasses. Grenade.

129. **Cymopolia cursor** (nov. sp.).

Cette espèce est nettement caractérisée par la très grande longueur des pattes de la 3e paire qui dépassent beaucoup celles de la 4e paire et qui mésurent trois fois la largeur de la carapace, celle-ci est fort élargie et ovalaire, le front est peu avancé. Le bord latéral ne porte pas de dents, en avant du sillon post-hépatique les régions branchiales sont pourvues de quelques gros tubercules sur leur bord. Le bord postérieur est surmonté d'une série de granulations. Le plancher de l'orbite est très avancé et son lobe médian est arrondi. L'angle sous-orbitaire interne est très large et très grand. Les pattes antérieures sont très grêles dans les deux sexes. La cuisse des pattes ambulatoires est renflée à sa base et garnie de gros tubercules.

Largeur de la carapace d'une femelle	0.015
Longueur	0.011
Largeur totale les pattes étendues	0.104

Coll. par Stimpson à 128 brasses. Sand Key.

Station	No. 55.	Profond. 242	brasses.	Havane.
"	No. 146.	" 245	"	St. Kitts.
"	No. 192.	" 138	"	Dominique.
"	No. 274.	" 209	"	Barbades.
"	No. 291.	" 200	"	Barbades.

130. **Cymopolia gracilipes** (nov. sp.).

Cette espèce ressemble beaucoup à la précédente, mais la carapace est plus élargie et il existe une forte dent latérale. Le front est très peu avancé. La cuisse des pattes ambulatoires de la troisième paire est moins granuleuse. L'abdomen du mâle est armé de deux dents sur son troisième article et d'une épine médiane sur son quatrième article.

Largeur de la carapace d'une femelle	0.075
Longueur	0.006
Largeur totale les pattes étendues	0.044

Station	No. 36.	Profond. 84	brasses.	Lat. 23° 13′ N., Long. 89° 16′ W.
"	No. 154.	" 298	"	Montserrat.
"	No. 262.	" 92	"	Grenade.

181. **Cymopolia sica** (nov. sp.).

Le cinquième article du sternum se prolonge en arrière en formant une arête aiguë qui déborde la carapace et s'étend entre la base des pattes correspondantes et l'abdomen, le deuxième et le troisième articles de cette partie du corps portent une crête mince et transversale qui se voit en arrière de la carapace. Le front est très faiblement découpé. Les bords latéro-antérieurs sont armés de trois tubercules pointus et spiniformes. La surface dorsale est couverte de granulations disposées par petits groupes. Le plancher de l'orbite est très peu avancé et l'angle orbitaire interne est tronqué en avant. Les pattes antérieures sont très faibles dans les deux sexes. Les pattes ambulatoires sont de longueur médiocre, leur cuisse est granuleuse; les deux derniers articles sont très aplatis et élargis.

Largeur de la carapace d'une femelle	0.012
Longueur	0.009

Coll. par Stimpson.	Profond.	128	brasses.	Sand Key.
" " "	"	80	"	Sand Key.
Station No. 32.	"	95	"	Lat. 23° 32′ N., Long. 88° 5′ O.
" No. 36.	"	84	"	Lat. 23° 13′ N., Long. 89° 16′ O.
" No. 132.	"	115	"	Santa Cruz.
" No. 192.	"	138	"	Dominique.
" No. 253.	"	92	"	Grenade.
" No. 272.	"	76	"	Barbades.
" No. 293.	"	82	"	Barbades.
" No. 292.	"	56	"	Barbades.

132. **Cymopolia acutifrons** (nov. sp.).

Le front est peu avancé et armé, au lieu de dents, de quatre petites épines, deux médianes très rapprochées et deux latérales occupant les angles orbitaires internes. L'échancrure sous-orbitaire interne est remarquable par ses dimensions. Les pattes sont courtes très faibles et leurs articles sont presque cylindriques et dépourvus de granulations ou de crêtes.

Je n'ai jamais vu qu'un seul exemplaire mâle en très mauvais état de cette espèce.

Largeur de la carapace	0.009
Longueur	0.006

Expéd. du Hassler. Profond. 15 brasses. Lat. 11° 49′ S., Long. 37° 10′ O.

133. **Ethusa americana** (nov. sp.).

Cette *Ethuse* ressemble beaucoup à l'*Ethusa mascarone* de la méditerranée, et les différences qui les séparent ne sont que de peu d'importance. Les épines frontales sont plus aiguës et plus divergentes, le bord sourcilier est plus échancré et l'épine postorbitaire est plus saillante. Le troisième article de l'abdomen du mâle porte deux renflements arrondis et fort saillants. Les autres caractères sont d'ailleurs les mêmes.

Largeur de la carapace	0.005
Longueur	0.006

♂ Stimpson, "Bache." Floride occidentale. Lat. 26° 16′, par 20 brasses.

♂ " "Bache." Floride occidentale, par 13 brasses.

FAMILLE DES DROMIENS.

134. **Dromia sator** (M.-Edwards).
Bahia Honda.

135. **Dromidia antillensis** (Stimpson).

Coll. par Stimpson.	Profond. 20 brasses.		Lat. 26° 16′ N.
Station No. 11.	"	37 "	Lat. 24° 43′ N., Long. 83° 25′ O.
" No. 12.	"	36 "	Lat. 24° 34′ N., Long. 83° 16′ O.
" No. 142.	"	27 "	Flannegan Passage.
" No. 247.	"	170 "	Grenade.

ACANTHODROMIA (nov. gen.).

Ce genre doit prendre place entre les *Dromia* et les *Dynomene*. La région orbito-frontale, ainsi que les pattes mâchoires sont disposées comme celles des Dromies. Les pattes ambulatoires sont au contraire semblables à celles des Dynomènes, celles de la 5e paire sont en effet rudimentaires et chéliformes. La carapace est étroite et ovoide.

136. **Acanthodromia erinacea** (nov. sp.).

Le corps et les pattes sont partout hérissés d'épines nombreuses, assez grandes et très rapprochées ; des épines plus petites existent dans l'intervalle. Le front est en forme de bec, très avancé et terminé par une épine médiane. Les orbites sont disposées très obliquement. L'article basilaire des antennes externes est épineux et ferme l'orbite en dessous. L'article basilaire des antennes internes est armé de petites épines. La pointe épistomienne se joint au front. Les pattes antérieures sont terminées en cuiller et denticulées sur leurs bords. L'abdomen de la femelle même chargé d'œufs, est peu élargi, il est très épais épineux. Les pièces latérales du sixième article sont très petites.

Largeur de la carapace (sans les épines)	0.015
Largeur avec les épines	0.018
Longueur de la carapace	0.018

Station No. 166.	Profond. 150 brasses.		Guadeloupe.	
" No. 232.	"	88 "	St. Vincent	Fragment de carapace.

DICRANODROMIA (nov. gen.).

La carapace est étroite, ovoide, allongée, à peine poilue. L'endostome ets garni de chaque côté d'un forte crête. La pointe épistomienne se joint au front. La région faciale occupe presque toute la largeur de la carapace. Les sillons du plastron sternal de la femelle sont à peine marqués et ne dépassent pas le niveau des pattes de la 3e paire. Les pattes sont grêles et très longues. Ce genre diffère des *Dromia* (Stimp.), des *Cryptodromia* (Stimp.) et des *Dromidia* (Stimp.) par le peu de largeur de la carapace. Par la longueur des pattes et par la disposition des sillons sternaux de la femelle, il se distingue des *Pseudodromia* (Stimp.); par son épistome joint au front et par les pattes de la 2^{e} paire plus longues que celles de la 5^{e}, enfin il ne peut-être confondu avec le genre *Petalomera* (Stimp.) dont les épimères sont membraneux.

137. **Dicranodromia ovata** (nov. sp.).

La carapace est plus convexe transversalement que d'avant en arrrière les bords latéraux en sont presque parallèles; ils divergent légèrement en arrière, la carapace étant plus élargie dans sa partie postérieure que dans sa partie antérieure. Le front est formé de deux grandes dents triangulaires entre lesquelles se voit une petite pointe médiane. Le bord orbitaire supérieur est interrompu en dehors par une fissure linéaire étroite. Une large échancrure existe en dehors de l'orbite. L'angle sous-orbitaire est arrondi et lobiforme. Quelques très petites épines arment le lobe orbitaire externe et la partie antérieure des bords latéraux. Les pattes antérieures sont lisses et revêtues d'un court duvet.

Largeur de la carapace d'une femelle de grande taille	0.023
Longueur	0.025
Longueur les pattes étendues	0.096

Coll. par Sigsbee.	Profond.	175 brasses.	Havane.
Station No. 295.	"	180 "	Barbades.
" No. 166.	"	150 "	Guadeloupe.
" No. 5.	"	152–229 "	Lat. 24° 15′ N., Long. 82° 13′ O.

FAMILLE DES HOMOLIENS.

HOMOLODROMIA (nov. gen.).

La carapace est étroite, plus large en arrière qu'en avant. Les antennes internes ne peuvent pas se replier dans des fossettes sous frontales. Les antennes externes sont très mobiles et insérées au dessous du pédoncule oculaire; elles sont beaucoup plus longues que la carapace. Les yeux sont très petits et n'ont pas de cavité orbitaire spéciale. Le cadre buccal est quadrilatère; l'épistome est bien distinct. Les dents de l'extrémité des pinces sont aiguës et s'engrènent. Les pattes de la 2^{e} et de la 3^{e} paire sont grêles et très longues, celles de la 4^{e} et de la 5^{e} paire sont relevées sur le dos, petites et chéliformes. L'abdomen du mâle se compose de 7 articles, qui ne sont en contact que dans leur portion médiane, leur partie latérale est plus étroite et libre.

Ce genre doit prendre place entre les Homoles et les Dromies. Par la disposition des pattes postérieures il ressemble aux Dorippes.

138. **Homolodromia paradoxa** (nov. sp.).

La carapace est épaisse, très bombée transversalement et revêtue d'un duvet clair-semé qui ne cache pas le test; sa surface est lisse un petit bourrelet à convexité postérieure la traverse dans la région branchio-cardiaque. Le front est armé de deux cornes rostrales fortes et triangulaires, qui s'avancent jusqu'au niveau de l'extrémité du 2e article des antennes externes; une grande épine post-orbitaire se dirige en dehors et un peu en avant. Les bords latéraux sont inermes et presque parallèles. Les régions latéro-inférieures sont inermes. Les pattes antérieures du mâle sont faibles, égales entre elles, couvertes de poils clair-semés mais lisses, le doigt immobile se termine par une espèce de fourche dans laquelle est reçue la pointe terminale du doigt mobile. Les pattes de la 2e et de la 3e paire sont lisses, cylindriques; leur dernier article est très long, et fortement courbé; leur cuisse porte en dessus et à son extrémité une petite épine. La pince des pattes de la 4e et de la 5e paire est formée par un petit doigt très crochu s'opposant à une dilatation de l'article précédent, garnie de plusieurs épines.

Largeur de la carapace	0.013
Longueur	0.019
Largeur totale les pattes étendues	0.115

♂ Station No. 151. Profond. 356 brasses. Nevis.

139. **Homola vigil** (nov. sp.).

Cette espèce se rapproche de l'*Homola spinifrons*, mais la carapace est plus élargie et plus courte. La pointe rostrale n'est pas bifurquée à son extrémité et les épines de la partie antérieure du corps sont plus faibles. Les yeux sont plus gros dans leur portion terminale. Les pinces du mâle sont plus courtes, tandis que les pattes ambulatoires sont beaucoup plus longues. La cuisse est armée en dessus d'une rangée d'épines aiguës. Le pénultième article des pattes de la dernière paire est plus allongé que chez l'espèce de la méditerranée.

Largeur de la carapace d'un mâle	0.018
Longueur	0.021
Largeur les pattes étendues	0.166

♂ Station No. 193.	Profond. 169 brasses.		Martinique.
♀ " No. 100.	" 250 à 400	"	Morro-Light.
" No. 171.	" 183	"	Guadeloupe.

140. **Homola spinifrons** (Lamarck).

Je ne puis trouver aucune différence spécifique entre une Homole draguée au Phare de Morro à 200 brasses de profondeur et l'*Homola spinifrons* de la méditerranée. Un autre exemplaire provenant des Barbades et peché à 100 brasses de fond par l'expédition du Hassler, présente les mêmes caractères.

HOMOLOPSIS (nov. gen.).

Ce genre diffère des *Homola* par la forme plus arrondie et plus ovoide de la carapace, par le grand développement du rostre, par la forme des yeux, qui sont très petits et ne se rétrécissent pas à leur base et par la faiblesse des pattes.

141. **Homolopsis rostratus** (nov. sp).

La carapace est fort rétrécie en avant et se termine par un rostre aigu, dirigé en avant et en bas et surmonté latéralement de deux fortes épines; sa pointe s'avance jusqu'à l'origine du filament des antennes externes. A la base du rostre, existent deux grandes épines sous-orbitaires dirigées en haut et en dehors. Une très longue épine, ayant la même direction que la précédente, arme la région hépatique. Le lobe branchial porte une très petite épine, ainsi que le lobe mérogastrique. Deux épines existent sur la région subhépatique. Les pattes sont très grêles, inermes et presque cylindriques.

Largeur de la carapace d'une femelle mesurée sous les épines	0.007
Largeur au niveau des épines latérales	0.012
Longueur de la carapace	0.070

♀ Station No. 124. Profond. 580 brasses entre St. Thomas et Santa Cruz.

FAMILLE DES RANINIENS.

142. **Raninoides nitidus** (nov. sp.).

Cette espèce se distingue du *R. lævis* par sa carapace plus rétrécie en avant et par l'existence de deux épines en arrière de l'angle postorbitaire. La pointe rostrale est triangulaire et étroite. L'épine postorbitaire est longue, grêle et très légèrement divergente. Les bords latéraux, au lieu d'être droits, sont un peu arqués et garnis en avant de deux épines, la première très courte, la seconde beaucoup plus longue. La première est plus courte et plus large que chez le *R. lævis* et les pattes ambulatoires sont disposées comme celles de cette dernière espèce. Le plastron sternal ne devient linéaire qu'entre la base des pattes de la 3e paire.

Largeur de la carapace	0.045
Longueur	0.006

Station No. 259. Draguée à la Grenade à la profondeur de 159 brasses.

RANINOPS (nov. gen.).

Ce genre par sa forme générale se rapproche des *Notopus*, mais il en diffère par la longueur plus grande des pédoncules oculaires qui se replient en arrière, et en dehors, occupant presque toute la largeur de la carapace et se logeant dans des rainures orbitaires creusées au dessous du bouclier cephalo-thoracique. Le plastron sternal devient linéaire entre la base des pattes de la seconde paire.

143 **Raninops constrictus** (nov. sp.).

La carapace est très resserrée et en forme de toit, surtout dans la partie antérieure; sa surface est finement ponctuée, mais dépourvue de lignes transversales saillantes et de granulations. Le rostre est étroit et pointu et le pédoncule oculaire s'insère à sa base, le bord orbitaire supérieur est très oblique et garni en dessous de poils; il est divisé en trois dents avancées; la dent interne est la plus grande les deux autres sont à peu près de même taille. Une épine latérale et dirigée en avant, existe à une petite distance de l'orbite, la longueur du pédoncule oculaire est environ égale aux deux tiers de la largeur de la carapace. Les pinces sont inermes en dessus. L'avant bras est pourvu d'une épine. Le bras est armé en dedans et en avant d'une petite épine.

Largeur de la carapace	0.008
Longueur	0.012

Dragué par W. Stimpson près de Sombréro à 47 brasses de profondeur.

144. **Raninops Stimpsoni** (nov. sp.).

La carapace est plus inclinée en dessus et moins inclinée en forme de toit que celle de l'espèce précédente. Le rostre est plus court et les dents du bord sourcilier sont plus pointues. Le bord supérieur de la main, au lieu d'être inerme, est surmonté d'une épine. La palette qui termine les pattes de la quatrième paire est plus large, plus arrondie et moins contournée que chez le *Raninops constrictus*.

Largeur de la carapace	0.008
Longueur	0.010

Cette espèce a été trouvée par W. Stimpson sur les récifs de la Floride occidentale.

FAMILLE DES PORCELLANIENS.

145. **Porcellana Stimpsoni** (nov. sp.).

Cette espèce doit prendre place à côté de la *Porcellana ocellata* de Gibbes; mais elle s'en distingue par sa carapace plus large, par son front moins avancé dont la pointe médiane est arrondie, lobiforme et ne dépasse pas les angles orbitaires internes et par ses pattes antérieures entièrement glabres, au lieu d'être garnies de poils le long de leur bord inférieur.

Largeur de la carapace	0.013
Longueur	0.013

Cette espèce provient du sud de la Floride, de Woman Key. Coll. par Stimpson.

146. **Porcellana Sigsbeiana** (nov. sp.).

La carapace est plus étroite et plus allongée que celle de la *P. ocellata;* le front est fortement tridenté et la dent médiane, triangulaire et pointue, dépasse les dents latérales qui sont plus étroites. Le bord latéral présente dans la région hépatique une échancrure en arrière de laquelle se voit une petite dent très aiguë dirigée en avant et indiquant la terminaison du sillon ou se replie l'antenne externe au dessous de la carapace. Les pattes antérieures sont plus longues que celles du *P. ocellata*, et l'avant bras, au lieu d'être pourvu en avant d'un lobe dentiforme, est armé d'une très petite dent spiniforme. Les pinces sont moins élevées et les doigts sont plus courts relativement à la région palmaire ; une fine bordure de poils se trouve au dessous de la main. L'angle antéro-interne du bras est aigu et denticulé et non arrondi comme chez le *P. ocellata*.

Largeur de la carapace d'une femelle	0.007
Longueur	0.008

Station No. 49. 118 brasses. Lat. 28° 51′ 30″ N., Long. 89° 1′ 30″ O.
" No. 36. 84 brasses par 23° 13′ de lat. N. et 89° 16′ de long. O.
" No. 142. 27 brasses. Flannegan Passage.

147. Pachycheles Ackleianus (nov. sp.).

La carapace est large, presque plate transversalement et bombée d'avant en arrière; un sillon situé en arrière des régions hépatiques et de la région gastrique s'étend d'un bord à l'autre. Quelques bosselures existent dans la partie antérieure de la carapace; le front est très déclive. Vu en dessus il parait droit, mais vu en avant il présente une petite pointe médiane en forme de bec. Les pattes antérieures sont très longues, très renflées, glabres et inégales. Le bras déborde notablement la carapace; il est revêtu dans sa partie libre de granulations aplaties. L'avant bras est aussi long que la main; il est armé en avant de trois tubercules ou dents spiniformes et il est couvert en dehors de grosses granulations inégales, surbaissées, luisantes et disposées sans régularité. La main est petite, rétrécie dans sa portion articulaire, dentelée par son bord inférieur et ornée de granulations semblables à celles de l'avant bras, mais ayant une tendance à se grouper suivant des séries longitudinales. Les doigts sont courts, granuleux en dehors et en contact dans toute leur longueur. Les pattes ambulatoires sont fortes, un peu granuleuses ou rugueuses, et elles ne portent que quelques poils très rares.

Largeur de la carapace d'une femelle	0.007
Longueur	0.0055

Station No. 11. 37 brasses par 24° 43′ de lat. N. et 83° 25′ long. O.
" No. 39. 14 brasses. Jolbos Islands.

148. Pachycheles rugimanus (nov. sp.).

Cette espèce se distingue de la précédente par ses moindres dimensions, par sa carapace moins bombée d'avant en arrière, plus étroite, plus avancée dans sa portion antérieure par la disposition de ses bords latéraux, nettement marginés, par son front peu déclive, par ses pattes antérieures subégales, plus courtes et couvertes de tubercules très élevées en forme de boutons aplatis, disposés en séries longitudinales doubles, séparées par des sillons profonds, par ses pattes ambulatoires plus velues et par l'existence d'une petite épine sur le 2e et le 3e article de l'antenne externe.

Largeur de la carapace	0.0045
Longueur	0.0046

Contoy de 12 à 18 brasses recueilli par Stimpson. Floride, O. 13 brasses. "Bache."

FAMILLE DES PAGURIENS.

XYLOPAGURUS (nov. gen.).

La carapace est étroite et limitée par des bords latéraux parallèles ; elle se termine en avant par une petite pointe rostrale ; elle est coriace en dessus et membraneuse latéralement. L'anneau ophthalmique est represénté par deux petites écailles séparées sur la ligne médiane. Les yeux sont peu allongés, les antennes sont courtes, les antennules sont grosses et raccourcies. L'abdomen n'est pas contourné et il se termine par une armature spéciale en forme de bouclier et parfaitement symétrique, formée par le penultième anneau qui est très développé, largement ovalaire et termine l'abdomen en biseau. Les appendices latéraux s'insèrent au dessous et sont symétriques, ils se replient dans une dépression creusée au dessous de l'article qui les porte et ils n'apparaissent que quand on les écarte. Le dernier anneau de l'abdomen est très petit et rejeté au dessous et en avant du précédent. Le mâle porte deux paires de fausses pattes très grêles. La femelle est pourvue de trois fausses pattes ovifères situées du côté gauche. Les pinces sont inégales et dissemblables ; la droite est la plus forte et terminée par des doigts aigus. Les pattes ambulatoires de la 2e et de la 3e paire sont longues et grêles, celles de la 4e paire ne sont pas chéliformes. Les pattes mâchoires externes sont petites et rapprochées à leur base.

149. **Xylopagurus rectus** (nov. sp.).

Les pinces dépassent à peine l'extrémité des pattes ambulatoires, l'articulation de la grosse main est transversale de façon que le pouce est en dedans et s'ouvre latéralement et non verticalement. Une épine forte mais peu allongée surmonte sa base. La portion palmaire est renflée et ornée en dehors de granulations et de quelques poils, les doigts sont également granuleux et poilus. L'avant bras et le bras sont rugueux et velus. La petite pince est très grêle et atteint à peine l'articulation de la précédente. Les pattes de la 2e et de la 3e paire sont comprimées latéralement terminées par des doigts styliformes et elles portent quelques poils. Le bouclier abdominal est entouré d'un rebord granuleux il est légèrement excavé et porte sur la ligne médiane un sillon dont les bords s'écartent inférieurement de manière à limiter un espace triangulaire. Un sillon transversal coupe, le premier à angle droit et le divise en deux parties à peu près égales, sa surface est granuleuse.

Longueur totale du corps d'une femelle	0,026
Longueur totale les pattes étendues	0.040

Cette espèce n'a encore été trouvée que dans des trous creusés dans des morceaux de bois, tantôt elle se loge dans la cavité intérieure d'un roseau ou d'un jonc, tantôt dans celle d'une branche quelconque. Cette cavité est toujours ouverte aux deux bouts. Les pinces se présentent à l'une des extrémités, le bouclier abdominal ferme complêtement l'autre orifice. L'animal ne s'y introduit pas à reculons comme le font les Pagures ordinaires, mais il y pénètre directement.

Station No. 192 à 138 brasses de profondeur près de la Dominique.
" No. 223 à 146 brasses. St. Vincent.

PYLOCHELES (nov. gen.).

Ce genre se place à côté des *Pomatocheles* décrits récemment par M. Miers et de même que ces crustacés il établit le passage entre les Paguriens et les Thalassiniens. Il diffère des *Pomatocheles* par l'absence d'une pointe rostrale, par la forme de la carapace rétrécie en avant et élargie en arrière, par la disposition des antennes. Le 2^{e} article de l'antenne externe porte au dessus une forte épine dentelée au dessous de laquelle s'insère une épine plus longue qu'elle et dentelée elle même à son extrémité; au dessous s'insère le 3^{e} article antennaire. L'anneau ophthalmique est incomplêtement caché par le bord frontal. Les anneaux de l'abdomen sont courts et larges, le dernier est formé de 3 pièces, l'une basilaire sur laquelle s'articulent deux pièces séparées sur la ligne médiane et le penultième anneau porte des appendices moins lancéolés et revêtus en dehors d'aspérités qui les transforment en une sorte de lime ou de râpe.

150. Pylocheles Agassizii (nov. sp.).

La carapace est complêtement coriace en dessus; la région gastrique est limitée antérieurement par un sillon arqué en avant et garni de poils. Ce sillon se prolonge en arrière de chaque côté du lobe méso-gastrique. Le sillon qui sépare la région gastrique de la région cardiaque est profond et se continue latéralement jusqu'aux bords latéraux de la carapace il est garni de petits poils. Les yeux sont élargis et aplatis dans leur portion terminale correspondant à la cornée. Les antennules sont longues et renflées à leur base. Les anneaux de l'abdomen sont revêtus de petits poils courts flexibles et peu serrés; ils se terminent latéralement en forme de lobe arrondi. Les pattes antérieures sont égales et semblables. La main est renflée, elle se plie à angle droit sur l'avant bras et elle est articulée de façon à ce que son bord supérieur soit tourné en dedans et puisse s'appliquer exactement contre le bord correspondant de l'autre main, les deux pinces ainsi rapprochées constituent alors une lame continue qui sert à clore hermétiquement la cavité ou s'enferme le *Pylocheles*. La face externe de la pince et ses bords sont revêtus de poils et de fines granulations qui sur le pourtour deviennent pointues; les doigts sont très élargis et aplatis, le pouce s'ouvre horizontalement. Le bord antérieur de l'avant bras se prolonge comme une sorte de mur denticulé, au dessus de la main et ce rebord complète en dessus l'opercule chéliforme du *Pylocheles*. Les pattes de la 2e et de la 3e paire sont comprimées, lisses et velues, celle de la 4e et de la 5e paire ne sont pas chéliformes, elles ressemblent à celles des *Pomatocheles*, mais elles sont moins élargies.

Longueur totale du corps d'un mâle	0.034
Longueur totale les pinces étendues	0.053
Largeur de la carapace en arrière	0.012

Station No. 291. Profond. 200 brasses. Barbades.

Ce crustacé vivait dans une cavité creusée au milieu d'un fragment pierreux formé de sable agglutiné, il remplissait entièrement cette cavité et la fermait au moyen de ses pinces.

MIXTOPAGURUS (nov. gen.).

Ce genre établit un passage entre les *Pagurus* proprement dits et les *Pylocheles*. La carapace est celle d'un Pagure, la région gastrique est dûre et crustacée et les régions branchiales sont membraneuses. L'abdomen est courbé et plus développé du côté droit que du côté gauche, il est divisé en sept articles bien distincts articulés et mobiles, les téguments des cinq premiers sont incomplètement calcifiés; le sixième est grand et très dur, le dernier à la forme d'une lame flexible, les appendices du penultième article sont grands et symétriques.

151. **Mixtopagurus paradoxus** (nov. sp.).

La carapace porte quelques bouquets de poils flexibles et assez longs, disposés surtout le long des bords et des sutures. La pointe rostrale est très courte, laissant à découvert l'anneau ophthalmique. Les yeux sont aussi longs que les deux premiers articles des antennes internes; l'épine sus-antennaire porte quelques poils et quelques spinules; la tigelle mobile est courte. Les pattes antérieures sont petites, épaisses et égales. La main est très renflée et couverte, ainsi que le pouce, d'épines courtes et coniques entre lesquelles s'implantent des poils, fins, assez longs et jaunâtres. L'extrémité des doigts est brune et cornée. L'avant bras porte des épines semblables à celles de la main. Les pattes de la 2e et de la 3e paire sont très velues, pourvues de doigts courts et elles sont armées de quelques courtes épines sur leur bord supérieur. Les pattes de la 4e paire sont monodactyles. De longs poils soyeux garnissent les derniers articles de l'abdomen.

Longueur de la carapace	0.010
Largeur	0.017
Longueur de la pince	0.013
Longueur des pattes de la 3e paire	0.020

Station No. 291. Profond. 200 brasses. Barbades.

152. **Aniculus Petersii** (nov. sp.).

Cette belle et grande espèce se reconnait facilement à la disposition de ses pinces légèrement inégales. La gauche étant la plus forte et couverte en dehors de sillons transversaux ou obliques bordés chacun d'une rangée de poils courts et égaux et surmontés d'une ligne de granulations régulières. Ces granulations deviennent spiniformes sur la partie supérieure de la main; les doigts sont très massifs, élargis à leur base et terminés par une extrémité cornée et noire, ils offrent le même mode d'ornementation que la main; le pouce porte en dessus près de son articulation une profonde dépression longitudinale. L'avant bras est garni de sillons pilifères et de petites épines. Les pattes de la 2[e] et de la 3[e] paire sont fortes; elles dépassent les pinces. De nombreux sillons transversaux et pilifères surmontés d'une série de granulations existent sur le pied et la jambe. Le doigt porte en dessus plusieurs rangées longitudinales de gros tubercules, separés par des surfaces poilues; celui de la 3[e] paire des pattes est plus large plus tranchant en dessous et on y remarque du côté externe de nombreux sillons pilifères disposés obliquement.

Longueur de la carapace	0.043
Largeur	0.033
Longueur de la patte antérieur gauche	0.078
Longueur de la pince gauche	0.039

Station No. 36. Profond. 84 brasses. Lat. 23° 13′ N., Long. 89° 16′ O.
" No. 296. " 84 " Barbades.

153. **Eupagurus macrocheles** (nov. sp.).

La carapace est courte et très élargie en arrière. La région gastrique est dure. Les parties latérales et postérieure sont membraneuses. Le front est armé d'une épine médiane bien développée, une très petite écaille spiniforme existe à la base de chacun des pédoncules oculaires. Les yeux sont courts renflés à leur extrémité et s'avancent à peu près au niveau du 3[e] article de l'antenne externe. L'épine sus-antennaire est très longue et très grêle. La pince droite est très grande et ressemble à celle de certaines Galathées. Le bras et l'avant bras sont presque de même longueur. Le bras porte sur son bord inférieur une série de petites épines regulières. L'avant bras et la main sont ornés de granulations qui deviennent spiniformes sur les bords des articles, les doigts de la pince sont plus courts que la portion palmaire ils sont cependant fort allongés, comprimés, et armés chacun, sur leur bord préhensile d'une dent; la dent inférieure située en arrière de la dent supérieure, quelques poils blonds, soyeux et courts, s'implantent sur les bords et à côté des granulations des pinces. La pince la plus faible ressemble beaucoup à la précédente, son extrémité atteint l'articulation du pouce de la pince droite. Les pattes de la 2[e] et de la 3[e] paire sont lisses, très comprimées et garnies de quelques poils sur leurs bords seulement. Les pattes de la 3[e] paire sont allongées et terminées par un doigt styliforme. L'abdomen de la femelle est court, très contourné, et pourvu de fausses pattes fort longues. L'article basilaire des fausses pattes du pénultième article de l'abdomen porte en dessous une épine.

Longueur de la carapace	0.043
Largeur en arrière	0.015
Longueur de la patte antérieure droite	0.056
Longueur de la pince droite	0.026
Longueur du pouce droit	0.010
Longueur de la patte antérieure gauche	0.042

Station No. 54. Profond. 175 brasses près de la Havane.

154. **Eupagurus discoidalis** (nov. sp.).

Cette espèce vit dans les tubes des Dentales, aussi son abdomen au lieu d'être contourné est il droit et pourvu à son extrémité de fausses pattes symétriques. La pince droite est très développée et en forme d'opercule de manière à clore plus ou moins exactement l'ouverture du Dentale. La main se plie à angle droit sur l'avant bras et ne peut s'étendre complètement. Sa face externe est lisse et constitue avec le doigt une sorte de pièce operculaire d'une forme ovalaire, raccourcie et presque discordiale, aplatie ou même légèrement excavée et entourée d'un rebord saillant. Les doigts sont très élargis, comprimés et leur contour continue exactement celui de la portion palmaire de la pince. L'avant bras est très court et orné de granulations disposées suivant des lignes squammeuses irrégulières ; la même ornementation existe sur la partie de la main située en arrière du rebord limitant la portion operculiforme. La petite pince est très faible et n'offre rien de particulier à noter. Les pattes ambulatoires sont comprimées latéralement et terminées par des doigts à ongle trés développé.

Chez les exemplaires conservés dans l'alcool les pinces sont rougés et les doigts blancs en tout ou en partie, ainsi que les pédoncules oculaires et les antennes.

Longueur totale du corps d'un mâle 0.031

Station	No. 36.	Profond.	84	brasses.	Lat. 23° 13′ N., Long. 89° 16′ O. 4071
"	No. 136.	"	508	"	Santa Cruz.
"	No. 157.	"	120	"	Montserrat.
"	No. 167.	"	175	"	Guadeloupe.
"	No. 220.	"	116	"	Ste. Lucie.
"	No. 223.	"	146	"	St. Vincent. 40
"	No. 273.	"	103	"	Barbades. 264
"	No. 290.	"	73	"	Barbades.
"	No. 291.	"	200	"	Barbades.
"	No. 300.	"	82	"	Barbades. 2714

155. **Eupagurus Bartletti** (nov. sp.).

Cette espèce est voisine de l'*Eupagurus pollicaris* (Say.) mais elle se distingue par ses pédoncules oculaires plus courts que l'épine sus-antennaire et par la forme de sa pince, celle-ci reste toujours pliée sur l'avant bras et ne peut s'étendre complêtement elle est bordée en dessous par une série de larges crenelures denticulées, qui garnissent aussi le bord supérieur du pouce; ce dernier article ne présente pas la saillie en forme de bosse que l'on remarque chez l'*Eupagurus pollicaris.*

Longueur de la carapace	0.013
Largeur	0.010
Longueur de la pince	0.028
Longueur des pattes de la 3e paire	0.032

Station	No. 223.	Profond.	146	brasses.	St. Vincent.
"	No. 259.	"	159	"	Grenade.
"	No. 274.	"	209	"	Barbades.
"	No. 291.	"	200	"	Barbades.

156. **Eupagurus erosus** (nov. sp.).

Chez cette espèce les pédoncules oculaires sont beaucoup plus longs que chez l'*E. pollicaris* et l'*E. Bartletti;* ils dépassent de plus d'un tiers l'épine sus-antennaire. La pince droite est courte, très arrondie et couverte de tubercules framboisés en forme de champignons et très rapprochés les uns des autres. Sur les bords ces tubercules sont pointus et forment une frange de courtes épines coniques. Sur la petite pince les épines du bord inférieur sont beaucoup plus fortes. Les pattes ambulatoires sont inermes.

Longueur de la carapace	0.007
Largeur	0.004
Longueur de la pince	0.012
Longueur des pattes de la 3e paire	0.014

Station	No. 202.	Profond.	210	brasses.	Martinique.
"	No. 273.	"	103	"	Barbades.
"	No. 290.	"	73	"	Barbades.
"	No. 296.	"	84	"	Barbades.
"	No. 300.	"	82	"	Barbades.

157. **Eupagurus gibbosimanus** (nov. sp.).

Cette très petite espèce doit se placer dans la même section que les *Eupagurus erosus* et *Bartletti*, mais il est facile de l'en distinguer par les caractères des pinces. La grosse main est couverte de granulations confluentes et très peu élevées et elle porte sur sa face externe deux gros bourrelets longitudinaux formant de fortes saillies, l'une au niveau du pouce, l'autre au niveau de l'index. Les yeux sont de la longueur de l'épine sus-antennaire et s'amincissent vers leur extrémité. Les œufs sont remarquablement gros.

Longueur totale d'une femelle chargée d'œufs . . 0.015

Station	No. 206.	Profond.	170	brasses.	Martinique.
"	No. 233.	"	174	"	St. Vincent.

158. **Eupagurus Jacobii** (nov. sp.).

Le corps est petit comparativement aux pattes. La partie antérieure de la carapace est crustacée et terminée par une très petite pointe rostrale; la région cardiaque est très petite et crustacée. Les pédoncules oculaires sont courts et dépassés de beaucoup par l'épine sus-antennaire; les pinces sont très inégales la droite est de beaucoup la plus grande; elle porte six poils très courts et très délicats, elle est couverte de granulations très fines, mais elle est inerme en dessus. Les doigts sont aigus et leurs bords sont tranchants et en contact dans toute leur longueur. Les pattes ambulatoires de la 2ᵉ et de la 3ᵉ paire sont très longues, comprimées, lisses et luisantes, celles de la 3ᵉ paire dépassent les autres. Le doigt est surtout remarquable par sa forme grêle et allongée et il a plus d'une fois et demie la longueur de la carapace.

Longueur de la carapace	0.012
Largeur	0.007
Longueur de la pince droite	0.028
Longueur de la 3ᵉ paire	0.050

Station No. 163.	Profond. 769 brasses.	Guadeloupe.
" No. 221.	" 423 "	Ste. Lucie.
" No. 205.	" 334 "	Martinique.

159. **Eupagurus pilimanus** (nov. sp.).

La carapace est étroite à pointe rostrale peu saillante les yeux sont gros, renflés à leur extrémité et atteignent l'extrémité de l'épine sus-antennaire. Les pinces sont inégales; la droite est la plus forte; la main est courte et presqu'aussi large que longue; elle est entièrement revêtue de poils serrés et elle présente, en dessus et en dessous, une bordure de petites épines; l'avant bras est poilu et spinuleux. Les pattes ambulatoires sont courtes, fortes, à doigts très arqués et elles ne portent que quelques poils en dessus.

Longueur de la carapace	0.015
Largeur	0.008
Longueur de la pince	0.030
Longueur des pattes de la 3ᵉ paire	0.037

Station No. 148.	Profond. 208 brasses.	St. Kitts.
" No. 281.	" 288 "	Barbades.
" No. 167.	" 175 "	Guadeloupe.

160. **Eupagurus bicristatus** (nov. sp.).

La pince droite de cette espèce est tout à fait caractéristique, elle est courte, haute et bordée en haut par deux crêtes granuleuses parallèles; l'une interne plus élevée, l'autre plus externe et prenant son origine au niveau du tubercule articulaire du pouce. Le bord supérieur du pouce est tranchant, finement denticulé et très arqué, le bord inférieur de la main est mince et finement serratulé. Les pattes ambulatoires sont inermes et très arquées.

Longueur de la carapace	0.018
Longueur de la pince	0.010

Station No. 136.	Profond. 508 brasses.	Frederickstadt.
" No. 218.	" 164 "	Ste. Lucie.

161. Paguristes sericeus (nov. sp.).

La carapace est aplatie et élargie, les bords latéraux de la région hépatique sont presque parallèles et spinuleux, les régions branchiales sont fort larges et leurs bords latéraux sont arqués. Le bord antérieur de la carapace est presque droit. Le rostre est bien marqué les yeux sont grands et dépassent les deux premiers articles des antennes internes. Les écailles ophthalmiques sont petites et simples. L'épine sus-antennaire est spinuleuse. Les pinces sont courtes et sub-égales; elles sont revêtues de poils doux, jaunes et soyeux, tandis que chez le *Paguristes depressus* elles sont nues, des granulations couvrent leur face externe, des tubercules pointus garnissent leur bord supérieur. L'extrémité des doigts est formée par une petite épine noire. Les pattes ambulatoires sont rugueuses et revêtues en dessus, surtout sur les articles terminaux, de poils semblables à ceux des pinces. Le doigt porte en dedans une cannelure longitudinale. Le plastron sternal est très élargi entre la base des pattes de la 2ᵉ de la 3ᵉ et de la 4ᵉ paire.

Longueur de la carapace	0.031
Largeur au niveau des régions branchiales . . .	0.028
Longueur des pinces	0.047
Longueur de pattes de la 3ᵉ paire	0.077

Station No. 142. Profond. 27 brasses. Flannegan passage.
" No. 12. " 36 " Lat. 24° 34′ N., Long. 83° 16′ O.

162. Paguristes spinipes (nov. sp.).

Cette espèce diffère de la précédente par sa carapace beaucoup plus étroite, par ses pédoncules oculaires plus grêles, par ses pinces couvertes de petites épines coniques, dans l'intervalle des quelles s'insèrent quelques poils et par ses pattes ambulatoires dont le bord supérieur est armé d'une rangée d'épines. L'ovisac de la femelle est très grand.

Longueur de la carapace	0.012
Largeur	0.008

Station No. 253. Profond. 92 brasses. Grenade.

163. Spiropagurus iris (nov. sp.).

La carapace est lisse et nue. La pointe rostrale est arrondie et peu avancée, l'anneau ophthalmique est à découvert. Les yeux sont gros et renflés à leur extrémité, ils n'atteignent pas le niveau de la pointe de l'épine sus-antennaire. Les pattes antérieures sont égales, terminées par des doigts pointus; elles sont couvertes de petites épines qui forment en dessous une bordure régulière; des poils fins et soyeux s'implantent dans les intervalles des épines et le test présente des reflets irisés très remarquables. Les pattes ambulatoires sont fortes; la cuisse de celles de la 2ᵉ paire porte en dessous quelques épines; les doigts sont grêles. L'appendice génital situé à la base des pattes de la 5ᵉ paire du côté gauche est grand et enroulé sur lui même.

Longueur de la carapace	0.010
Largeur	0.008
Longueur des pinces	0.020
Longueur des pattes de la 3e paire	0.025

Station No. 293.	Profond.	82	brasses.	Barbades.
" No. 290.	"	73	"	Barbades.
" No. 299.	"	140	"	Barbades.

OSTRACONOTUS (nov. gen.).

Ce genre se place parmi les Pagurides dont il se distingue par sa carapace entièrement coriace, par son abdomen rudimentaire et par la disposition de ses pattes. Le bouclier céphalo-thoracique par sa forme générale ressemble à celui de certains Galathéides, il est court, ses bords latéraux sont légèrement arrondis et il est large en arrière. Les yeux sont bien développés. Les antennes externes ressemblent à celles des Pagures, elles sont pourvues d'une épine implantée sur leur 2e article. Les antennes internes sont longues. Les pattes antérieures sont inégales, la droite est plus grosse, elles se terminent par des doigts aigus. Les pattes de la seconde paire sont beaucoup plus courtes que celles de la troisième, elles se terminent par un doigt élargi en palette très comprimée, pointue, et ciliée sur ses bords; du côté droit ce doigt est articulé de façon à se replier en avant. Les pattes de la 4e paire sont très petites, monodactyles et leur penultième article est ovalaire et aplati mais beaucoup plus grand chez la femelle que chez le mâle. Le doigt qui le termine est un peu recourbé et pointu. Les pattes de la 5e paire sont remarquablement petites et monodactyles. L'abdomen est tout à fait atrophié, il est mou et l'on ne peut y reconnaitre que peu de traces d'annulations, si ce n'est ses deux derniers articles qui sont très petites. Les appendices du 6e article sont symétriques, arrondis à leur extrémité et hérissés de petites rugosités comme chez les Pagures. La femelle porte ses œufs attachés à trois fausses pattes qui n'existent que du côté gauche mais ce mode de fixation serait insuffisant si les pattes de la 4e paire ne se repliaient pas au dessous du paquet d'œufs, le pénultième article formant une sorte de plancher ovalaire. Le plastron sternal est de forme triangulaire et très élargi entre les pattes de la 4e paire.

164. **Ostraconotus spatulipes** (nov. sp.).

La carapace est dure, résistante et glabre, les sillons branchio-gastriques et cardiaques y sont bien indiqués. Le front s'avance en une pointe arrondie entre les yeux. On voit aussi une saille de chaque côté de l'insertion de l'antenne externe. Les bords latéraux sont serratulés et portent unè échancrure assez profonde correspondant au sillon gastrique. Les pattes antérieures sont lisses luisantes glabres et dépourvues d'épines ou de granulations. Le bras et l'avant bras sont à peu près de même longueur. La pince est plus forte et plus longue. Les doigts sont un peu plus courts que la portion palmaire. Les pattes suivantes sont lisses et glabres sauf sur le dernier article. Le plastron sternal porte entre chaque anneau et sur la ligne médiane des sillons profonds. Je ne sais quelles sont les habitudes de ce crustacé cependant il ne doit pas habiter les coquilles vides et la conformation de ses pattes me fait penser qu'il vit dans la vase ou dans le sable très fin.

Station No. 50.	Profond. 119 brasses.	Lat. 26° 31′ N., Long. 85° 53′ O.
"Bache."	" 128 "	Sand Key.

CATAPAGURUS (nov. gen.).

Ce genre établit le passage entre les *Ostraconotus* et les *Spiropagurus*. La carapace est coriace en avant de la suture transversale et membraneuse en arrière et sur les côtés. Le front est arrondi et plus avancé au milieu que sur les côtés. Les yeux sont gros, courts, élargis, et comprimés dans la portion qui correspond à la cornée. Une petite épine sus-ophthalmique se remarque à leur base. Il existe une épine sus-antennaire longue et aiguë. Les pattes-mâchoires externes sont grêles et écartées à leur base. Les pattes antérieures sont très longues et inégales, la droite est la plus forte. Les pattes de la 2^e et de la 3^e paire sont au moins aussi longues que les précédentes, elles sont comprimées et se terminent par un doigt élargi, aplati et pointu articulé de manière à se plier en avant, comme chez les *Ostraconotus*. Les pattes de la 4^e paire sont très petites et monodactyles celles de la 5^e paire sont encore plus petites. À la base de celle du côté droit s'élève chez le mâle un appendice génital légèrement arqué et non contourné en spirale comme chez les *Spiropagurus*. L'abdomen est contourné et très petit. L'animal se loge dans de très petites coquilles dont les dimensions contrastent avec la taille de la carapace et des pattes qui restent à découvert.

165. Catapagurus Sharreri (nov. sp.).

La carapace est arrondie et légèrement rugueuse sur la région gastrique. La pince droite est beaucoup plus longue que le corps tout entier, le bras et l'avant bras sont finement denticulés sur leurs bords. La main est plus forte et plus allongée que les articles précédents et les doigts en sont courts comparés à la région palmaire; ils sont aigus à leur extrémité. La face interne de la main porte des poils flexibles et jaunâtres. La patte antérieure gauche est très grêle et presqu'aussi longue que celle du côté opposé, les doigts en sont comparativement beaucoup plus longs. Les pattes de la 2^e et de la 3^e paire sont glabres sauf sur les bords du doigt qui est cilié; leur cuisse porte près de ses bords quelques très petites spinules qui ne se voient qu'à loupe.

Longueur de la carapace	0.006
Longueur de la pince droite	0.027
Longueur de la pince gauche	0.024

Station No. 280.	Profond. 221 brasses.	Barbades.
" No. 291.	" 200 "	Barbades.
" No. 299.	" 140 "	Barbades.

DÉCAPODES MACROURES.

FAMILLE DES GALATHIENS.

166. **Galathea Agassizii** (nov. sp.).

Les stries transversales de la carapace sont peu nombreuses, faiblement granuleuses et poilues. Le rostre dépasse du quart environ de sa longueur les pédoncules oculaires ; il est triangulaire et ses bords sont inermes, une très petite épine existe cependant de chaque côté à sa base. Les côtés latéraux sont garnis d'environ six très petites épines. Les pattes antérieures sont fortes elles portent de longs poils clair-semés. Le bras et l'avant bras sont très épineux ; la main ne l'est que faiblement sur ses bords supérieur et inférieur, celle du côté gauche est généralement plus forte que l'autre et l'index en est faiblement arqué de façon que les doigts ne se touchent que par leur extrémité. Les pattes ambulatoires sont grêles, comprimées et armées de petites épines sur la cuisse et la jambe.

Longueur totale du corps d'un mâle	0.021
Longueur de la carapace	0.012
Largeur	0.007
Longueur des pattes antérieures	0.032

Station No. 218. Profond. 164 brasses. Ste. Lucie.
" No. 283. " 237 " Barbades.

167. **Galathea rostrata** (nov. sp.).

Chez cette espèce le rostre est beaucoup plus grand et il porte de chaque côté quatre dents spiniformes dirigées en avant. Les bords latéraux sont armés en avant d'environ huit petites épines. Les pattes ambulatoires sont courtes et robustes comme chez les *Galathea strigosa*. Les pinces sont moins épineuses que chez le *Galathea Agassizii*.

Longueur totale du corps d'une femelle 0.018

Station No. 39. Profond. 14 brasses à 16 milles au nord des îles Jolbos.

168. **Munida Stimpsoni** (nov. sp.).

La carapace porte des lignes transversales granuleuses très marquées. La région gastrique est surmontée de cinq petites épines, deux sont disposées par paires, en avant, la cinquième est sur la ligne médiane, en arrière. La région cardiaque est pourvue d'une épine médiane, le bord postérieur de la carapace en présente une paire médiane. Les régions branchiales sont armées d'une épine placée presqu'au niveau du sillon gastro-cardiaque. Les bords latéraux commencent par une forte épine, en arrière de laquelle se voient trois ou quatre spinules. Les pointes rostrales sont longues et grêles. Les pattes antérieures sont très grandes et très épineuses. Les 2e, 3e, et 4e anneaux de l'abdomen sont pourvus de petites épines disposées symétriquement, la dernière épine seule est médiane.

Longueur totale du corps d'un mâle	0.043
Longueur de la carapace	0.021
Largeur	0.012
Longueur des pattes antérieures	0.070

Station	No. 23.	Profond.	190	brasses.	Lat. 23° 1′ N., Long. 83° 14′ O.
"	No. 119.	"	1105	"	Entre St. Thomas et Santa Cruz.
"	No. 128.	"	180	"	Frederickstadt.
"	No. 132.	"	115	"	Santa Cruz.
"	No. 134.	"	248	"	Frederickstadt.
"	No. 139.	"	218	"	Mt. Eagle, Santa Cruz.
"	No. 143.	"	150	"	Saba Bank.
"	No. 148.	"	208	"	St. Kitts.
"	No. 167.	"	175	"	Guadeloupe.
"	No. 172.	"	62 à 80	"	Guadeloupe.
"	No. 184.	"	94	"	Dominique.
"	No. 186.	"	98	"	Dominique.
"	No. 203.	"	96	"	Martinique.
"	No. 206.	"	170	"	Martinique.
"	No. 215.	"	226	"	Ste. Lucie.
"	No. 219.	"	151	"	Ste. Lucie.
"	No. 231.	"	95	"	St. Vincent.
"	No. 238.	"	127	"	Grenadines.
"	No. 262.	"	92	"	Grenade.
"	No. 290.	"	73	"	Barbades.

169. **Munida affinis** (nov. sp.).

Cette espèce est très voisine de la précédente elle ne s'en distingue que par la disposition des stries transversales de la carapace qui, au lieu d'être simplement granuleuses sont hérissées de très petites épines.

Longueur totale du corps d'un mâle	0.035
Longueur de la carapace	0.017
Largeur	0.009
Longueur des pattes antérieures	0.052

Station No. 148. Profond. 208 brasses. St. Kitts.

170. **Munida robusta** (nov. sp.).

Dans cette espèce il n'existe pas d'épine sur la région cardiaque et celles des anneaux de l'abdomen sont toutes disposées par paires. Les bords latéraux portent six épines dont la première est beaucoup plus longue que les autres. La pointe rostrale médiane est grêle et deux fois aussi longue que les pointes latérales. Les pattes antérieures sont grandes et fortes; la main est comprimée, épineuse en dessus et rugueuse dans le reste de son étendue. Les doigts sont en contact sur toute leur longueur. De fortes épines se voient en dedans et au dessus du bras, de l'avant bras, et sur le bord supérieur de la cuisse des pattes ambulatoires.

Longueur totale du corps d'un mâle	0.065
Longueur de la carapace	0.032
Largeur	0.020
Longueur des pattes de la 1e paire	0.090

Station No. 241. Profond. 163 brasses. Cariacou.

171. **Munida iris** (nov. sp.).

Cette espèce atteint une grande taille. Les poils qui garnissent les stries transversales de la carapace ont des reflets irisés très marqués. La région gastrique porte quelques petites épines en avant, il n'en existe pas en arrière. Les bords latéraux portent sept épines; la première beaucoup plus longue que les autres. Les pointes latérales du rostre dépassent un peu les yeux. Les pattes antérieures sont très grandes. La main est presque cylindrique, rugueuse et on ne voit a peine quelques très courtes épines sur son bord supérieur, les doigts sont longs, grêles et appliqués l'un contre l'autre. L'abdomen est dépourvu d'épines.

Longueur totale du corps d'une femelle	0.073
Longueur de la carapace	0.037
Largeur	0.021
Longueur des pattes antérieures	0.130

Station No. 274. Profond. 209 brasses. Barbades.

172. **Munida irrasa** (nov. sp.).

Cette espèce ne se distingue de la précédente que par la disposition des épines frontales. Les latérales sont très courtes et atteignent à peine la moitié de la longueur des pédoncules oculaires.

Longueur totale du corps d'un mâle	0.033
Longueur de la carapace	0.017
Largeur	0.009
Longueur des pattes antérieures	0.062

Station	No. 32.	Profond.	95	brasses.	Lat. 23° 32′ N., Long. 88° 5′ O.
"	No. 36.	"	84	"	Lat. 23° 13′ N., Long. 89° 16′ O.
"	No. 50.	"	119	"	Lat. 26° 31′ N., Long. 85° 53′ O.
"	No. 132.	"	115	"	Frederickstadt.
"	No. 192.	"	138	"	Dominique.
"	No. 232.	"	88	"	St. Vincent.
"	No. 241.	"	163	"	Grenadines.
"	No. 253.	"	92	"	Grenade.
"	No. 272.	"	76	"	Barbades.
"	No. 276.	"	94	"	Barbades.

173. **Munida caribœa** (nov. sp.).

Stimpson, Notes on North American Crustacea, No. 2, p. 166 (Annals of the Lyceum of Natural History of New York, Vol. VII.).

Station No. 36. Profond. 84 brasses. Lat. 23° 13′ N., Long. 89° 16′ O.

174. **Munida forceps** (nov. sp.).

La carapace se rétrécit beaucoup en avant; le front est étroit, son épine médiane est grêle et un peu arquée à sa base. Ses épines latérales sont petites et très rapprochées. Le bord orbito-antennaire est très oblique. Trois paires d'épines se voient sur la région gastrique; une paire existe en dedans des régions branchiales. Les bords latéraux sont armés de six épines. Les pattes antérieures ne sont pas symétriques, elles sont remarquables par la longueur des doigts qui excède celle de la portion palmaire. Du côté droit le pouce est arqué à sa base de manière à s'écarter de l'index, puis ces deux doigts s'appliquent l'un contre l'autre dans toute leur étendue, du côté gauche la pince est plus faible, les doigts sont très grêles appliqués l'un contre l'autre et légèrement courbés en haut, l'index des pinces se termine par deux petites épines, quelques petites épines garnissent le bord supérieur des doigts et les bords supérieur et inférieur des mains. L'avant bras et la main sont courts, forts et épineux. Le 2e anneau de l'abdomen porte une paire de très petites épines.

Longueur totale du corps d'un mâle	0.040
Longueur de la carapace	0.023
Largeur	0.012
Longueur des pattes antérieures	0.066
Longueur de la pince gauche	0.037
Longueur des doigts de cette pince	0.024

Station No. 36. Profond. 84 brasses. Lat. 23° 13′ N., Long. 89° 16′ O.

175. **Munida longipes** (nov. sp.).

La carapace de cette espèce est armée d'une paire d'épines gastriques situées en arrière des pointes latérales du rostre, d'une petite épine cardiaque, de deux paires d'épines branchiales internes et d'une paire d'épines sur le bord postérieur, quelques très petites épines garnissent les bords latéraux. Le front est armé de trois épines à peu près de même longueur et ne dépassant pas les yeux, les épines latérales sont un peu divergentes. Les pattes antérieures sont de longueur médiocre; épineuses et égales. Les pattes ambulatoires sont épineuses et remarquablement longues. Celles de la seconde paire dépassent un peu les autres, et toutes dépassent les pattes antérieures. Les 2e et 3e anneaux de l'abdomen sont garnis de deux paires d'épines une seule paire existe sur le 4e anneau.

Longueur totale du corps d'un mâle	0.043
Longueur de la carapace	0.020
Largeur	0.014
Longueur des pattes de la 3e paire	0.084
Longueur des pattes antérieures	0.073

Station	No. 100.	Profond.	250	brasses.	Phare Morro.
"	No. 146.	"	245	"	St. Kitts.
"	No. 148.	"	208	"	St. Kitts.
"	No. 216.	"	154	"	Ste. Lucie.
"	No. 218.	"	164	"	Ste. Lucie.
"	No. 274.	"	209	"	Barbades.
"	No. 291.	"	200	"	Barbades.

176. **Munida miles** (nov. sp.).

Le corps et les pattes sont un peu poilus. La carapace est traversée par des stries très marquées. La région gastrique porte quelques petites épines très courtes situées sur une ligne transversale en arrière du front; les autres régions sont inermes. Les pointes rostrales sont robustes et un peu redressées. Les bords latéraux sont armés de six épines, la première grande et forte, les autres très petites. Les pattes antérieures sont très fortes, peu allongées et chez les mâles adultes elles sont dissemblables. L'une des pinces est plus forte, le doigt immobile est échancré à sa base, sur son bord tranchant de manière à ne pas être en contact dans ce point avec le doigt opposé. L'extrémité des doigts est aiguë, très crochue, celle du pouce croise en dehors celle de l'index et deux petites épines situées en dehors de cette dernière limitent une petite excavation où s'enchasse le crochet terminal du pouce. La main est comprimée latéralement et armée de quelques épines placées surtout en dessous, en dessus et sur la face externe. L'avant bras et le bras sont épineux. Les doigts de la pince du côté opposé sont en contact dans toute la longueur de leur bord tranchant. Les pattes ambulatoires sont courtes, fortes, très comprimées et carénées en dessus. Le 2^e et le 3^e article de l'abdomen portent une rangée transversale de très petites épines.

Longueur totale du corps d'un mâle	0.047
Longueur de la carapace	0.025
Largeur	0.015
Longueur des pattes antérieures	0.063

Station	No. 11.	Profond. 37 brasses.		Lat. 24° 43′ N., Long. 83° 25′ O.
"	No. 17.	"	320 "	Lat. 23° 4′ N., Long. 82° 43′ O.
"	No. 193.	"	169 "	Martinique.
"	No. 274.	"	209 "	Barbades.

177. **Munida microphthalma** (nov. sp.).

Cette espèce se distingue de toutes les *Munida* par le faible développement des yeux dont la cornée est à peine dilatée. La carapace ressemble à celle de la *Munida miles*, mais la pointe rostrale médiane est plus longue et les épines rangées transversalement sur la région gastrique sont plus nombreuses, le 2^e article de l'abdomen est garni de 4 paires d'épines. Les pinces sont semblables à celles de la *Munida inæquimana*, mais elles sont symétriques et les doigts de celle de droite et de celle de gauche sont en contact dans toute leur longueur. Les antennes sont très longues.

Longueur totale du corps d'une femelle	0.037
Longueur de la carapace	0.022
Largeur	0.012
Longueur des pattes antérieures	0.037

Station	No. 2.	Profond. 805 brasses.		Phare Morro.
"	No. 35.	"	804 "	Lat. 23° 52′ N., Long. 88° 58′ O.
"	No. 196.	"	1030 "	Martinique.
"	No. 227.	"	573 "	St. Vincent.

178. **Munida constricta** (nov. sp.).

Cette espèce se distingue de la *Munida miles* par son corps et ses pattes presque glabres, par son rostre plus long, sa carapace plus étroite dont la région gastrique porte seulement deux épines situées en arrière des pointes latérales du rostre, par ses pinces symétriques et par ses pattes ambulatoires plus longues.

Longueur totale du corps d'un mâle	0.029
Longueur de la carapace	0.017
Largeur	0.008
Longueur des pattes antérieures	0.030

Station	No. 100.	Profond.	250–400	brasses.	Phare Morro.
"	No. 146.	"	245	"	St. Kitts.
"	No. 147.	"	250	"	St. Kitts.
"	No. 151.	"	356	"	Nevis.
"	No. 185.	"	333	"	Dominique.
"	No. 216.	"	154	"	Ste. Lucie.
"	No. 221.	"	423	"	Ste. Lucie.
"	No. 222.	"	422	"	Ste. Lucie.
"	No. 241.	"	163	"	Cariacou.
"	No. 260.	"	291	"	Grenade.

GALACANTHA (nov. gen.).

Ce genre est voisin des Galathées, mais sa carapace est élargie et armée de grandes épines latérales et dorsales. Le rostre est grand et relevé. L'insertion des antennes externes est à découvert et les lignes épimériennes de la carapace sont cachées sous le rebord latéral. Les pattes antérieures sont plus courtes que les pattes ambulatoires, celles-ci sont de longueur médiocre.

179. **Galacantha rostrata** (nov. sp.).

La carapace est ornée de granulations plus saillantes en arrière qu'en avant, la région gastrique est armée, en avant, de deux petites épines symétriques et en arrière d'une très grande épine, comprimée latéralement et dirigée en haut et un peu en avant. Une petite épine surmonte le lobe cardiaque antérieur. Le bord latéral est armé dans sa région hépatique d'une épine en arrière de laquelle est placée une autre épine plus grande et épibranchiale, dirigée en dehors et un peu en avant. Le rostre est grand, spiniforme et relevé, deux petites épines s'implantent au dessous de lui près de sa base. Le mérognathe des pattes mâchoires externes porte deux spinules sur son bord interne. Les pattes antérieures sont courtes et granuleuses. Les doigts de la pince sont comprimés latéralement, excavés en dedans et de la longueur de la portion palmaire. Les pattes ambulatoires sont un peu granuleuses. Les anneaux de l'abdomen sont sculptés et les trois premiers sont surmontés d'une épine médiane un peu recourbée en avant.

Les yeux sont arrondis, bien développés, mais dépourvus de pigment et les facettes sont reduites à de simples ponctuations.

Longueur totale	0.004
Largeur de la carapace	0.025
Largeur au niveau du sillon branchial	0.015

Station No. 236. Profond. 1591 brasses. Bequia.

180. **Galacantha spinosa** (nov. sp.).

Cette espèce se distingue de la précédente par son rostre beaucoup plus court et dépourvu d'épines à sa base, par sa carapace couverte de tubercules épineux au lieu de granulations et par le développement inverse des épines latérales, la première étant beaucoup plus grande que la seconde ; la pointe mésogastrique est plus large et plus comprimée. Les anneaux de l'abdomen sont couverts de tubercules pointus. Les pinces sont lisses.

Longueur totale d'une femelle	0.041
Longueur de la carapace	0.021
Largeur au niveau du sillon branchial	0.014

Station No. 185. Profond. 333 brasses. Dominique.

GALATHODES (nov. gen.).

Dans ce genre la carapace est étroite, à téguments très solides. Le rostre a la forme d'une épine, soit simple, soit armée de pointes latérales, mais à sa base il n'existe pas d'épines sus-orbitaires comme chez les *Munida*. Les pattes-mâchoires externes sont courtes et faibles. Les antennes internes sont très petites et renflées à leur base. Les yeux sont petits à corneules généralement incomplètes et ils ne se renflent pas en massue comme celle des *Munida*. Les doigts des pattes ambulatoires sont fortement denticulés en dessous. Les œufs sont gros et peu nombreux.

182. **Galathodes erinaceus** (nov. sp.).

La carapace est très bombée transversalement, le sillon gastrique postérieur est très marqué. La région gastrique porte quatre épines disposées par paires l'une au devant de l'autre ; la région cardiaque est surmontée de quatre épines dont une paire de grandes en avant et une paire de très petites en arrière. Les flancs sont armées en avant de trois fortes épines ; une épine courte se voit entre la 1^{e} et la 2^{e}. Les régions branchiales portent latéralement trois épines plus courtes et disposées longitudinalement. Le rostre est spiniforme et presqu'aussi long que les antennes internes ; vers le milieu de sa longueur il donne naissance de chaque côté à une petite pointe de manière à paraître trifurqué, la pointe médiane étant de beaucoup la plus longue. Les deuxième et troisième anneaux de l'abdomen portent quatre ou six épines disposées transversalement. Ces pointes existent, mais très peu marquées sur le 4^{e} anneau. Les pattes antérieures sont longues. Le bras et l'avant bras sont armés d'épines ; la main est inerme. Chez la femelle les doigts sont en contact dans toute leur longueur, chez les mâles ils ne se rencontrent que vers leur extrémité. Les pattes ambulatoires sont épineuses.

Longueur totale du corps d'un mâle	0.038
Longueur de la carapace	0.020
Largeur sans les épines	0.010
Longueur des pattes antérieures	0.046

Station	No. 219.	Profond.	151 brasses.	Ste. Lucie.
"	No. 130.	"	451 "	Frederickstadt.
"	No. 151.	"	356 "	Nevis.
"	No. 222.	"	422 "	Ste. Lucie.
"	No. 226.	"	424 "	St. Vincent.

183. **Galathodes spinifer** (nov. sp.).

Cette espèce se rapproche beaucoup du *Galathodes erinaceus*, mais les épines de la carapace sont plus courtes et plus nombreuses; la région gastrique en porte trois paires; la région cardiaque quatre. Les bords latéraux sont garnis d'une série de cinq épiues égales, en dedans de laquelle règne sur les régions branchiales une autre série de trois épines. Six épines courtes disposées symétriquement ornent le bord postérieur. Le rostre est droit et ses deux pointes latérales sont très petites et dirigées en avant. Le 2ᵉ et le 3ᵉ anneaux de l'abdomen sont surmontés d'un groupe de trois épines très rapprochées, une épine latérale existe souvent sur les côtés, le 4ᵉ anneau n'en porte qu'une. Les pattes ressemblent à celles de l'espèce précédente.

Longueur totale du corps d'un mâle	0.032
Longueur de la carapace	0.018
Largeur	0.019
Longueur des pattes de la 1ᵉ paire	0.042

Station	No. 100.	Profond.	250–400 brasses.	Phare de Morro.
"	No. 146.	"	245 "	St. Kitts.
"	No. 295.	"	180 "	Barbades.

184. **Galathodes robustus** (nov. sp.).

La carapace est plus élargie en arrière qu'en avant, elle est épaisse et couverte ainsi que les pattes et le reste du corps de poils très courts qui donnent au test un aspect velouté. Sa surface est couverte de tubercules inégaux disposés avec regularité et symétriquement. L'angle latéro-antérieur est pointu. Les bords latéraux sont inermes. Le rostre est court, triangulaire, large à sa base, relevé vers son extrémité, dépourvu de carène en dessus et finement granuleux sur ses bords, les 2ᵉ, 3ᵉ, et 4ᵉ articles de l'abdomen portent une carène médiane terminée en avant par une épine. Les pattes antérieures sont faibles; le bras est épineux. Les pattes ambulatoires sont très courtes, très robustes, non épineuses; le doigt est fortement découpé en dents de scie.

Longueur totale du corps d'une femelle	0.046
Longueur de la carapace	0.022
Largeur	0.016
Longueur des pattes antérieures	0.045

Station No. 258. Profond. 159 brasses. Grenade.

185. **Galathodes serratifrons** (nov. sp.).

La carapace rugueuse et inégale. La région gastrique porte trois petites épines disposées transversalement, l'une sur la ligne médiane, les autres latéralement. Deux épines médianes surmontent la région cardiaque. L'angle latéro-antérieur de la carapace est spiniforme. Le bord latéral est garni en avant de granulations, mais, en arrière des régions branchiales, il porte trois épines. Le bord postérieur est surmonté de chaque côté de la ligne médiane d'une épine en forme de crochet. Le rostre est triangulaire, caréné en dessus et finement serratulé sur ses bords, les 2[e] et 3[e] articles de l'abdomen sont armés d'une épine médiane et d'épines latérales. Les pattes antérieures sont longues et grêles. Le bras et l'avant bras sont pourvus de fortes épines et de granulations. La main est granuleuse. La jambe des pattes ambulatoires porte quelques épines, les autres articles hérissés d'aspérités.

Longueur totale du corps d'un mâle	0.018
Longueur de la carapace	0.010
Largeur	0.007
Longueur des pattes antérieures	0.021

Station No. 185. Profond. 333 brasses. Dominique.

186. **Galathodes abbreviatus** (nov. sp.).

Cette espèce se reconnait facilement à sa carapace plus élargie et à ses pinces très courtes. Le bouclier céphalo-thoracique est couvert de granulations disposées en séries transversales qui donnent au test une apparence rugueuse. Quelques unes de ces granulations situées sur la région gastrique s'élèvent d'avantage et constituent de très courts spinules. Le rostre est spiniforme et élargi à sa base, il est horizontal, sa pointe se relève un peu. Les bords latéraux sont armés de deux épines, l'une hépatique, l'autre plus petite et épibranchiale, en arrière de celle-ci un tubercule se remarque sur le bord branchial. Les 2[e], 3[e], 4[e] anneaux de l'abdomen portent sur la ligne médiane une épine dirigée en avant. Les pattes antérieures sont courtes et fortes. Le bras et l'avant bras ne sont armés d'épines courtes qu'à leur extrémité ; ils sont d'ailleurs rugueux. Les pattes de la 2[e] paire atteignent environ le niveau de l'articulation du doigt mobile de la pince. Le corps et les pattes portent des poils très courts constituant en revêtement d'un aspect poussièreux, sur les bords et entre les doigts des pinces les poils sont plus longs.

Longueur totale du corps d'une femelle	0.032
Longueur de la carapace	0.018
Largeur	0.010
Longueur des pattes antérieures	0.026

Station No. 195.	Profond.	502	brasses.	Martinique.
" No. 161.	"	583	"	Guadeloupe.
" No. 162.	"	734	"	Guadeloupe.

187. **Galathodes Reynoldsi** (nov. sp.).

Cette espèce doit se placer à côté du *Galathodes abbreviatus*, mais elle s'en distingue par ses épines gastriques plus saillantes, par son rostre plus relevé, par l'absence d'épines sur les anneaux de l'abdomen et par la longueur des pattes ambulatoires; celles de la seconde paire dépassent les pinces, leur cuisse est armée en dessus d'une série d'épines.

Longueur totale du corps d'une femelle	0.033
Longueur de la carapace	0.020
Largeur	0.011
Longueur des pattes de la 1e paire	0.030

Station No. 138. Profond. 2376 brasses. Frederickstadt.

188. **Galathodes simplex** (nov. sp.).

La carapace de cette espèce ne porte pas d'épines, on remarque seulement sur la région gastrique quelques tubercules pointus; elle est ornée de quelques rugosités simulant des lignes transversales irrégulières. Le rostre à la forme d'une longue épine simple et un peu relevée. Une profonde dépression transversale sépare le lobe cardiaque antérieur du lobe cardiaque postérieur. L'angle latéro-antérieur de la carapace est aigu et spiniforme. Les bords latéraux sont arrondis et inermes; le 2e et le 3e articles de l'abdomen sont surmontés d'une petite épine médiane. Les pattes antérieures sont faibles dans les deux sexes. Le bras est armé en dedans de quelques spinules. La main est lisse et les doigts sont en contact dans toute leur longueur. La cuisse des pattes ambulatoires est rugueuse.

Station	No. 162.	Profond.	734	brasses.	Guadeloupe.
"	No. 163.	"	769-878	"	Guadeloupe.
"	No. 180.	"	982	"	Dominique.
"	No. 185.	"	333	"	Dominique.
"	No. 179.	"	824	"	Dominique.
"	No. 195.	"	502	"	Martinique.
"	No. 214.	"	892	"	Martinique.
"	No. 226.	"	424	"	St. Vincent.
"	No. 227.	"	573	"	St. Vincent.

189. **Galathodes Sigsbei** (nov. sp.).

La carapace est plus bombée transversalement que dans l'espèce précédente; elle ne porte pas de tubercules spiniformes et ne présente que quelques lignes très finement granuleuses disposées transversalement. La dépression cardiaque transversale est peu profonde. Le rostre au lieu d'être relevé est droit et légèrement caréné en dessus, le bord antérieur de la carapace est plus oblique à partir de la pointe frontale. Le bord postérieur porte dans sa portion médiane trois très petites épines disposées transversalement. L'abdomen est dépourvu d'épines et les articles sont presque lisses. Les pattes antérieures sont longues, leur cuisse et leur bras sont épineux ; la main porte des rugosités aiguës. Les pattes ambulatoires sont courtes et fortes. Quelques poils revêtent les pattes.

Longueur totale du corps d'une femelle	0.040
Longueur de la carapace	0.021
Largeur	0.010
Longueur des pattes antérieures	0.047

Station	No. 35.	Profond.	804	brasses.	Lat. 23° 52′ N., Long. 88° 58′ O.
"	No. 137.	"	625	"	Frederickstadt.
"	No. 163.	"	769–878	"	Guadeloupe.
"	No. 204.	"	476	"	Martinique.
"	No. 173.	"	734	"	Guadeloupe.
"	No. 195.	"	502	"	Martinique.
"	No. 200.	"	472	"	Martinique.
"	No. 201.	"	565	"	Martinique.

190. **Galathodes latifrons** (nov. sp.).

La carapace est étroite et revêtue de poils très courts. Les bords latéraux présentent en avant quatre ou cinq petites épines. Le rostre est lamelleux à sa base, il est trifurqué à son extrémité, la pointe médiane dépassant les autres. L'abdomen est dépourvu d'épines. Les pattes antérieures sont grêles et revêtues de longs poils clair-semés. Le bras et l'avant bras sont armés de quelques épines. La main est lisse.

Longueur totale du corps d'une femelle chargée d'œufs	0.016
Longueur de la carapace	0.010
Largeur	0.005
Longueur des pattes antérieures	0.021

Station No. 288. Profond. 399 brasses. Barbades.

191. **Galathodes tridens** (nov. sp.).

Chez cette espèce le front est disposé comme chez le *Galathodes latifrons*, mais la carapace est comparativement beaucoup plus large, elle est entièrement glabre et porte sur la région gastrique une paire d'épines. Les bords latéraux sont garnis de quatre épines bien distinctes. Les pattes antérieures et les pattes ambulatoires sont beaucoup plus courtes, plus fortes, moins épineuses et elles sont presque glabres. J'ajouterai que l'abdomen est lisse.

Longueur totale du corps d'une female	0.024
Longueur de la carapace	0.013
Largeur	0.008
Largeur des pattes antérieures	0.026

Station No. 148. Profond. 208 brasses. St. Kitts.

OROPHORHYNCHUS (nov. gen.).

Le rostre est triangulaire et les yeux très petits peuvent se cacher en partie au dessous, ils portent une épine ou un prolongement apophysaire en dedans de la cornée. Les antennes internes s'insèrent immédiatement au dessous des pédoncules oculaires. Les pattes mâchoires externes sont remarquablement petites. Les pattes antérieures sont grosses et courtes. Les pattes ambulatoires sont robustes.

192. **Orophorhynchus aries** (nov. sp.).

La carapace est plus large en avant qu'en arrière; elle est glabre et couverte de tubercules et de granulations disposées sur la portion moyenne, en lignes, transversales. Le rostre forme un triangle presqu'équilateral caréné en dessus sur la ligne médiane. Deux petites pointes existent au dessus de l'antenne; la seconde est séparée de la dent hépatique latérale par une échancrure qui se continue avec le sillon gastrique; en arrière les bords sont très finement serratulés. Les pédoncules oculaires sont très élargis, aplatis et la cornée est fort réduite on n'y distingue ni matière pigmentaire ni facettes. Les pinces sont courtes, rugueuses et revêtues de quelques poils à l'extrémité des doigts; celle-ci est en cuillère et très finement denticulée. Les pattes ambulatoires sont rugueuses et carénées. L'abdomen est ponctué et dépourvu d'épines.

Longueur totale du corps d'un mâle	0.036
Longueur de la carapace	0.020
Largeur	0.014
Longueur des pattes de la 1e paire	0.018

Station No. 236. Profond. 1591 brasses. Bequia.

193. **Orophorhynchus spinosus** (nov. sp.).

Cette espèce se distingue de la précédente par son rostre plus étroit et plus aigu, par ses bords latéraux plus épineux, par les deux petites épines qui sont placées symétriquement sur la région gastrique et par les épines qui surmontent la cuisse et la jambe des pattes ambulatoires et le bras et l'avant bras des pinces.

Longueur totale du corps d'une femelle	0.026
Longueur de la carapace	0.014
Largeur de la carapace	0.009
Longueur des pattes de la 1e paire	0.014

Station No. 180. Profond. 982 brasses. Dominique.

194. **Orophorhynchus squamosus** (nov. sp.).

La carapace est courte, massive et couverte non pas de lignes rugueuses transversales, mais de groupes de granulations simulant des sortes d'écailles proéminentes et espacées. Les bords latéraux sont inermes, le rostre est court et triangulaire, les yeux sont immobiles. En dedans de la cornée, s'avance un prolongement arrondi qui ressemble à une petite corne rostrale latérale. Les pattes antérieures sont courtes, la main est comprimée et rugueuse; le bras et l'avant bras sont armés de fortes épines et de tubercules. Les pattes ambulatoires sont comprimées et couvertes sur les premiers articles de tubercules élevés ou spiniformes. Les anneaux de l'abdomen sont dépourvus de carènes transversales.

Longueur totale du corps d'un mâle 0.010

Station No. 210. Profond. 191 brasses. Martinique.

195. **Orophorhynchus Sharreri** (nov. sp.).

La carapace porte de nombreuses petites épines; il en existe quatre sur les bords latéraux. Le rostre est robuste et caréné en dessus et, de même que chez les *Orophorhynchus nitidus* et *spinoculatus*, l'œil se transforme en une épine. Les premiers anneaux abdominaux sont fortement carénés transversalement, mais ils ne portent pas d'épines. Les pattes antérieures sont grêles, le bras et l'avant bras sont très épineux. Les pattes ambulatoires sont courtes. Les œufs sont peu nombreux et très gros.

Station No. 134. Profond. 248 brasses. Santa Cruz.

196. **Orophorhynchus nitidus** (nov. sp.).

Cette espèce se rapproche beaucoup de la précédente. Ses yeux sont terminés par une épine aiguë, mais plus grêle; elle se distingue par les deux épines symétriques qui existent sur la région gastrique, par sa carapace luisante; par ses épines latéro-antérieures plus marquées et par son rostre plus grêle.

Longueur totale du corps d'un mâle 0.023
Longueur des pattes antérieures 0.012

Station No. 163. Profond. 769–878 brasses. Guadeloupe.

197. **Orophorhynchus spinoculatus** (nov. sp.).

La carapace est rugueuse, elle porte en avant de chaque côté une épine sus-antennaire. L'angle latéro-antérieur est aigu et il existe une courte épine hépatique. La surface dorsale est traversée par des lignes rugueuses. Le rostre est spiniforme et caréné en dessus. Les yeux sont immobiles et la cornée se prolonge en une épine grosse et aiguë qui atteint à la moitié environ de la longueur du rostre. L'abdomen est dépourvu d'épines. Les pinces sont très courtes et à doigts fort petits, mais gros; elles ne portent qu'une épine en dedans, vers l'extrémité du bras la deuxième paire de pattes dépasse un peu la première

Longueur totale du corps d'un mâle 0.022
Longueur de la carapace 0.012
Largeur 0.007
Longueur des pattes antérieures 0.015

Station No. 179. Profond. 824 brasses. Dominique.

ELASMONOTUS (nov. gen.).

La carapace est peu bombée, ses bords latéraux sont presque parallèles et dépourvus d'épines ou de dents, sa surface ne porte pas d'épines. La région orbito-antennaire est très étroite. Les antennes externes sont petites placées presqu'au dessous des yeux et très en dedans de l'angle antéro-antérieur de la carapace. Les premiers anneaux de l'abdomen sont généralement carénés en dessus. Les pattes de la cinquième paire sont très petites.

198. **Elasmonotus longimanus** (nov. sp.).

Le rostre est large, triangulaire obtus à son extrémité, un peu déprimé en dessus, il cache en partie les yeux. Sa surface de même que celle de la carapace est couverte de petites granulations. La région hépatique qui constitue l'angle latéro-antérieur de la carapace est arrondie ; elle se rattache au rostre par un bord droit ou plutôt un peu oblique en arrière et en dedans, les 2^e, 3^e, et 4^e anneaux de l'abdomen sont carénés transversalement et leur portion médiane se relève en formant une forte dent comprimée d'avant en arrière et recourbée en avant. Les pattes antérieures sont longues et fortes. Les doigts des pinces du mâle sont légèrement saillants à leur base ; leurs bords sont très finement et très régulièrement denticulés. L'avant bras et le bras sont granuleux. Les pattes ambulatoires sont courtes et faibles ; le bord supérieur de la cuisse est tranchant. La jambe est surmontée d'un bord denticulé et d'une ou de deux crêtes longitudinales. Tous ces articles sont granuleux.

Longueur totale du corps d'un mâle	0.022
Longueur de la carapace	0.012
Largeur	0.007
Longueur des pattes antérieures	0.035

Station	No. 130.	Profond.	451	brasses.	Frederickstadt.
"	No. 188.	"	372	"	Dominique.
"	No. 195.	"	502	"	Martinique.
"	No. 221.	"	423	"	Ste. Lucie.
"	No. 222.	"	422	"	Ste. Lucie.

199. **Elasmonotus brevimanus** (nov. sp.).

Cette espèce se rapproche beaucoup de la précédente, mais la carapace est plus étroite, le rostre est notablement plus court et les pattes antérieures sont plus courtes et plus fortes.

Longueur totale du corps d'une femelle	0.020
Longueur de la carapace	0.010
Largeur	0.007
Longueur des pattes antérieures	0.019

Station No. 291. Profond. 200 brasses. Barbades.

200. **Elasmonotus armatus** (nov. sp.).

La carapace est marquée de quelques rugosités disposées par séries transversales. Les angles latéro-antérieurs sont spiniformes et les bords latéraux sont épais et renflés, formant de chaque côté un bourrelet en dedans duquel la surface dorsale est déprimée. Le rostre est long et spiniforme, plus étroit, à sa base que dans sa partie médiane et très rétréci dans le reste de son étendue; il est convexe transversalement en dessus, concave en dessous. Les yeux sont plus grands et les antennes externes plus développées que dans les autres espèces du même genre. Le 2ᵉ et le 3ᵉ anneau de l'abdomen portent une carène transversale très élevée, arrondie en bourrelet et plus saillante sur la ligne médiane, mais dépourvue d'épine. Le bras des pattes antérieures est armé en dedans de deux épines et à son extrémité de deux autres épines grêles. Les pattes ambulatoires sont faibles, la cuisse est arrondie en dessous et présente une petite épine à son extrémité supérieure.

Longueur totale du corps d'une femelle	0.027
Longueur de la carapace	0.017
Longueur du rostre	0.007
Largeur	0.008
Longueur des pattes antérieures	0.034

Station No. 137. Profond. 625 brasses. Frederickstadt.

201. **Elasmonotus abdominalis** (nov. sp.).

La carapace de cette espèce est plus étroite que celle de l'*Elasmonotus longimanus* et le rostre plus long et moins élargi se termine par une pointe aiguë. L'angle latéro-antérieur de la carapace au lieu d'être arrondi est aigu. Enfin les anneaux de l'abdomen sont lisses et ils ne portent pas de dent sur la ligne médiane.

Longueur totale du corps d'une femelle	0.021
Longueur de la carapace	0.012
Largeur	0.0075
Longueur des pattes antérieures	0.023

Station No. 291. Profond. 200 brasses. Barbades.

DIPTYCHUS (nov. gen.).

La forme générale est celle d'une Galathée. La carapace est terminée en avant par un rostre pointu et simple. Les yeux sont de grosseur médiocre. Les antennes externes sont très petites et l'extrémité de la tigelle ne dépasse guère la pointe du rostre; une écaille spiniforme s'insère au dessus de la base de la tigelle. Les pattes mâchoires sont grêles, longues et très écartées à leur base. Les doigts des pattes ambulatoires sont crochus, courts, denticulés en dessous. Le pénultième article est garni sur son bord inférieur de quelques épines articulées et très fines. La nageoire caudale se replie complètement sous les derniers anneaux de l'abdomen de manière à disparaître quand on étend celui-ci. Les 4^e, 5^e et 6^e anneaux sont appliqués sur le sternum. Le 7^e article est très petit et beaucoup plus court que les appendices latéraux de la nageoire caudale.

202. **Diptychus nitidus** (nov. sp.).

La carapace est glabre, lisse, luisante, dépourvue d'épines ou de stries transversales; elle est bombée transversalement, presque plane d'avant en arrière et plus étroite en avant qu'en arrière. Les régions y sont à peine marquées. Le rostre est spiniforme et aplati en dessus, il est environ deux fois plus long que les yeux. Une petite épine arme l'angle latéro-antérieur. Les bords latéraux sont inermes. Les pattes antérieures sont très longues, glabres, lisses et luisantes. Le bras est très grêle à sa base. L'avant bras est plus long que le bras. Légèrement comprimé latéralement et arrondi en dessus et en dessous. La portion palmaire de la main est de la longueur de l'avant bras et présente la même forme. Les doigts sont de moitié plus courts que la portion palmaire, poilus vers leur extrémité qui est aiguë et excavée en dedans. Le pouce présente à sa base une longue dent finement denticulée sur son bord. Les pattes ambulatoires sont glabres, lisses, légèrement comprimées, celles de la 2^e paire sont les plus longues, celles de la 5^e paire sont très petites. Le plastron sternal est parcouru sur la ligne médiane par un sillon, il est bombé d'avant en arrière et échancré en avant.

Longueur totale du corps d'un mâle	0.031
Longueur de la carapace	0.017
Largeur	0.009
Longueur des pattes antérieures	0.057

Cette espèce vit dans des coraux (Chrysogorgia).

Station	No. 44.	Profond.	539	brasses.	Lat. 25° 33′ N., Long. 84° 35′ O.
"	No. 130.	"	451	"	Frederickstadt.
"	No. 137.	"	625	"	Santa Cruz.
"	No. 147.	"	250	"	St. Kitts.
"	No. 173.	"	734	"	Guadeloupe.
"	No. 175.	"	611	"	Dominique.
"	No. 190.	"	542	"	Dominique.
"	No. 195.	"	502	"	Martinique.
"	No. 200.	"	472	"	Martinique.
"	No. 222.	"	422	"	Ste. Lucie.
"	No. 227.	"	573	"	St. Vincent.
"	No. 232.	"	88	"	St. Vincent.
"	No. 241.	"	163	"	Cariacou.
"	No. 254.	"	164	"	Grenade.
"	No. 260.	"	291	"	Grenade.
"	No. 277.	"	106	"	Barbades.
"	No. 283.	"	237	"	Barbades.
"	No. 297.	"	123	"	Barbades.

203. **Diptychus uncifer** (nov. sp.).

Cette espèce se distingue de la précédente par son rostre plus court ne dépassant pas les yeux et par ses pattes antérieures moins longues.

Longueur totale du corps d'un mâle	0.012
Longueur des pattes antérieures	0.020

Station No. 269.	Profond. 124 brasses.	St. Vincent.
" No. 273.	" 103 "	Barbades.
" No. 299.	" 140 "	Barbades.

204. **Diptychus armatus** (nov. sp.).

Cette espèce diffère de la précédente par sa carapace armée latéralement de sept à huit épines. Les pinces manquaient sur l'exemplaire unique que j'ai étudié. Les pattes ambulatoires sont lisses.

Longueur totale du corps d'un mâle 0.011

Station No. 241. Profond. 163 brasses. Cariacou.

205. **Diptychus rugosus** (nov. sp.).

La carapace de cette petite espèce est très courte, étroite en avant et terminée par un rostre très long, triangulaire et large à sa base; elle est couverte de petites tubercules spiniformes. Le bras des pattes antérieures est armé d'épines. L'avant bras est rugueux, la main est presque lisse. Les pattes ambulatoires sont armées sur la cuisse et sur la jambe de petites épines.

Longueur totale du corps d'un mâle	0.010
Longueur des pattes antérieures	0.018

Station No. 177.	Profond. 118 brasses.	Dominique.
" No. 231.	" 95 "	St. Vincent.
" No. 238.	" 127 "	Grenadines.
" No. 269.	" 124 "	St. Vincent.
" No. 299.	" 140 "	Barbades.

206. **Diptychus intermedius** (nov. sp.).

Cette espèce diffère du *Diptychus rugosus* par sa carapace lisse en dessus et armée de quelques épines latérales, par son rostre plus court. Le bras et l'avant bras des pattes antérieures sont très épineux. La cuisse et la jambe des pattes ambulatoires sont surmontées d'une rangée d'épines qui n'existent pas chez le *Diptychus armatus*.

Longueur totale du corps d'un mâle 0.007

Station No. 241. Profond. 163 brasses. Cariacou.

PTYCHOGASTER (nov. gen.).

Ce genre diffère des *Diptychus* par sa carapace plus étroite, ses yeux plus renflés, ses antennes notablement plus longues et par le développement extraordinaire des pattes, enfin les lignes épimériennes latérales se voient en dessus comme chez les *Pleuroncodes*, par leur aspect extérieur ces Galatheins rappellent beaucoup les *Leptopodia*.

207. **Ptychogaster spinifer** (nov. sp.).

La carapace est longue, bombée transversalement plane d'avant en arrière, rétrécie en avant et couverte de petites épines. Une rangée d'épines un peu plus grandes existe sur la ligne médiane ; elle est formée de quatre épines gastriques et de quatre épines cardiaques. De chaque côté sur la région branchiale, au dessus des sutures épimériennes se voit une rangée longitudinale d'épines. Le rostre à la forme d'une aiguille, dépassant un peu les pédoncules oculaires. Les pattes antérieures ont environ cinq fois la longueur de la carapace ; elles sont cylindriques et partout couvertes de petites épines très serrées, dirigées en avant disposées et implantées en séries longitudinales, quelques poils flexibles et rares s'implantent sur les pattes. Les doigts sont grêles, longs et pourvus de denticulations très fines et pointues. Les pattes suivantes sont très grandes, faibles et épineuses. Celles de la 2e paire sont les plus développées elles s'étendent jusqu'à l'articulation de la pince. L'abdomen est large et complêtement lisse. Le plastron sternal porte un sillon médian profond.

Longueur totale du corps d'une femelle	0.054
Longueur de la carapace	0.026
Largeur	0.014
Longueur des pattes de la 1e paire	0.137
Longueur des pattes de la 2e paire	0.094

Station	No. 128.	Profond.	180	brasses.	Frederickstadt.
"	No. 171.	"	183	"	Guadeloupe.
"	No. 216.	"	154	"	Ste. Lucie.
"	No. 238.	"	127	"	Grenadines.
"	No. 241.	"	163	"	Cariacou.
"	No. 297.	"	123	"	Barbades.
"	No. 299.	"	140	"	Barbades.

FAMILLE DES SCYLLARIENS.

208. **Scyllarus Gundlachi** (Von Martens, Archiv. für Naturges., 1872, pl. 5, fig. 13.)

Station No. 142. Profond. 27 brasses. Flannegan Passage.

209. **Arctus americanus** (Sidney Smith). See Scyllarus [illegible]

Station No. 167. Profond. 175 brasses. Guadeloupe.

210. **Willemœsia forceps** (nov. sp.).

Cette espèce très voisine de la *W. leptodactyla* en diffère par sa carapace plus renflée, plus épaisse et par ses bords latéraux garnis d'épines plus petites, par sa carapace couverte de rugosités et par ses pattes antérieures moins épineuses.

Station No. 31. Profond. 1920 brasses. Lat. 24° 33′ N., Long. 84° 23′ O.

211. **Pentacheles validus** (nov. sp.).

Le bouclier céphalo-thoracique est aplati et plus large dans la région branchiale que dans la région gastrique. Le bord frontal porte sur la ligne médiane deux petites épines rostrales, une autre épine á l'angle orbitaire interne et quelques spinules sur son bord. Les échancrures oculaires sont triangulaires, très étroites et très profondes, l'angle orbitaire externe est épineux. Les bords latéraux sont finement crénelés, la ligne médiane de la carapace est saillante et granuleuse ainsi que la ligne qui circonscrit en arrière la région gastrique et qui aboutit à une échancrure du bord latéral. Quelques tubercules épais et pointus existent sur la carapace. La surface de celle-ci porte quelques poils très courts. Les articles basilaires des antennules sont lamelleux, très dilatés en dedans et en contact sur toute la longueur de leur bord interne; ils se terminent en pointe aiguë et portent une petite épine à leur angle externe. La tigelle externe de l'antennule est très petite, l'interne est plus longue que l'antenne externe. L'écaille qui surmonte l'insertion de cette antenne est pointue et lamelleuse. L'œil est armé en avant d'une épine et il se continue sous l'angle antérieur de la carapace pour se terminer par une extrémité arrondie. Les cinq premiers articles de l'abdomen portent en dessus une carène obtuse terminée en avant par une pointe mousse; de cette pointe part de chaque côté un sillon profond dirigé en arrière et en dehors. Les pattes antérieures sont très longues. Le bras est pourvu en dessous de quelques épines. Les doigts des pinces sont très crochus et inermes. Une petite épine surmonte l'articulation du pouce.

Le plus grand exemplaire que j'ai vu a été pris à 1591 brasses à Bequia.

Station No. 29.	Profond.	955	brasses.	Lat. 24° 36′ N., Long. 84° 5′ O.
" No. 182.	"	1131	"	Dominique.
" No. 196.	"	1030	"	Martinique.
" No. 236.	"	1591	"	Bequia.

212. **Pentacheles Agassizii** (nov. sp.).

La carapace de cette espèce est plus poilue et moins rétrécie en avant que celle de le *P. validus*, les bords latéraux sont parallèles dans une grande partie de leur étendue. Le bord frontal porte en avant une seule petite épine. L'échancrure orbitaire est plus étroite en arrière et plus profonde; son bord externe est très arqué et garni de fines spinules. La carène médiane est très élevée et une autre carène de chaque côté sur la région branchiale de façon à dessiner trois lignes parallèles saillantes et granuleuses sur la partie postérieure de la carapace. Le bord postérieur de la carapace est très échancré et armé de quelques spinules (six ou huit). L'article basilaire des antennules est très pointu, mais il se dilate peu en dedans aussi les bords des antennules ne sont ils pas en contact sur la ligne médiane et il existe une espace vide en avant du rostre. L'abdomen est très sculpté et les 2ᵉ, 3ᵉ, 4ᵉ et 5ᵉ anneaux portent en dessus une carène saillante terminée en avant par une forte épine recourbée. Le mâle et la femelle ne diffère pas.

Station No. 47.	Profond. 321 brasses.	Lat. 28° 42′ N., Long. 88° 40′ O.
" No. 151.	" 356 "	Nevis.
" No. 216.	" 154 "	Ste. Lucie.
" No. 240.	" 164 "	Grenadines.
" No. 245.	" 1058 "	Grenade.
" No. 246.	" 154 "	Grenade.
" No. 274.	" 209 "	Barbades.
" No. 279.	" 118 "	Barbades.
" No. 281.	" 288 "	Barbades.

213. **Pentacheles spinosus** (nov. sp.).

La carapace est lisse et plus élargie en avant que chez les espèces précédentes, le front porte sur la ligne médiane deux pointes rostrales, l'échancrure orbitaire est très large et l'œil est très gros, les bords de cette échancrure sont inermes. Les bords latéraux de la carapace sont garnis de fortes épines. La carène médiane, au lieu d'être granuleuse, porte des épines disposées isolément ou par paires, on en compte trois paires sur la région cardiaque et une paire dans la partie moyenne de la région gastrique, tandis qu'en avant et en arrière de cette région il n'existe qu'une épine. Les carènes branchiales portent environ cinq épines, un espace vide se voit en avant du rostre à la base des antennes internes dont l'article basilaire est peu élargi et n'est pas en contact dans toute son étendue avec celui du côté opposé. Le premier anneau de l'abdomen porte trois épines, une médiane et deux latérales, les 2^e, 3^e, 4^e, et 5^e anneaux sont pourvus d'une forte épine médiane comme chez le *P. Agassizii.*

Les pattes antérieures sont très grêles.

Station No. 29.	Profond. 955 brasses.	Lat. 24° 36′ N., Long. 84° 5′ O.
" No. 33.	" 1568–1400 "	Lat. 24° 1′ N., Long. 88° 58′ O.
" No. 162.	" 734 "	Guadeloupe.
" No. 163.	" 769–878 "	Guadeloupe.
" No. 173.	" 734 "	Guadeloupe.
" No. 175.	" 611 "	Dominique.

PALINUSTUS (nov. gen.).

Ce genre se distingue des *Palinurus* par la disposition de l'anneau ophthalmique, complêtement à découvert au devant de la carapace, ce qui permet aux yeux de se redresser, par la longueur des antennes internes dont les tigelles multiarticulées sont très petites et par la forme des cornes latérales du front qui ressemblent à des lames aplaties et horizontales.

214. **Palinustus truncatus** (nov. sp.).

La carapace est couverte de petites épines et de tubercules. Les épines ne se voient qu'en avant; elles sont disposées en séries longitudinales. Le front est bordé en avant de sept spinules dont une médiane et les autres latérales. Les cornes frontales des Langoustes sont remplacées de chaque côté par une lame tronquée en avant, horizontale et très finement découpée sur son bord antérieur qui s'avance au dessus de l'insertion des pédoncules oculaires. À la base de chacune de ces lames existe une dent spiniforme, en arrière de laquelle sont rangées, en série longitudinale, d'autres épines plus petites. Chacun des anneaux de l'abdomen est sillonné transversalement, et terminé latéralement par deux pointes, l'antérieure plus grande que la postérieure. Le sixième et le septième anneaux sont ornés de quelques tubercules pointus. Chacun des cinq premiers anneaux porte en dessous une paire d'épines ; le sixième en présente une série plus nombreuse. Les pattes ambulatoires sont grêles et un peu épineuses.

Longueur totale du corps d'un mâle 0.07

Station No. 241. Profond. 163 brasses. Cariacou.

(*La suite prochainement.*)

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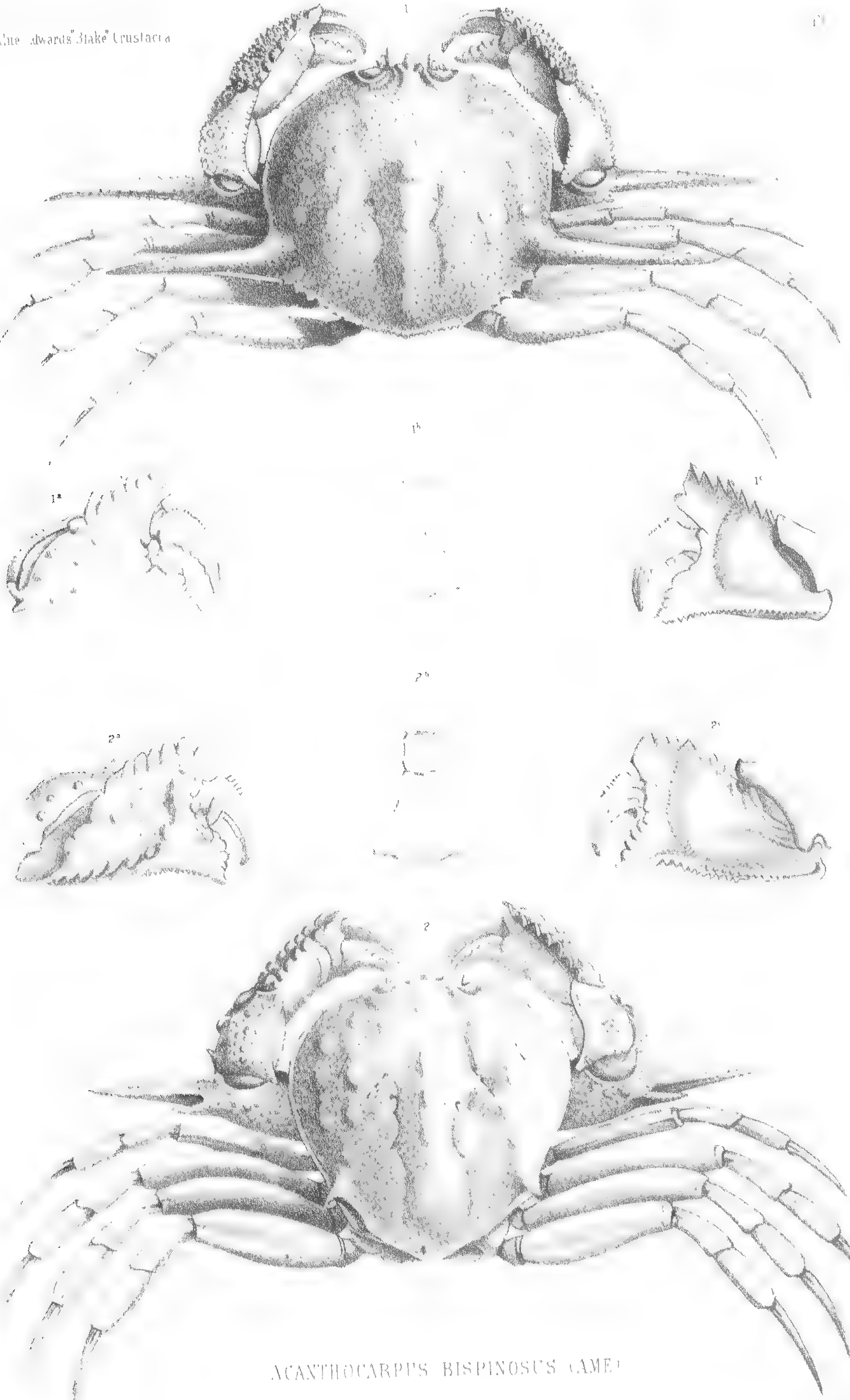
PLANCHE I.

Fig. 1. *Acanthocarpus bispinosus* (A. M.-Edwards), de grandeur naturelle.
" 1 a. Pince du côté droit, vue par sa face externe.
" 1 b. La même pince, vue en dedans.
" 1 c. Abdomen.
" 2. *Acanthocarpus Alexandri* (Stimpson), de grandeur naturelle.
" 2 a. Pince du côté droit, vue par sa face externe.
" 2 b. La même, vue en dedans.
" 2 c. Abdomen.

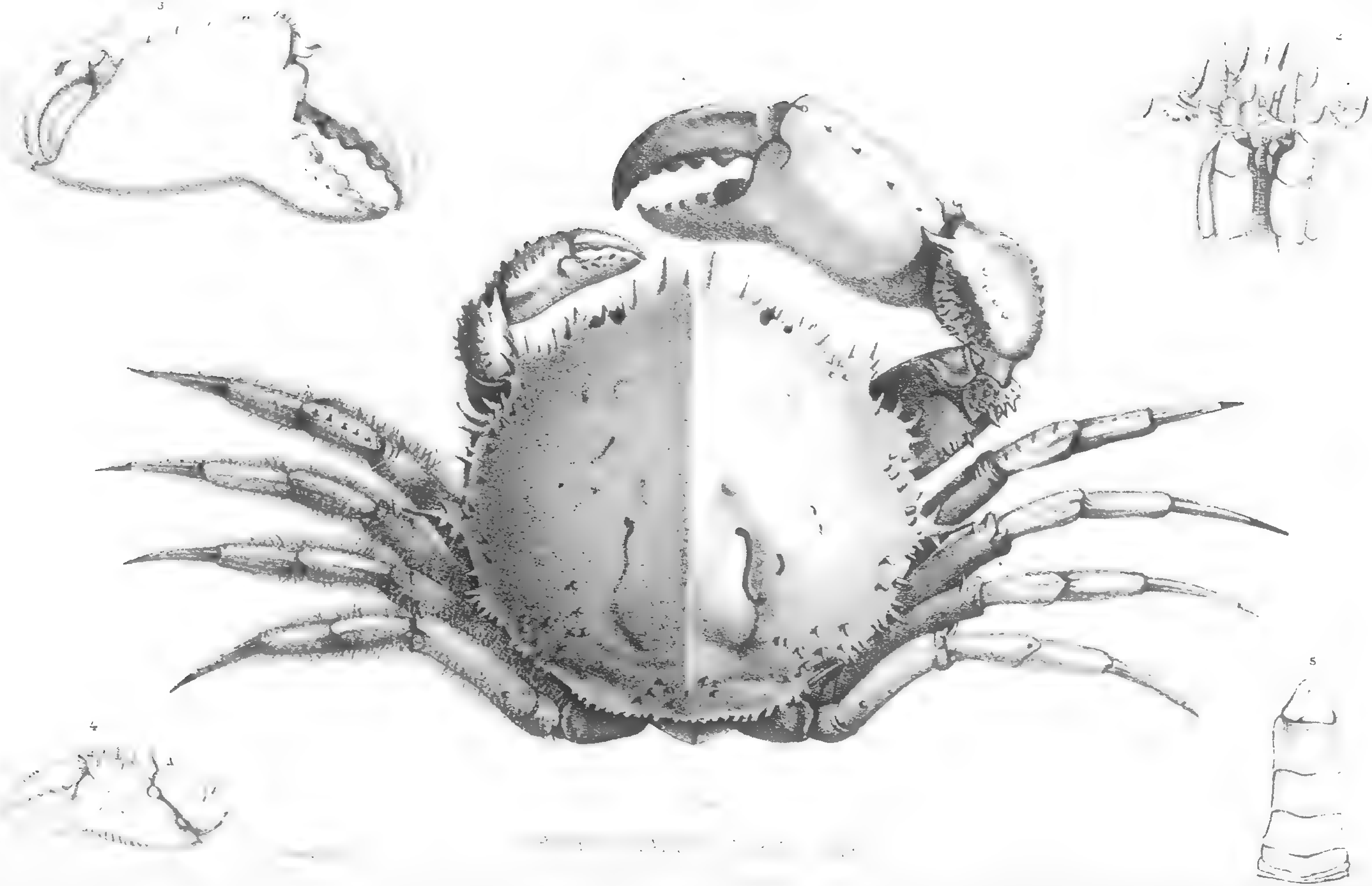
PLANCHE II.

Fig. 1. *Trichopeltarion nobile* (A. M.-Edwards), de grandeur naturelle. Les poils ont été enlevé sur une moitié de la carapace et sur les pattes du côté droit.
" 2. Région antennaire et buccale.
" 3. Pince du côté droit.
" 4. Pince du côté gauche.
" 5. Abdomen.



ACANTHOCARPUS BISPINOSUS (A.M.E.)

2 ACANTHOCARPUS ALEXANDRI (St.)



No. 2. — *Reports on the Results of Dredging, under the Supervision of* ALEXANDER AGASSIZ, *in the Caribbean Sea in* 1878–79, *and along the Atlantic Coast of the United States during the Summer of* 1880, *by the U. S. Coast Survey Steamer "Blake,"* COMMANDER J. R. BARTLETT, U. S. N., Commanding.

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IX.

Preliminary Report on the Echini, by ALEXANDER AGASSIZ.

Cidaris tribuloides BL.

Station	142.	27 fathoms.	Flannegan Passage.
"	147.	250 "	Off St. Kitts.

Dorocidaris Bartletti A. AG. n. sp.

At St. Vincent in 95 fathoms, at Martinique in 210 fathoms, and at Montserrat in 88 fathoms, a number of the peculiar spiny transversely banded radioles, similar to *Goniocidaris bispinosa* were collected, some of which I mentioned in the Preliminary Report of the Echini of the "Blake" Expedition for 1877–78, p. 186.

From Barbados a few specimens were collected, showing that these spines belong to a Dorocidaris which differs from *D. papillata* and *D. Blakei* in the shape of the plates of the abactinal system. These specimens can at once be distinguished from the above species by the large size of the triangular ocular plates in contact with the extremities of the large anal plates inserted between the genital plates.

It may be that some of the specimens formerly referred to *D. papillata* (*D. abyssicola*), with spines having serrated edges, belong to this species.

Station	155.	88 fathoms.	Off Montserrat.
"	157.	120 "	" "
"	166.	150 "	" Guadeloupe.
"	177.	118 "	" Dominica.
"	202.	210 "	" Martinique.
"	203.	96 "	" "
"	209.	189 "	" "

Station 217.	398	fathoms.	Off St. Lucia.
" 231.	95	"	" St. Vincent.
" 272.	76	"	" Barbados.
" 273.	103	"	" "
" 276.	94	"	" "
" 277.	106	"	" "

Dorocidaris Blakei A. Ag.

Station 134.	248	fathoms.	Off Santa Cruz.
" 145.	270	"	" St. Kitts.
" 241.	163	"	" Grenadines.
" 291.	200	"	" Barbados.

Dorocidaris papillata A. Ag.

Station 101.	175–250	fathoms.	Off Morro Light.
" 126.	226	"	" Santa Cruz.
" 132.	115	"	" "
" 144.	21	"	On Saba Bank.
" 155.	88	"	Off Montserrat.
" 157.	120	"	" "
" 159.	196	"	" Guadeloupe.
" 164.	150	"	" "
" 166.	150	"	" "
" 167.	175	"	" "
" 198.	136	"	" Martinique.
" 206.	170	"	" "
" 208.	213	"	" "
" 211.	357	"	" "
" 213.	357	"	" "
" 215.	226	"	" St. Lucia.
" 218.	164	"	" "
" 224.	114	"	" St. Vincent.
" 230.	464	"	" "
" 232.	88	"	" "
" 238.	127	"	" Grenadines.
" 241.	163	"	" "
" 242.	842	"	" "
" 253.	92	"	" Grenada.
" 262.	92	"	" "
" 269.	124	"	" St. Vincent.
" 280.	221	"	" Barbados.
" 316.	229	"	Lat. 32° 7′ 0″ N., Long. 78° 37′ 30″ W.
" 318.	337	"	" 31° 48′ 50″ N., " 77° 51′ 50″ W.

Station 319.	262 fathoms.	Lat. 32° 25′ 0″ N.,	Long. 77° 42′ 30″ W.
" 320.	257 "	" 32° 33′ 15″ N.,	" 77° 30′ 10″ W.
" xxii. (Bartlett)*	250 "	" 19° 48′ 47″ N.,	" 77° 23′ 0″ W.

Porocidaris Sharreri A. Ag. n. sp.

This is a larger species than either of the recent ones thus far known. The only two large individuals collected are males. A small female measuring slightly over an inch in diameter, shows that, as in *P. elegans*, the genital openings are placed within the genital plates. The abactinal system, which is but sparsely covered by papillæ, is remarkable for the comparatively larger size of the anal system than in the other species of the genus, and for the elongate genital and ocular plates.

The primary radioles are smooth, and uniformly tapering in one of the specimens, which is of a light greenish pink color when alive; the spines are white, with a delicate brownish pink base. In the other large specimen they vary greatly in shape, from the peculiar serrated short, flattened spines surrounding the actinostome characteristic of this genus to long slender cylindrical spines, straight, or sometimes slightly curved, equalling in length twice the diameter of the test, and finely fluted for the whole length, or the shorter radioles gradually becoming thicker towards the tip, with coarser fluting, and we find some spines with slightly cupuliform tips, as in Goniocidaris. The largest specimen measures fully three inches in diameter.

Station 151.	356 fathoms.	Off Nevis.
" 152.	122 "	" St. Kitts.
" 297.	123 "	" Barbados.

Salenia varispina A. Ag.

A large number of specimens of this species, in all stages of growth, were collected by the "Blake" during the season 1878–79.

Station 108.	994 fathoms.	Off Nuevitas.
" 111.	1200 "	Lat. 19° 7′ N., Long. 74° 52′ W.
" 131.	580 "	Off Santa Cruz.
" 135.	450 "	" "
" 136.	508 "	" "
" 140.	1097 "	" Virgin Gorda.
" 175.	611 "	" Dominica.
" 188.	372 "	" "
" 190.	542 "	" "
" 204.	476 "	" Martinique.

* A few stations marked (Bartlett) were occupied by COMMANDER BARTLETT during the winter of 1879–80, while surveying in the "Blake" the western part of the Caribbean.

Station 205.	334 fathoms.	Off Martinique.
" 211.	357 "	" "
" 214.	892 "	" "
" 227.	573 "	" St. Vincent.
" 265.	576 "	" Grenada.
" 281.	288 "	" Barbados.
" 288.	399 "	" "
" xiv. (Bartlett),	608 "	" Grand Cayman.
" xviii. (Bartlett),	600 "	Lat. 18° 20′ 30″ N., Long. 87° 16′ 40″ W.

Salenia Pattersoni A. Ag.

This is the largest recent species of the genus thus far known. A number of large specimens measuring nearly an inch in diameter, and with primary spines over three inches in length, were collected at Barbados and Guadeloupe.

Station 101.	175–250 fathoms.	Off Morro Light.
" 129.	314 "	" Frederickstadt.
" 139.	218 "	" Santa Cruz.
" 157.	120 "	" Montserrat.
" 158.	148 "	" "
" 159.	196 "	" Guadeloupe.
" 164	150 "	" "
" 209.	189 "	" Martinique.
" 274.	209 "	" Barbados.
" 300.	82 "	" "
" xx. (Bartlett)	51 "	Lat. 21° 26′ 30″ N., Long. 86° 28′ 40″ W.
" xxii. (Bartlett)	250 "	" 19° 48′ 47″ N., " 77° 23′ 0″ W.
" xxix. (Bartlett)	300 "	" 21° 23′ 19″ N., " 82° 54′ 42″ W.

Podocidaris sculpta A. Ag.

This species does not seem to be common in the West Indies; only a single specimen was dredged at.

Station 100. 250–400 fathoms. Off Morro Light.

Podocidaris scutata A. Ag. n. sp.

This is a much larger species than either of the others of the genus. Test depressed, remarkable for its large abactinal system. The whole abactinal surface of test covered by small, distant, fine, slender fixed spines contrasting with the corresponding coarse granulation of *P. sculpta;* fewer large primary tubercles close to the ambitus on the actinal surface. Actinal membrane entirely covered by prominent imbricating plates; 5 anal plates, as in *P. prionigera*, to which it is most closely allied. Test light grayish brown when alive.

Station 131. 580 fathoms. Off Santa Cruz.

Coelopleurus floridanus A. Ag.

Some of the specimens of this species dredged off the Windward Islands in the Caribbean are much larger than the small tests from which this species was first described. Several specimens measured over three quarters of an inch in diameter, and others one inch in diameter. This species does not attain the size of *C. Maillardi.* When alive it is most brilliantly colored, the color of the test varying from a rich light chocolate in the interambulacra, separated by the brilliant orange or yellow ambulacral areas. The primary radioles vary greatly in color, from a delicate straw, often nearly white, to a bright carmine, or orange.

Station 132.	115	fathoms.	Off Santa Cruz.
" 155.	88	"	" Montserrat.
" 158.	148	"	" "
" 177.	118	"	" Dominica.
" 224.	114	"	" St. Vincent.
" 232.	88	"	" "
" 253.	92	"	" Grenada.
" 262.	92	"	" "
" 269.	124	"	" St. Vincent.
" 272.	76	"	" Barbados.
" 276.	94	"	" "
" 277.	106	"	" "
" 282.	154	"	" "
" 290.	73	"	" "
" 292.	56	"	" "
" 293.	82	"	" "
" 297.	123	"	" "
" 300.	82	"	" "
" xxiv. (Bartlett)	206	"	" Cape Cruz, Cuba.

Diadema setosum Gray.

A single very young specimen of this species from

Station 132. 115 fathoms. Off Santa Cruz.

Aspidodiadema antillarum A. Ag. n. sp.

Aspidodiadema microtuberculatum A. Ag. Bull. M. C. Z., 1878, V. no. 9 (non Chall. Echini).

At the time of writing the Report of the Challenger Echini, I referred the more common of the West Indian species of Aspidodiadema to *A. microtuberculatum.* A more careful examination of the extensive series collected by the "Blake" shows that these West Indian specimens belong to a species closely allied to *A. microtuberculatum,* but differing from it in having a single row of minute plates larger than in that species immediately surrounding the anal opening, as in *A. tonsum*, but much smaller.

The primary spines are also proportionally longer and more slender, more as in *A. tonsum*, but with the proportionally bare intertubercular spaces characteristic of *A. microtuberculatum*. When alive this species is of a light violet or grayish pink, with spines of the same tint.

Station 108.	994	fathoms.	Off Nuevitas.
" 111.	1200	"	Lat. 19° 7′ N., Long. 74° 52′ W.
" 130.	451	"	Off Frederickstadt.
" 140.	1097	"	" Virgin Gorda.
" 162.	734	"	" Guadeloupe.
" 163.	769–878	"	" "
" 175.	611	"	" Dominica.
" 227.	573	"	" St. Vincent.

Aspidodiadema Jacobyi A. Ag. n. sp.

This is the largest species of the genus; it is intermediate between *A. tonsum* and *A. microtuberculatum*, having comparatively stout spines, slightly curved as in the latter species, but having the more numerous coronal plates of the former species and its larger primary ambulacral tubercles with more closely packed primaries.

The anal system is protected near the anal opening with six plates (five large, one small), as in *A. tonsum;* they cover but a small part of the centre of the anal system. The color of this species is either a greenish chocolate, with same color extending along base of shaft of the white spines, or of a lighter dirty yellowish green. The largest specimen collected measured over an inch in diameter.

Station 134.	248	fathoms.	Off Santa Cruz.
" 146.	245	"	" St. Kitts.
" 148.	208	"	" "
" 231.	95	"	" St. Vincent.
" 280.	221	"	" Barbados.
" v. (Bartlett)	288	"	" Santiago de Cuba.
" xxvi. "	297	"	" Cayman Brac.

Asthenosoma hystrix A. Ag.

This species is globular in outline when alive, but slightly depressed on the actinal side, varying from a dark claret to a grayish pink color.

Station 132.	115	fathoms.	Off Santa Cruz.
" 273.	103	"	" Barbados.
" 294.	137	"	" "
" 297.	123	"	" "
" 299.	140	"	" "

Asthenosoma Reynoldsi A. Ag. n. sp.

This species grows to a large size, measuring, when expanded, fully 9 inches in diameter. It is the Atlantic representative of *A. coriaceum*, to which it is closely allied. When alive the outline of the test is globular, of an ashy gray color, with patches of a darker brownish or a dirty claret color, especially on the actinal side of the test.

Readily distinguished from *A. hystrix* by the larger, higher coronal plates, the prominent vertical row of primary tubercles on the outer edge of the interambulacral area on the abactinal side, the less numerous secondaries and miliaries, and the color of the test. The primary spines, quite closely packed, on the actinal side are long, slender, slightly curved, and trumpet-shaped; on the abactinal side they form one principal vertical row extending half-way to the apical system near the outer edge of the interambulacral areas. The rest of the test is covered by distant small secondary spines.

Station 150.	373 fathoms.	Between St. Kitts and Nevis.
" 153.	303 "	Off Montserrat.
" 260.	291 "	" Grenada.
" 274.	209 "	" Barbados.
" 291.	200 "	" "
" 295.	180 "	" "

Phormosoma Sigsbei A. Ag. n. sp.

Closely allied to *P. placenta*, from which it differs in having a smaller number of coronal plates, a stouter test, and primary radioles on the actinal surface resembling those of *P. bursaria*. The color of the test when alive is of a reddish-orange color near the ambitus, and more pinkish towards the apical system.

Station 129.	314 fathoms.	Off Frederickstadt.
" 130.	451 "	" "
" 135.	450 "	" Santa Cruz.
" 147.	250 "	" St. Kitts.
" 148.	208 "	" "
" 153.	303 "	" Montserrat.
" 157.	120 "	" "
" 192.	138 "	" Dominica.
" 226.	424 "	" St. Vincent.
" 227.	573 "	" "
" 246.	154 "	" Grenada.
" 248.	161 "	" "
" 258.	159 "	" "
" 260.	291 "	" "
" 305.	810 "	Lat. 41° 33′ 15″ N., Long. 65° 51′ 25″ W.

Station 307.	980 fathoms.	Lat. 41° 29′ 45″ N.,	Long. 65° 47′ 10″ W.
" 308.	1242 "	" 41° 24′ 45″ N.,	" 65° 35′ 30″ W.
" 338.	922 "	" 38° 18′ 40″ N.,	" 73° 18′ 10″ W.
" 342.	1002 "	" 39° 43′ 0″ N.,	" 70° 55′ 25″ W.

Phormosoma Petersii A. Ag. n. sp.

This is a species with an extremely thin test, and one which, when alive, is greatly swollen, assuming a nearly globular outline. It is of a brilliant light claret color. As in *P. uranus*, there is but little difference between the spines of the actinal and abactinal surfaces. The coronal plates of this species are more numerous than in any other species of the genus.

Station 111.	1200 fathoms.	Lat. 19° 7′ N., Long. 74° 52′ W.
" 197.	1224 "	Off Martinique.
" 268.	955 "	" Grenada.
" 288.	399 "	" Barbados.
" 325.	647 "	Lat. 33° 35′ 20″ N., Long. 76° W.
" 338.	922 "	" 38° 18′ 40″ N., " 73° 18′ 10″ W.
" 343.	732 "	" 39° 45′ 40″ N., " 70° 55′ W.

Echinometra subangularis Desml.

Station 147.	250 fathoms.	Off St. Kitts.

Strongylocentrotus Dröbachiensis A. Ag.

Station 302.	73 fathoms.	Lat. 41° 30′ N., Long. 66° W.

Temnechinus maculatus A. Ag.

This species, as well as *Echinus gracilis*, hitherto only found in the Straits of Florida and the Caribbean, were, as I am informed by Professor Verrill, also collected off Newport in deep water by the U. S. Fish Commission.

Station 155.	88 fathoms.	Off Montserrat.
" 157.	120 "	" "
" 247.	170 "	" Grenada.
" 248.	161 "	" "
" 253.	92 "	" "
" 269.	124 "	" St. Vincent.
" 272.	76 "	" Barbados.
" 273.	103 "	" "
" 276.	94 "	" "
" 290.	73 "	" "

Trigonocidaris albida A. Ag.

Station 100.	250–400 fathoms.	Off Morro Light.
" 269.	124 "	" St. Vincent.
" 281.	288 "	" Barbados.
" 299.	140 "	" "

Echinus norvegicus Düb. o. Kor.

It seems almost hopeless to attempt to distinguish the species of Echinus known as *E. elegans*, *E. norvegicus*, *E. melo*, and *E. Flemingii*. While the specimens from the same localities usually vary but little, those of adjoining or distant localities vary to such an extent that they generally combine more or less the specific features by which we have become accustomed to separate the above-named species.

A large series of *E. norvegicus* from 1241 fathoms shows but the slightest possible variation among the different individuals, yet they all have the anal system which thus far has been considered characteristic of *E. elegans*.

The largest specimens I have seen of this species were collected by the "Porcupine," but they differ in no marked way from the typical *E. norvegicus*.

This species was very common in 1241 fathoms.

Station 308.	1242 fathoms.	Lat. 41° 24′ 45″ N.,	Long. 65° 35′ 30″ W.
" 341.	1241 "	" 39° 38′ 20″ N.,	" 70° 56′ 0″ W.

Echinus Wallisi A. Ag. n. sp.

This is a large species allied to *E. Flemingii* and *E. elegans*. The test is somewhat depressed. It is readily distinguished by the close secondary tuberculation surrounding the primary tubercles, by the arrangement of the pairs of pores in sets of two. The primary spines are long and sharp, like those of *E. Flemingii*. The anal system is intermediate in size between that of *E. Flemingii* and that of *E. elegans*. When alive it was of a brilliant dark reddish pink color, the test of a darker shade than the spines; these are darkest at the base and pinkish at the tip. The smallest specimen collected measured about half an inch. A fine large specimen of this species, measuring three and a half inches in diameter, was collected. It has also been found off Newport by the U. S. Fish Commission.

Station 306.	524 fathoms.	Lat. 41° 32′ 50″ N.,	Long. 65° 55′ W.
" 309.	304 "	" 40° 11′ 40″ N.,	" 68° 22′ W.
" 320.	257 "	" 32° 33′ 15″ N.,	" 77° 30′ 10″ W.
" 330.	1047 "	" 31° 41′ 0″ N.,	" 74° 35′ 0″ W.

Also from Station 330, 1047 fathoms, fragments of a large Echinus of a dark violet color, with close tuberculation and long slender spines, with a low test, which I am unable to refer to any of the known species of the genus.

Toxopneustes variegatus A. Ag.

Nearly all the specimens are remarkable for their small size contrasting with the large size of the littoral individuals. The largest of the specimens found in deep water are more globular than the littoral species; have also finer spines and a closer tuberculation. The young specimens, on the contrary, are remarkable for the flat test.

Station 139.	218 fathoms.	Off Santa Cruz.	
" 142.	27 "	Flannegan Passage.	
" 224.	114 "	Off St. Vincent.	
" 232.	88 "	" "	
" 238.	127 "	" Grenadines.	
" 269.	124 "	" St. Vincent.	
" 273.	103 "	" Barbados.	
" 278.	69 "	" "	
" 277.	106 "	" "	
" 282.	154 "	" "	
" 291.	200 "	" "	
" 294.	137 "	" "	
" 295.	180 "	" "	
" 296.	84 "	" "	
" 299.	140 "	" "	
" 319.	262 "	Lat. 32° 25′ 0″ N.,	Long. 77° 42′ 30.
" xx. (Bartlett)	51 "	" 21° 26′ 30″ N.,	" 86° 28′ 40″ W.
" xxix. "	300 "	" 21° 23′ 19″ N.,	" 82° 54′ 42″ W.

Hipponoë esculenta A. Ag.

Station 130.	451 fathoms.	Off Frederickstadt.
" 272.	76 "	" Barbados.
" 276.	94 "	" "

Echinocyamus pusillus. Gray.

Station 100.	250–400 fathoms.	Off Morro Light.
" 128.	180 "	" Frederickstadt.
" 147.	250 "	" St. Kitts.
" 186.	98 "	" Dominica.
" 206.	170 "	" Martinique.
" 211.	357 "	" "
" 230.	464 "	" St. Vincent.
" 239.	338 "	" Grenadines.
" 274.	209 "	" Barbados.
" 282.	154 "	" "
" 288.	399 "	" "
" 299.	140 "	" "

Clypeaster subdepressus Agass.

Both the forms of this species were collected, the one the ordinary flat type, the other the pentagonal type with swollen raised edge figured on Plate XI[c]. of the Revision of the Echini.

Station 120.	1952	fathoms.	Lat. 18° 12′ N., Long. 64° 55′ W.
" 132.	115	"	Off Santa Cruz.
" 134.	248	"	" "
" 155.	88	"	" Montserrat.
" 177.	118	"	" Dominica.
" 186.	98	"	" "
" 231.	95	"	" St. Vincent.
" 262.	92	"	" Grenada.
" 269.	124	"	" St. Vincent.

Echinanthus rosaceus Gray.

Station 177.	118	fathoms.	Off Dominica.
" 276.	94	"	" Barbados.

Echinarachnius parma Gray.

With the exception of Echinocyamus, and the young of *Clypeaster subdepressus*, no Clypeaster has as yet been found to extend to the depth at which the "Blake" dredged this species off Newport.

Station 302.	73	fathoms.	Lat. 41° 30′ 0″ N.,	Long. 66° 0′ 0″ W.
" 303.	306	"	" 41° 34′ 30″ N.,	" 65° 54′ 30″ W.
" 345.	71	"	" 40° 10′ 15″ N.,	" 71° 4′ 30″ W.
" 347.	24	"	" 40° 59′ 0″ N.,	" 71° 22′ 30″ W.

Echinolampas depressa Gray.

The specimens of this species collected in the West Indies during the winter of 1878–79 show that it attains a considerable size, although none of the specimens dredged attain the size of *E. oviformis*. The largest specimen measured a little over two inches in length. When alive, the color of the test with its spines is a dirty greenish-yellow.

Station 253.	92	fathoms.	Off Grenada.
" 300.	82	"	" Barbados.

Conoclypus Sigsbei A. Ag.

Among the specimens of this species collected by the "Blake" were three small Echini, which for the present I may call the young of the above species, yet they resemble to such an extent the genus Pygaster that they may be after all the young of the species of Pygaster mentioned by Lovén as found in the West Indies. A very critical revision of the young of Echinolampas and of Conoclypus is necessary to define the systematic position of these young sea-urchins.

Station 155.	88	fathoms.	Off Montserrat.
" 177.	118	"	" Dominica.
" 220.	116	"	" St. Lucia.
" 272.	76	"	" Barbados.

Pourtalesia miranda A. Ag.

Fragments of some of the other genera of Pourtalesiæ but too imperfect for accurate determination, were also collected, principally from Barbados.

Station 265. 576 fathoms. Off Grenada.

Urechinus naresianus A. Ag.

This is another of the abyssal species having a most extensive geographical range. I am unable to distinguish the specimens collected by the "Blake" from those collected by the "Challenger" in the Southern Ocean.

Station 222.	422	fathoms.	Off St. Lucia.
" 308.	1242	"	Lat. 41° 24′ 45″ N., Long. 65° 35′ 30″ W.

Homolampas fragilis A. Ag.

Station 162. 734 fathoms. Off Guadeloupe.

Palæotropus Thomsoni A. Ag. n. sp.

At Station 781 a single broken specimen of this species was collected, it differs most strikingly from all the other specimens of Palæotropus collected. It is closely covered by uniform tubercles on the abactinal side. It has a proportionally greater number of coronal plates, and a high test, with a keeled posterior interambulacral median line. Apex more posterior than in *P. Josephinæ*.

The color of the test is yellowish white when alive. The large *P. Josephinæ* are of a dirty greenish red color, and when young more pinkish. This species is also remarkable for its broad, bare posterior lateral ambulacra on the abactinal side, and for its prominent keeled, very elongate actinal plastron, and its longitudinally elongate anal fasciole, still very prominent at a time when in *P. Josephinæ* the posterior extremity has become flattened, and the fasciole quite indistinct.

Station 321. 233 fathoms. Lat. 32° 43′ 25″ N., Long. 77° 20′ 30″ W.

Palæotropus Josephinæ Lovén.

An excellent series of this species shows that it attains a length of nearly two inches. The test of the larger specimens becomes quite flattened, regularly arched from the apex towards the anterior and posterior extremities, having completely lost the globular outline so characteristic of the young stages as figured by Lovén. It has a flattened actinal surface, slightly re-entering near the actinostome. It also loses its distinct subanal fasciole, which is obliterated in the accumulation of secondary and miliary tubercles at the extremity of the actinal plastron. In addition it has the double ambulacral pores, forming, as in Paleopneustes, rudimentary petaloid ambulacra, contrasting most markedly to the simple ambulacral pores characteristic of the young of this genus. This brings the genus very close to Nacopatagus, which the adult greatly resembles.

Station	241.	163 fathoms.	Off Grenadines.
"	269.	124 "	" St. Vincent.
"	291.	200 "	" Barbados.
"	295.	180 "	" "
"	299.	140 "	" "
"	300.	82 "	" "

Paleopneustes cristatus A. Ag.

A small specimen measuring about two inches in longitudinal diameter, showed a narrow but very distinct fasciole, parallel to the ambitus immediately above it, and an indistinct branch round the anal system. The disappearance of the fasciole in this species in the older specimens I have already alluded to when describing *Linopneustes Murrayi*, a Japanese type closely allied to the West Indian Paleopneustes.

Station	128.	180 fathoms.	Off Frederickstadt.
"	132.	115 "	" Santa Cruz.
"	143.	150 "	On Saba Bank.
"	156.	88 "	Off Montserrat.
"	157.	120 "	" "
"	158.	148 "	" "
"	184.	94 "	" Dominica.
"	191.	108–250 "	" "
"	202.	210 "	" Martinique.
"	203.	96 "	" "
"	220.	116 "	" St. Lucia.
"	231.	95 "	" St. Vincent.
"	290.	73 "	" Barbados.
"	292.	56 "	" "
"	300.	82 "	" "
"	x. (Bartlett)	103 "	Lat. 18° 13′ 20″ N., Long. 78° 36′ 40″ W.
"	xxiv. "	206 "	E. of Cape Cruz, S. side of Cuba.

Paleopneustes hystrix A. Ag. n. sp.

This species is more flattened than *P. cristatus;* the ambulacral pores are more distant, extending in nearly vertical rows, slightly and uniformly spreading towards the ambitus. The primary tubercles of the abactinal surface are not numerous; they carry large, comparatively stout, slightly curved sharp primary radioles, which, at first sight, give this Spatangoid the appearance of one of the regular Sea-urchins. The color of the test and of the spines is greenish purple, or a light Indian red. The spines of the actinal surface are finer, spathiform, and closely packed, specially closely clustered round the anal system. There is no trace of a marginal fasciole.

Station 144.	21	fathoms.	On Saba Bank.
" 148.	208	"	Off St. Kitts.
" 157.	120	"	" Montserrat.
" 166.	150	"	" Guadeloupe.

Linopneustes longispinus A. Ag.

Eupatagus longispinus A. Ag. Bull. M. C. Z., V. no. 9.

In the Preliminary Report of the Echini of the "Blake" Expedition for 1877–78, I noticed under the name of *Eupatagus longispinus* fragments of a large Spatangoid too imperfectly preserved for accurate generic determination. A number of specimens of this fine species were collected, and I am now able to say that it belongs to the subgenus Linopneustes (Paleopneustes), and is most closely allied to *Linopneustes Murrayi.*

It can at once be distinguished from it by the great flatness of the test, the nearly closed lateral petaloid ambulacra, about half-way from the apical system, and the simple rows of pores spreading far apart at the ambitus. The primary tubercles are distant; on the abactinal surface they carry long, stout, curved primary radioles of a whitish silvery lustre, with yellowish tint. The color of the test is pinkish or flesh-color. The subanal fasciole is small, transversely elliptical; the marginal fasciole is of a dark color, extends a very short distance above the ambitus along the whole outline of the test, and crosses the posterior extremity above the anal system.

The spines of the actinal surface are much finer and shorter than those of the abactinal side. The ambulacral areas are broad, bare; the actinal plastron is small. Large specimens measure nearly four inches in length.

Station 127.	38	fathoms.	Off Santa Cruz.
" 134	.248	"	" "
" 147.	250	"	" St. Kitts.
" 148.	208	"	" "
" 149.	60–150	"	" "
" 150.	373	"	Between St. Kitts and Nevis.
" 154.	298	"	Off Montserrat.
" 274.	209	"	" Barbados.
" 300.	82	"	" "

Spatangus purpureus Leske.

A large number of dead tests and fragments of this species were found, but no live specimens.

Station 134.	248	fathoms.	Off Santa Cruz.
" 145.	270	"	" St. Kitts.
" 146.	245	"	" "
" 147.	250	"	" "
" 150.	373	"	Between St. Kitts and Nevis.
" 238.	127	"	Off Grenadines.
" 254.	164	"	" Grenada.
" 274.	209	"	" Barbados.
" 280.	221	"	" "
" 291.	200	"	" "
" 300.	82	"	" "

Hemiaster Mentzi A. Ag. n. sp.

A few specimens of this small globular species were collected. It differs strikingly from the other species of the genus by the small, narrow comparatively elongate space included within the peripetalous fasciole.

Station 136.	508	fathoms.	Off Santa Cruz.
" 206.	170	"	" Martinique.
" 230.	464	"	" St. Vincent.
" 265.	576	"	" Grenada.
" 267.	626	"	" "

Brissopsis lyrifera Agass.

Station 116.	150	fathoms.	Lat. 17° 55′ N., Long. 76° 41′ 20″ W.	
" 206.	170	"	Off Martinique.	
" 246.	154	"	" Grenada.	
" 260.	291	"	" "	
" 307.	980	"	Lat. 41° 29′ 45″ N.,	Long. 65° 47′ 10″ W.
" 308.	1242	"	" 41° 24′ 45″ N.,	" 65° 35′ 30″ W.
" 329.	603	"	" 34° 39′ 40″ N.,	" 75° 14′ 40″ W.
" 331.	898	"	" 35° 44′ 40″ N.,	" 74° 40′ 20″ W.
" 338.	922	"	" 38° 18′ 40″ N.,	" 73° 18′ 10″ W.
" 339.	1186	"	" 38° 16′ 45″ N.,	" 73° 10′ 30″ W.
" 340.	1394	"	" 39° 25′ 30″ N.,	" 70° 58′ 40″ W.
" 341.	1241	"	" 39° 38′ 20″ N.,	" 70° 56′ 0″ W.

Agassizia excentrica A. Ag.

Fragments of this species show that it attains a size of nearly two inches in length. An excellent series of some of the younger stages is found in the collection of this season.

Station 148.	208	fathoms.	Off St. Kitts.
" 155.	88	"	" Montserrat.
" 156.	88	"	" "
" 167.	175	"	" Guadeloupe.
" 176.	391	"	" Dominica.
" 177.	118	"	" "
" 184.	94	"	" "
" 231.	95	"	" St. Vincent.
" 247.	170	"	" Grenada.
" 272.	76	"	" Barbados.
" 273.	103	"	" "
" 274.	209	"	" "
" 290.	73	"	" "

Schizaster orbignyanus A. Ag., n. sp.

A fine specimen of this species was collected in 209 fathoms at Barbados. It is closely allied to *Schizaster canaliferus*, differing from it by its narrow, less sunken anterior ambulacrum; the lateral ambulacra are also narrower, the test flatter, the posterior extremity more pointed, apical system more posterior, anal system smaller. Peripetalous fasciole narrow, re-entering between the lateral ambulacra. The fragments of the test show a primary tuberculation of the actinal surface finer than in *S. canaliferus*. The spines have the same general coloring of its Mediterranean representative.

Station 143.	150	fathoms.	Off Saba Bank.
" 235.	1507	"	" Bequia.
" 247.	170	"	" Grenada.
" 253.	92	"	" "
" 258.	159	"	" "
" 259.	159	"	" "
" 260.	291	"	" "
" 262.	92	"	" "
" 268.	955	"	" "
" 274.	209	"	" Barbados.
" 291.	200	"	" "

Schizaster fragilis Agass.

This seems to be a not uncommon species near the 100 fathom line off our New England coast. Good series in all stages of growth have been collected.

Station 303.	306	fathoms.	Lat. 41° 34′ 30″ N.,	Long. 65° 54′ 30″ W.
" 310.	260	"	" 39° 59′ 16″ N.,	" 70° 18′ 30″ W.
" 311.	143	"	" 39° 59′ 30″ N.,	" 70° 12′ 0″ W.
" 322.	362	"	" 33° 10′ 0″ N.,	" 76° 32′ 15″ W.
" 336.	197	"	" 38° 21′ 50″ N.,	" 73° 32′ 0″ W.
" 344.	129	"	" 40° 1′ 0″ N.,	" 70° 58′ 0″ W.
" 345.	71	"	" 40° 10′ 15″ N.,	" 71° 4′ 30″ W.

Cambridge, December 31, 1880.

No. 3. — *New and little-known Reptiles and Fishes in the Museum Collections.* By SAMUEL GARMAN.

Hydrophis Semperi sp. nov.

In a general way resembling *H. fasciatus* or *H. fischeri.* Body elongate, slender, compressed. Head very little larger than the neck, crown convex, snout broad, rounded; tail about one eighth of the total length, moderately broad. Eye small, pupil round. Nostrils superior, in the outer posterior corner of the nasal. Fangs small. Rostral moderate, nearly as high as broad, reaching the top of the snout, convex in front, in contact with four plates, with three prominences on its lower margin, formed by a notch on each side of the middle. Nasals large, elongate, grooved from the nostril to the second labial. Prefrontals smaller than nasals, broader than long. Frontal little less than twice as long as broad, lateral margins nearly parallel, obtuse-angled in front, acute behind. Supraciliaries short, broad, hexangular. Parietals broad, pentangular, separated by the frontal for about two fifths of their length. Labials eight, second more than twice the size of the first and in contact with nasal, prefrontal, and preocular; third, fourth, and fifth, in the orbit; seventh smallest, and separated from the temporal by a large pentagonal plate. No loreal. Oculars 1 — 2. Temporals 1 + 2 + 3, anterior large. Infralabials nine, first two large, first in contact with its opposite behind the small mental. Submentals two pairs, anterior larger. Scales smooth, flat, short, broad, imbricated, in 38 rows at the middle of the body. Ventrals 329, small, generally about twice as large as the scales on each side of them, frequently dissected so as to be similar to those on the flanks. Subcaudals 34. Preanals 4, outer larger.

Black, crossed by narrow bands of white (53 on body, 4 on tail) which do not meet on the abdomen. On the middle of the length the white bands are nearly half the width of the black spaces separating them, on the vertebral rows.

A fresh-water species. One of a number secured in Lake Taal, Luzon Island, Philippines, by the distinguished naturalist, Dr. Carl Semper, by whom it was presented to the Museum.

Rhinocerophis nasus sp. nov.

Body moderate, fusiform, belly broad; head moderate, distinct from the neck, subtriangular, crown flat; tail short, thick, tapering, ending in a bony point or spine, which is slightly curved upward. Eye small, pupil erect. Fangs moderate. Snout with a prominence on the internasal space. The posterior faces of this knob are covered by two shields (internasals), which meet the rostral at the lateral angles and on the top. Rostral very high, rather more than twice as high as broad, extending considerably above the general surface of the head, forming the anterior face of the bony protuberance. Crown covered with keeled scales, of which there are eight series between the supraciliaries. Supraciliaries large, elongate, entire. Anterior portion of nasal twice as large as posterior, upper angle acute. Pit surrounded by three scales, neither of which enters the orbit. Anteorbitals two, lower small, upper large and separated by two plates from those on the sides of the knob on the snout. Below the eye a large plate rests on the fourth labial; between this and the supraciliary there are five small orbitals, decreasing in size backward. Labials eight to nine, narrow, third and fourth largest, posterior four bounded above by as many large smooth scales. Infralabials twelve, anterior largest, in contact with its opposite behind the mental. A pair of short, broad submentals, followed by others more scale-like. Scales carinate, in 23 rows, vertebral narrow, outer row broad, faintly keeled. Ventrals 151, broad. Subcaudals 38 pairs.

Yellowish brown, punctulate with brown ; yellowish below. Back with a series of subquadrate light-edged spots of brown (37), more or less often divided on the vertebral row into two series, which alternate posteriorly. Flank with two alternating series of smaller, less distinct blotches. Lower flank and abdomen with flecks and punctulations of brown. Seven spots on the tail. A band from the nostril, through the eye, to the angle of the mouth. A blotch on the prefrontal region. A pair of spots on the parietal region diverge posteriorly, then approach again on the nape. Posterior labials with brown margins. Chin clouded with brown. Coloration closely resembling that of light-colored specimens of *Heterodon platyrhinus.*

Rhinocerophis agrees in pit, fangs, squamation, bifid subcaudals, and minor characters, with *Cophias* Merr. (*Bothrops* Wagler), in which it might be placed as a subgenus. It differs in the rostral protuberance, the consequent upward extension of the rostral shield, and great development of the caudal spine.

The specimen described was secured by the "Hassler" Expedition at Puerto San Antonio, Eastern Patagonia. The jar in which it is kept bore the name *Bothrops nasus,* for which I am unable to find authority or description.

Rhinichthys meleagris Agassiz, 1854, Am. Jour. Sci. 357.

D. 2 + 8 ; A. 2 + 7 ; V. 8 ; P. 14 ; L. lon. 71 (70–76) ; L. trans. 11 + 1 + 10. Teeth 4 . 2 — 2 . 4, compressed, uncinate.

Body moderately stout. Head broad behind, narrowing rapidly in front. Snout blunt. Length of head more than four times, and depth of body five to five and one half times in the total length, without caudal. Eye small, diameter of orbit less than twice in length of snout or width of interorbital space. Mouth somewhat oblique, close to the end of the snout. Jaws nearly equal.

Lips with less development than is common in the genus, upper not separated by a fold in front. Barbel short, passed by a vertical from the posterior margin of the nasal cavity. Anterior margin of orbit and base of caudal equidistant from the first ray of the dorsal, a vertical from which passes near the middle base of the ventral. Caudal moderately notched, peduncle stout.

Dotted and blotched with black upon a silvery ground; belly plain silvery white to cream color, or to orange in life. Crown of head darker. Lower half of cheek silvery.

Young with a dark band on each side from the end of the snout, through the eye, to the base of the caudal. Described from the type specimens. Burlington, Iowa.

Rhinichthys arenatus sp. nov.

D. 2+8; A. 2+7; V. 1+9; P. 14; L. long. 63–66; L. trans. 9+1+7 (7–8).

Teeth 4 . 1 — 1 . 4.

A small species of the *R. meleagris* type.

Head four and one fourth and depth five and one half times in the total, without caudal. Eye moderate, diameter of orbit one and one half times in either length of snout or interorbital space, and about four and one half times in the length of the head. Mouth slightly oblique. Jaws about equal. Maxillary reaching about half-way from the end of the snout to the eye. Upper lip not separated by a fold in front. The lips are not very thick, and the mouth is scarcely to be called inferior, the snout has so little prominence. Barbel conspicuous, short. First ray of the dorsal behind a vertical from the base of the ventrals.

Light reddish brown, blotched and clouded by darker. Top of head and an irregular, darkly defined line, from the end of the snout through the eye along each flank to the base of the caudal, dark. Belly light; lower half of flank and cheek silvery.

Sand Hill River, North Minnesota. Collected by S. H. Scudder, Esq.

Rhinichthys luteus sp. nov.

D. 2+8 (8–9); A. 2+7 (7–8); V. 8; P. 14; L. lon. 68 (68–75); L. trans. 10+1+10.

Teeth 4 . 2 — 2 . 4, uncinate.

Head one fourth and depth one sixth of total, without caudal. Eye small, diameter of orbit twice in length of snout, about five times in length of head, and one and one half times in the width of the head between the eyes. Muzzle prominent, obtuse, extending considerably beyond the mouth. Barbel in advance of the eye. Mouth comparatively short and broad. First ray of dorsal midway between nostrils and base of caudal; a vertical from this ray touches the hinder extremity of the base of the ventral. Ventrals reaching the vent, not reached by the pectorals. Lateral line complete. Caudal moderately forked. Upper lip not separated by a fold in front. Young slender, subcylindrical.

Reddish brown, clouded with brown, scales punctulate with black. Entire body and fins irregularly dotted with small spots of black. A dark band beneath the nostrils. Lower surface yellow to orange or red in life. Young with a dark band along the flank.

Near Ogden, Utah, J. A. Allen.

Rhinichthys (Eritrema) rhinichthyoides.

Tigoma rhinichthyoides Cope, 1871, Hayden's Report U. S. Geol. Surv., 473.

D. 2 + 9 (9–10) ; A. 2 + 7 (7–8) ; V. 1 + 8 ; P. 14 ; L. lon. 66 ; L. trans. 12 + 1 + 10 (12–13 + 1 + 10–12).

Teeth 4 . 2 — 2 . 4, compressed, clawed.

Length of head one fourth and depth one fifth of total, without caudal. Eye small, diameter of orbit one and one half times in length of snout, or about four and a half times in length of head. Muzzle obtuse, slightly projecting; maxillary reaching about two thirds of the distance to the orbit. Maxillary barbel thread-like, frequently lacking in older specimens. First dorsal ray midway between pupil of the eye and base of caudal, over the middle of the bases of the ventrals. Dorsal larger than anal, posterior margins of both concave. Ventrals reaching the vent, not reached by the pectorals. Lateral line complete. Caudal deeply forked. Fold of upper lip distinct in front.

Reddish brown, irregularly blotched with brown, with small black spots on body and fins. A brownish band from the lower edge of the orbit to the end of the muzzle. Young with a more or less distinct band, which afterward breaks up into blotches on the flank. Belly red.

Seventy specimens from near Ogden, Utah.

Zygonectes lineatus sp. nov.

D. 11 ; A. 14 ; V. 6 ; P. 15 ; L. lon. 36 ; L. trans. 12.

Moderately stout, compressed. Head less than three times in the total length, without caudal ; depth more than four times in the same distance. Crown flat. Eye large, diameter of orbit equal length of snout, three and one half times in the length of the head, or one and three fourths times in the width at the eyes. Lower jaw a little longer. Outer row of teeth in each jaw long, slender, curved. First ray of the dorsal one third of the distance from the base of the caudal to the anterior edge of the orbit, almost directly opposite the first ray of the anal. Caudal truncate.

Brownish, finely punctulate with brown ; white below. Lips, top of head, and a line along the middle of the back dark. Tail with faint transverse bands.

Northeastern Wyoming.

Some of the following species have a special interest on account of their locality. The majority are from small streams or springs flowing into the Lago del Muerte or the Lago de Parras, in the southwestern part of the State of Coahuila, Mexico. These lakes or lagoons are said to be completely isolated. They are marked so on the latest maps of this portion of the country. The list is compiled from a collection made for the Museum by Dr. Edward Palmer.

Noturus flavus Raf.

San Antonio, Texas.

Ichthyobus tumidus Girard.

D. 3 + 26 ; A. 3 + 8 ; V. 11 ; P. 16 ; L. lat. 37 ; L. trans. 7 + 1 + 5.

San Pedro, on the Nazas River, flowing into the Lago del Muerte from the west.

Catostomus nebuliferus sp. nov.

D. 3 + 9 ; A. 2 + 8 ; V. 1 + 8 (-9); P. 15 ; L. lat. 90 ; L. trans. 14 + 1 + 14.

Length of head or height of body one fifth of the total, exclusive of the caudal. Body stout, little compressed. Head moderate, nearly as broad as high, length in front of the eye almost twice the diameter of the orbit. Eye small. Mouth small ; lips with a considerable free margin. Anterior spine of the dorsal midway between the muzzle and the caudal ; a vertical from the middle of the base of the fin reaches the insertion of the ventrals ; the latter extend to a vertical from the posterior extremity of the free portion. Caudal deeply notched. Anterior rays of dorsal and ventral longer.

Reddish brown to brown, clouded and blotched with darker. Darker along the lateral line. Belly light colored, uniform. Lower half of the preopercle silvery white. The line of demarcation between the dark color of the upper portion of the head and the light of the face and throat is very distinct. Allied to *C. guzmanensis* Girard ; differing in the radial formulæ and, somewhat, in coloration. It differs from *C. griseus* Girard in radial formulæ, squamation, and colors.

Nazas River.

Hybognathus (Dionda) punctifer sp. nov.

D. 2 + 8 ; A. 2 + 8 ; V. 8 ; P. 16 ; L. lat. 40 ; L. trans. 5 + 1 + 3.

Teeth 4–4, compressed, clawed.

Length of head or height of body equal to one fourth of the total, without caudal. Body but slightly compressed, outline from forehead to dorsal curving regularly. Head moderately broad ; snout rounded, little, if any, longer from the eye than the diameter of the orbit. Eye medium. Mouth small ; maxillary reaching about half-way to the orbit. Snout bluntly rounded above the mouth. Dorsal somewhat larger than the anal ; a vertical from the posterior extremity of its base passes in front of the vent. Ventrals short, not reaching the vent, insertion very little in advance of that of the dorsal. Pectorals rather small, reaching a little more than half-way to the ventrals. Caudal deeply notched. The lateral line descends slightly along the middle of the body.

Back brownish ; belly whitish ; cheeks silvery. Scales punctulate with black. Much lighter colored than *Dionda melanops* Girard. A spot on the tail at the end of the lateral line. Distinguished from *D. couchii* Girard by the size of the scales and a stouter form. The formulæ for *D. melanops*, according to type sent by the Smithsonian Institution, are D. 2 + 8 ; A. 2 + 8 ; V. 8 ; P. 14 ; L. lat. 42 ; L. trans. 6 + 1 + 4.

Parras, and spring near Saltillo.

STYPODON, gen. nov.

Body oblong, compressed. Scales large, deciduous. Lateral line complete, below the middle of the side of the tail. Dorsal and anal fins short ; spinous rays weak. Mouth small, anterior ; upper jaw protractile ; fold of lower lip not crossing the symphysis ; lower jaw trenchant, without a horny covering. No barbels. Gill rakers short. Pharyngeals strong ; teeth 3 — 3, of the *Mylocheilus* type, more or less cylindrical, with rounded grinding surfaces, posterior more slender and subconical.

Stypodon signifer sp. nov.

D. 2 + 8 ; A. 2 + 8 ; V. 8 ; P. 12 ; L. lon. 35 ; L. trans. 6 + 1 + 2.

Length of head or height of body three and two thirds times in the total length, without caudal. Body compressed, upper and lower outlines similar, forming a gradual curve from snout to dorsal. Head moderate, length in front of the eye a little less than the diameter of the orbit. Mouth oblique, lower jaw more prominent, upper protractile. Maxillary hardly reaching a vertical from the anterior margin of the orbit. Eye comparatively large. Pharyngeals very strong. Teeth 3 — 3, stout ; stump-like with smooth convex summits. The posterior tooth of each series is more slender, and the shape of its top approaches that of a cone with rounded apex. The anvil or bone against which they strike is large and heavy, subelliptical in shape, and in length equals the diameter of the orbit. Scales moderately large, easily detached, broadly rounded on the posterior margin. The depth of the caudal notch is less than half of the free portion of the fin. Ventrals not quite reached by the pectorals, reaching the anal, inserted a little in front of the first dorsal ray. Lateral line complete, below the middle of the caudal peduncle.

Upper half of head and body brown ; below the lateral line and eye silvery ; fins light colored. A broad band of dark brown from the eye to the caudal notch, bordered above by a narrow silvery line. Scales punctulate with brown.

Parras, Dr. Palmer.

Cyprinella rubripinna sp. nov.

D. 2 + 8 ; A. 2 + 11 ; V. 8 (7–8) ; P. 13 ; L. lat. 38 ; L. trans. 7 + 1 + 3.

Height two and two thirds and length of head four and one half times in length of body, exclusive of caudal. Body much compressed. Head small. Snout shorter than diameter of eye. Maxillary not reaching a vertical from the edge of the orbit. Outline quite convex from dorsal to back of head. Caudal notch equal to about half the length of the free portion of the fin. A vertical from the anterior extremity of the base of the dorsal falls near the middle of the space between the bases of ventrals and anal. Ventrals reaching the anal. Pectorals not reaching the ventrals. Total length of largest $2\frac{7}{8}$, height $\frac{7}{8}$ inches. The shape of a scale on the flanks is a nearly perfect lozenge, the width of one being equal to the length of three.

Back dark to light reddish brown, commonly brown. Dorsal fin dark brown. Sides flesh to rose color. Cheeks silvery. Pectorals, ventrals, and anal salmon color. A narrow band of brownish from the nape to the bases of the pectorals. First ray of the pectorals dark brown. Top of head lighter. Caudal fin reddish. Belly and sides more or less silvery. Young with sides and belly silver and back somewhat flesh-colored.

Near Parras, Dr. Palmer.

Gila conspersa sp. nov.

D. 3 + 8 (9) ; A. 3 + 8 (9) ; V. 1 + 7 (8) ; P. 16 ; L. lat. 68 to 70 ; L. trans. 13 + 1 + 9.

Teeth 4 . 1 — 1 . 4, clawed.

Length of head or height of body three and three fourths times in the total length, without caudal. Body rather thick, considerably arched in front of the dorsal, moderate posteriorly. Outline of the top of the head concave. Maxillary reaching a vertical from the anterior edge of the orbit. Distance from eye to end of snout more than diameter of orbit. The distance to the eye from the first ray of the dorsal is equal to that from the same point to the caudal fin. Caudal notch rather less than half the length of the free portion. Base of dorsal above the free portion of the ventrals. Pectorals extending about three fourths of the distance to the latter, which extend to the vent. Scales rounded posteriorly. Proportions and shape similar to those of *C. gibbosa*.

Back and top of head brown ; belly lighter ; cheeks silvery. Scales of back and flanks sprinkled with small spots of brown. An indistinctly outlined band of dark above the lateral line on the posterior half of the body.

Nazas River.

Gila gibbosa BAIRD & GIRARD.

D. 3 + 8 ; A. 3 + 8 ; V. 1 + 8 ; P. 14 ; L. lat. 90 ; L. trans. 18 + 1 + 12.
Formulæ taken from a type specimen sent by the Smithsonian Institution.

Cheonda nigrescens GRD. ; JORDAN.

Tigoma nigrescens GIRARD.

D. 3 + 9 ; A. 3 + 9 ; V. 9 ; P. 17 ; L. lat. 74 ; L. trans. 16 + 1 + 10.
Teeth 5 . 2 — 2 . 5.
Head one fourth of the total length, excluding the caudal fin.
Parras.

Cheonda modesta sp. nov.

D. 2 + 8 ; A. 3 + 8 ; V. 1 + 8 ; P. 15 ; L. lat. 65 ; L. trans. 14 + 1 + 9.
Teeth 5 . 1 — 1 . 5.

Length of head more than height of body, three and one half times in the total length, without the caudal. Body moderately stout, compressed, outline curving regularly from the head to the dorsal. Outline of the head prominent upon the ethmoid, from whence it is nearly straight to the back of the head, or to the lip. A vertical from the anterior extremity of the dorsal passes behind the base of the ventral. Dorsal convex on the posterior border. Anal truncate. Distinguished from the preceding by the greater length and shape of the head, shorter body, and a difference in the position of the dorsal.

Brownish, lighter below ; cheeks silvery. The flanks have not the lustrous appearance of those of *C. nigrescens*.

Saltillo.

Astyanax argentatus BAIRD & GIRARD.

D. 11 ; A. 2 + 21 ; V. 8 ; P. 13 ; L. lat. 37 ; L. trans. 6 + 1 + 6.
Tributaries of the Lago del Muerte and springs near Monclova.

Cyprinodon latifasciatus sp. nov.

D. 12 ; A. 11 ; V. 6 ; P. 14 ; L. lat. 29–31 ; L. trans. 11.

Height of body three and length of head four times in the total length. Outline and teeth as in *C. gibbosus* Girard ; black band on end of caudal much wider. A light band from the middle of the opercle to the lower half of the caudal ; a dark band above this is separated by a narrower band of light from the dark olive of the back. Silvery color of the belly separated from the light band on the flanks by a short band of brown. Fins clouded with brown. Caudal with a narrow black band across its base, and a broad one across its extremity. Light bands silvery in young.

From a spring near Parras, Dr. Palmer.

Alburnellus megalops GIRARD.

Sutherland Springs, Texas.

Gambusia patruelis BAIRD & GIRARD.

Fem. D. 8; A. 8; V. 6; P. 14; L. lat. 31; L. trans. 8.
San Antonio, Texas.
Mas. D. 9; A. 3 + 6; V. 6; P. 14; L. lat. 31; L. trans. 8.
Monclova, Mexico.

Heros pavonaceus sp. nov.

D. 16 + 12; A. 5 + 8; V. 1 + 5; P. 14; L. lat. 32; L. trans. 4 + 1 + 12.
Head as high as long, profile nearly straight in front of the eyes. Height of body equal to length of head, two and two thirds times in total length, exclusive of the caudal fin. Outline curved on the nape. Orbit large, wider than the preorbital. Mouth small, narrow, horizontal; jaws equal in front, maxillary not reaching back to a vertical from the anterior edge of the orbit. The fold on the lower lip but slightly interrupted in the middle. Outer row of teeth largest, brown-tipped. Cheek-scales in five series. Opercles scaly. A few scales on the bases of dorsal and anal. Dorsal reaching its greatest height at the fifth spine, fifth to the sixteenth nearly equal. Dorsal and anal extending beyond the root of the caudal. Caudal fin rounded posteriorly. Ventrals extending to the anus in some, to the base of the anal in most. Pectorals extending to a vertical from the vent. In older specimens the outline from the mouth to the middle of the dorsal approaches a regular very open curve. Largest specimen, apparently adult, $3\frac{1}{2}$, and smallest $1\frac{8}{16}$ inches.

Dark olivaceous brown, slightly flecked with light. Lighter below. With five (4–6) more or less ocellated and vertically expanded spots of black upon the flank of the posterior half of the body below the dorsal fin. An ocellate spot of black on the base of the tail above the lateral line. In large and small the spots are distinct; in both there are ten or eleven faintly indicated transverse bands on the sides, the posterior traversing the spots. Allied to *H. angulifer*.

From a spring near Monclova, Dr. Palmer.

CAMBRIDGE, Mass., January 31, 1881.

No. 4.—*List of Dredging Stations occupied during the Year* 1880 *by the U. S. Coast Survey Steamer "Blake,"* Commander J. R. Bartlett, U. S. N., Commanding.

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The following stations (I. to XXX.) were occupied by Commander Bartlett from February to May, 1880. They are all comprised in the Western Caribbean, between Cuba, Jamaica, and Honduras.

Stat.	Fms.	Temperature. Surface.	Temperature. Bottom.	Locality.	Nature of Bottom.
I.	145		64½°	9 miles E. ⅛ N. of Mathewtown, Quangue Isl.	
IV.	766		40	Lat. 20° 11′ N., Long. 73° 33 W.	Hard coral sand, black pebble, sponge, pieces of wood & shell.
IV.*	772		39¼	Lat. 20° 24′ 15″ N., Long. 73° 56′ 50″ W.	Coral sand, stone, shells.
V.	288		55¼	3.3 miles S. E. by E. ½ E. from Santiago de Cuba Light.	Sand, mud, black spks.
VI.	250	80°	56½	Lat. 17° 51′ 50″ N., Long. 76° 45′ W.	Mud.
VII.	610		41	Lat. 17° 28′ 30″ N., Long. 77° 30′ W.	Coral sand.
VIII.	322		52	Lat. 17° 45′ N., Long. 77° 58′ 40″ W.	Coral sand.
IX.	254			Lat. 18° 12° N., Long. 78° 20′ W.	Mud.
X.	103			Lat. 18° 13′ 20″ N., Long. 78° 36′ 40″ W.	Coral.
XI.	555		41	Lat. 17° 30′ N., Long. 79° 14′ W.	Coral sand and ooze.
XIII.	272		56½	1 mile W. of Georgetown, Grand Cayman Isl.	Coral.
XIV.	608		41	Grand Cayman Island.	Coral sand.
XV.	903		41	Lat. 18° 51′ N., Long. 83° 7′ W.	Coral sand and ooze, Pterop. shells.
XVII.	41		79	Lat. 18° 22′ 20″ N., Long. 87° 21′ 30″ W.	Coral.

Stat.	Fms.	Temperature. Bottom.	Locality.	Nature of Bottom.
XVIII.	600	40½°	Lat. 18° 20′ 30″ N., Long. 87° 16′ 40″ W.	Coral sand and ooze.
XX.	961	39½	Lat. 16° 42′ N., Long. 83° 1′ W.	Coral sand, gray ooze.
(Apr. 28, 1880.)	100		Off entrance to Port Royal, Jam.	
XXI.	33		Lat. 19° 48′ N., Long. 77° 17′ W.	Coral.
XXII.	250		Lat. 19° 48′ 47″ N., Long. 77° 23′ W.	Mud.
XXIV.	206		5 miles east of Cape Cruz, south side Cuba.	Coral sand.
XXVI.	297		1 mile N. of W. end of Cayman, Brac Isl.	Coral sand.
XXIX.	300	55	Lat. 21° 23′ 19′ N., Long. 82° 54′ 42″ W.	Coral sand.
XXX.	51	69	Lat. 21° 26′ 30″ N., Long. 86° 28° 40″ W.	

The following stations were occupied by the "Blake" during the dredging cruise of the summer of 1880.

Stations 301 to 308 are on the lines run off the northeastern extremity of George's Bank.

Station 309 is intermediate between the northeastern extremity of George's Bank and the next line run off Newport, which includes Stations 310 to 312.

Stations 313 to 318 are in a line normal to the coast in about latitude 32° N.

Stations 319 to 323 are in a line parallel to the coast in the so-called axis of the Gulf Stream.

Stations 324 to 329, south off Cape Hatteras.

Stations 330 to 333, north off Cape Hatteras.

Stations 334 to 339, east off Cape May.

Stations 340 to 347, normal to coast southeast off Montauk Point.

Stat.	Fms.	Temperature. Surface.	Temperature. Bottom.	Locality.	Nature of Bottom.
301	71	55°	42½°	Lat. 41° 26′ 55″ N., Long. 66° 3′ W.	Fine yellow sand, black sp.
302	73	53	42½	Lat. 41° 30′ N., Long. 66° W.	Fine yellow sand, black sp.
303	306	61	40½	Lat. 41° 34′ 30″ N., Long. 65° 54′ 30″ W.	Gray sand, mud, black sp., gravel.

Stat.	Fms.	Temperature. Surface.	Bottom.	Locality.	Nature of Bottom.
304	139	62°	44°	Lat. 41° 35′ N., Long. 65° 57′ 30″ W.	
305	810	$56\frac{1}{4}$	39	Lat. 41° 33′ 15″ N., Long. 65° 51′ 25″ W.	Fine dark gray mud, stones.
306	524	59	$39\frac{1}{2}$	Lat. 41° 32′ 50″ N., Long. 65° 55′ W.	Fine dark gray mud.
307	980	68	38	Lat. 41° 29° 45″ N., Long. 65° 47′ 10″ W.	Dark gray mud.
308	1242	65	38	Lat. 41° 24′ 45″ N., Long. 65° 35′ 30″ W.	Fine dark gray mud.
309	304	66	$40\frac{1}{2}$	Lat. 40° 11′ 40″ N., Long. 68° 22′ W.	Dark gray sand, mud.
310	260	$69\frac{1}{2}$	42	Lat. 39° 59′ 16″ N., Long. 70° 18′ 30″ W.	Fine dark green mud.
311	143	$70\frac{1}{2}$	$45\frac{1}{2}$	Lat. 39° 59′ 30″ N., Long. 70° 12′ W.	Yellowish gray sand, black sp.
312	466	$71\frac{1}{2}$	40	Lat. 39° 50′ 45″ N., Long. 70° 11′ W.	Dark gray mud and green sand, very sticky clay, lumpy.
313	75	82	$61\frac{1}{2}$	Lat. 32° 31′ 50″ N., Long. 78° 45′ W.	Fine gray sand, black sp.
314	142	81	$56\frac{1}{2}$	Lat. 32° 24′ N., Long. 78° 44° W.	Fine gray sand, black sp.
315	225	$80\frac{1}{2}$	48	Lat. 32° 18′ 20″ N., Long. 78° 43′ W.	Fine yellowish gray sand, black sp.
316	229	$82\frac{1}{2}$	48	Lat. 32° 7′ N., Long. 78° 37′ 30″ W.	Pebbles.
317	333	85	45	Lat. 31° 57′ N., Long. 78° 18′ 35″ W.	Hard bottom.
318	337	$84\frac{1}{4}$	47	Lat. 31° 48′ 50″ N., Long. 77° 51′ 50″ W.	Coral, br. sh.
319	262	84	$45\frac{1}{2}$	Lat. 32° 25′ N., Long. 77° 42′ 30″ W.	
320	257	$84\frac{1}{2}$	51	Lat. 32° 33′ 15″ N., Long. 77° 30′ 10″ W.	Gray sand, black sp., sh.
321	233	84	$53\frac{1}{2}$	Lat. 32° 43′ 25″ N., Long. 77° 20′ 30″ W.	Glob. sand.
322	362		$46\frac{1}{2}$	Lat. 33° 10′ N., Long. 76° 32′ 15″ W.	Glob. sand.
323	457	83	40	Lat. 33° 19′ N., Long. 76° 12′ 30″ W.	Fine greenish gl. ooze.
324	1386	84		Lat. 33° 27′ 20″ N., Long. 75° 53′ 30″ W.	Glob. ooze.
325	647	$84\frac{1}{2}$	39	Lat. 33° 35′ 20″ N., Long. 76°	Glob. ooze.
326	464	$84\frac{1}{2}$	$39\frac{1}{2}$	Lat. 33° 42′ 15″ N., Long. 76° 0′ 50″ W.	Glob. ooze.

Stat.	Fms.	Temperature. Surface.	Temperature. Bottom.	Locality.	Nature of Bottom.
327	178	83°	49½°	Lat. 34° 0′ 30″ N., Long. 76° 10′ 30″ W.	Glob. ooze.
328	1632	84½	37	Lat. 34° 28′ 25″ N., Long. 75° 22′ 50″ W.	Glob. ooze.
329	603	84½	39¾	Lat. 34° 39′ 40″ N., Long. 75° 14′ 40″ W.	Glob. ooze.
330	1047	85	38½	Lat. 31° 41′ N., Long. 74° 35′ W.	Glob. ooze and clay.
331	898	81	39	Lat. 35° 44′ 40″ N., Long. 74° 40′ 20″ W.	Glob. ooze.
332	263	79½	41½	Lat. 35° 45′ 30″ N., Long. 74° 48° W.	Glob. ooze.
333	65	79		Lat. 35° 45′ 25″ N., Long. 74° 50′ 30 W.	Clay.
334	395	78¼	41	Lat. 38° 20′ 30″ N., Long. 73° 26′ 40″ W.	Dark gray ooze, clay.
335	89	77½	56½	Lat. 38° 22′ 25″ N., Long. 73° 33′ 40″ W.	Gray sand, black sp., br. sh.
336	197	77½	45	Lat. 38° 21′ 50″ N., Long. 73° 32′ W.	Blue mud.
337	740	79	39½	Lat. 38° 20′ 8″ N., Long. 73° 23″ 20″ W.	Glob. ooze, clay.
338	922	79	39	Lat. 38° 18′ 40″ N., Long. 73° 18′ 10″ W.	Dark grayish blue mud, clay.
339	1186	78	39	Lat. 38° 16′ 45″ N., Long. 73° 10′ 30″ W.	Dark blue mud, clay.
340	1394	76½	38	Lat. 39° 25′ 30″ N., Long. 70° 58′ 40″ W.	Gray mud, glob. ooze.
341	1241	76	38	Lat. 39° 38′ 20″ N., Long. 70° 56′ W.	Gray mud, glob. ooze.
342	1002	76½	39	Lat. 39° 43′ N., Long. 70° 55′ 25′ W.	Clay, brown mud.
343	732	75¼	39½	Lat. 39° 45′ 40″ N., Long. 70° 55′ W.	Dark gray mud, clay.
344	129	74½	51	Lat. 40° 1′ N., Long. 70° 58′ W.	Fine sand, mud.
345	71	73	51	Lat. 40° 10′ 15″ N., Long. 71° 4′ 30″ W.	Green mud, brk. sh. sand.
346	44	75½	49	Lat. 40° 25′ 35″ N., Long. 71° 10′ 30″ W.	Pebbles.
347	24	72½	60	Lat. 40° 59′ N., Long. 71° 22′ 30 W.	Pebbles, sand.

ALEXANDER AGASSIZ.

CAMBRIDGE, February, 1881.

No. 5. — *Reports on the Results of Dredging, under the Supervision of* ALEXANDER AGASSIZ, *on the East Coast of the United States, during the Summer of* 1880, *by the U. S. Coast Survey Steamer "Blake,"* COMMANDER J. R. BARTLETT, U. S. N., Commanding.

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X.

Report on the Cephalopods, and on some additional Species dredged by the U. S. Fish Commission Steamer "Fish Hawk," during the Season of 1880. By A. E. VERRILL.

Ommastrephes illecebrosus VERRILL.

Loligo illecebrosa LESUEUR, Journ. Phil. Acad. Nat. Sci., II. p. 95, Pl. X. figs. 18–21, 1821 (figures incorrect).

GOULD, Invert. Mass., 1st ed., p. 318, 1841 (habits).

Loligo piscatorum LA PYLAIE, Ann. des Sci. Nat., IV. p. 319, 1825, Pl. XVI. (habits as observed at St. Pierre).

Ommastrephes sagittatus (pars) D'ORBIG., Céphal. Acétab., p. 345, Pl. VII. figs. 1–3 (after Lesueur).

BINNEY, in Gould's Invert. Mass., 2d ed., p. 510, 1870 (excl. syn.), Pl. XXVI. figs. 341–344 [341 is imperfect], *not* Pl. XXV. fig. 339.

TRYON (pars), Man. Conch., I, p. 177, Pl. LXXVIII. fig. 342 (very poor, after Lesueur), Pl. LXXIX. fig. 343, 1879 (*not* Pl. LXXVIII. figs. 341, 345).

Ommastrephes illecebrosa VERRILL, Amer. Jour. Sci., III. p. 281, 1872 (synonymy); Report Invert. Vineyard Sound, etc., 1873, pp. 441 (habits), 634 (descr.); Amer. Jour. Sci., XIX. p. 289, April, 1880; Trans. Conn. Acad., V. p. 268, Pl. XXVIII. figs. 1–7, Pl. XXIX. figs. 5, 5 *a*, Pl. XXXVII. fig. 8, Pl. XXXVIII. fig. 2, Pl. XXXIX. figs. 2, 3 *a*, 3 *b*.

Illex illecebrosus STEENSTRUP, Oversigt K. D. Vidensk. Selsk. Forhandl., p. 90, 1880. (author's sep. copy, p. 20).

Three adult females were taken at Station 332, N. Lat. 35° 45′ 30″, W. Long. 74° 48′, in 263 fathoms. This extends the southward distribution of this species far beyond its previously known range. It is not certain that these specimens were living at the bottom, for they may have been caught in the trawl on its way to the surface. But specimens were taken from the stomachs of fishes (*Lophius*) caught off Newport, R. I., in 65 and 372 fathoms, this season, by the United States Fish Commission, indicating that it frequents the bottom at such depths.

This species ranges northward, on the American coast, to Cumberland Gulf. It is most abundant from Cape Cod to Newfoundland. Large specimens have been taken at Wood's Holl, on the southern coast of Massachusetts, in winter.

MASTIGOTEUTHIS gen. nov.

Body elongated, tapering to a point, confluent with the caudal fin posteriorly. Caudal fin very large and broad, rhomboidal, occupying about half the length of the body. Mantle fastened to the base of the siphon by an ovate, ear-shaped elevated cartilage, on each side, fitting into corresponding deep, circumscribed pits on the base of the siphon. Siphon with a bilabiate aperture, an internal valve, and a pair of dorsal bridles. Eyes large, with round pupils; lids free, thin, apparently with a very small anterior sinus. Arms very unequal, the ventral ones much the longest. Suckers small, in two regular rows. Tentacular arms long and round, tapering to the tips, shaped like a whip-lash, without any distinct club; the distal portion is covered nearly all around with exceedingly numerous and minute suckers, which leave only a very narrow, naked line along the outside. Pen narrow and bicostate anteriorly, very slender in the middle; posteriorly much larger, with a long tubular cone.

This remarkable genus differs so widely from all others hitherto described that it will form the type of a new family (*Mastigoteuthidæ*), distinguished by the character of the tentacular arms and suckers, the pen, the connective cartilages, and simple eyelids.

Mastigoteuthis Agassizii sp. nov.

Plate I. Fig. 1. Plate II. Figs. 2-3*a*.

Body elongated, round anteriorly; posteriorly tapering rapidly to the slender, acute, terminal portion, which is confluent with the caudal fin to the tip. Front dorsal edge of mantle emarginate in the middle. Caudal fin very large and broad, transversely rhomboidal, obtuse posteriorly; its length, from origin to tip, about equal to half the combined length of the head and body. Eyes large, with thin lids; pupils circular; iris brown, in alcohol. Sessile arms very unequal; ventral arms much larger and longer than the others, about equal to the combined length of head and body; dorsal arms very small, scarcely one third the length of the ventral pair; two lateral pairs nearly equal, decidedly longer and stouter than the dorsal pair. A delicate, thin, marginal membrane extends along the arms, outside the rows of suckers, to the slender tips. Suckers small, in two regular rows, on all the arms, subglobular, with small oblique apertures, surrounded by small horny rings, having a nearly entire margin. Basal web, between the arms, very small.

In the smaller specimen, which is a male, the right ventral arm is longer than the left, and the tip appears to have been flattened, and the marginal membranes seem to have been wider, with the edges infolded so as to form a sort of furrow on the outer side ; but the suckers are mostly gone, and the tip is too much injured in both specimens to be accurately described.

Tentacular arms long, more than twice the combined length of the head and body, slender, round, gradually tapering to the tip, like a whip-lash ; the distal half of their length covered with very numerous, crowded, minute, pedicelled suckers, which cover nearly the entire surface along the terminal portion, leaving only a narrow naked line along the back, but farther from the tip this naked space becomes gradually wider and the band of suckers narrower, and after these crowded bands of suckers cease, scattered suckers, placed mostly two by two, extend for some distance along the proximal part of the arms. The suckers of the tentacular arms are so small that their form cannot be seen with the naked eye ; they are deep cup-shaped, with a small circular aperture, supported by a horny ring, which is often armed with two or three sharp teeth, on one side.

The pen is pale yellow, thin and slender anteriorly, with two sublateral costæ, and with narrow, delicate margins, outside the costæ ; in the middle it becomes still thinner and narrower, with the margin inrolled ; beyond the middle, the margins become much wider, and then unite together ventrally, forming a long, hollow, conical portion, extending to the acute posterior tip ; this portion is not so broad as deep, and has a slight dorsal keel and a ventral groove ; the cavity is filled with a soft, gelatinous substance.

Color of body and arms, so far as it is preserved in alcohol, deep brownish orange : on the upper side of the back and caudal fin the color is better preserved, and shows small ocellated circular spots of orange-brown, with an inner circle of whitish, and a central spot of purplish brown. Similar spots also exist on the head and arms, and also on the lower side of the body, where the color is best preserved.

A considerable amount of a bright orange oily fluid, insoluble in alcohol, exuded from the viscera. Examined by means of the spectroscope, this fluid absorbed part of the green, all of the blue, and most of the violet rays. The stomach contained fragments of small Crustacea.

MEASUREMENTS IN MILLIMETERS.

	Male.	Male.
Total length, to end of sessile arms	137.	232.
Head and body combined	59.	122.
Length of body	46.	99.
Length of caudal fin, from origin	30.	60.
Breadth of caudal fin	42.	75.
Breadth of body	15.	23.
Length of dorsal arms	24.	45.
Length of 2d pair of arms	33.	60.
Length of 3d pair of arms	34.	60.

Length of ventral arms	80.	112.
Length of tentacular arms		312.
Breadth of dorsal arms, at base	3.	4.
Breadth of ventral arms	6.	7.
Breadth of tentacular arms	2.	4.
Diameter of eye	7.5	9.
Length of pen		198.
Breadth of pen anteriorly		2.25
Breadth of pen posteriorly		2.50
Depth of pen posteriorly		4.50

SPECIMENS EXAMINED.

No.	Stat.	Locality.	Fath.	When coll'd.	Specimens. No.	Specimens. Sex.
24	325,	N. Lat. 33° 35′ 20″, W. Long. 76°	647	1880	1	♂
25	328,	N. Lat. 34° 28′ 25″, W. Long. 75° 22′ 50″	1632	1880	1	♂

Chiroteuthis Bonplandi D'Orb. (?)

Loligopsis Bonplandi Verany, Acad. Turin, Ser. II. Vol. I. Pl. V. (specimen without tentacular arms, t. D'Orb.).

Chiroteuthis Bonplandi D'Orbigny, Céphal. Acétab., p. 226 (description compiled from Verany).

Plate III. Figs. 1–1b.

A detached tentacular arm, belonging to a species of Chiroteuthis, was taken at station 303, Lat 41° 34′ 30″, Long. 65° 54′ 30″, in 306 fathoms.

This arm is very long and slender; the length being 780 mm. (or over 30 inches); its diameter being from 1.5 to 2 mm., except near the base, where it is 3 mm., and at the terminal club, which is 6 mm. broad and 54 mm. long. The arm is white, with purplish specks, and is generally roundish, except at the club; along the greater part of its length there is a row of rather distant sessile suckers, the distance between them being usually from 12 to 18 mm.; these suckers are larger than those of the club, and have a nearly flat upper surface and no horny marginal rim. A row of small, simple, scattered pits, perhaps homologues of these suckers, extends up the back side of the club. These smooth suckers evidently serve to unite the tentacular arms together, when used in concert. The club is stouter than the rest of the arm, convex on both sides, and but little flattened; on each side it is bordered by a well-developed marginal membrane, supported by a series of transverse thickened, but flat, tapering muscular processes, with their ends projecting at the edge of the membrane, as digitations; on the distal half of the club these are separated by spaces greater than their breadth, but on the proximal portion they become forked and crowded close together, showing only narrow intervals or merely a groove between them. At the tip of the arm there is a thick, ovate, dark purple, spoon-shaped, hollow organ, about 4 mm. long, with its opening on the back side of the arm. This so strongly resembles the spoon-shaped organ of the hectocotylized arm of some Octopods as to suggest the possibility of a similar use, for sexual purposes. The suckers are crowded in 4 indistinct rows. Their pedicels are long and slender, having beyond the middle a large dark purple, fluted, swollen portion, beyond which the pedicel is more slender; the cup of the suckers is small and lateral, with a very oblique, horny rim, which is not denticulated.

Heteroteuthis tenera Verrill.

Amer. Jour. Sci., XX. p. 392, November, 1880; Proc. Nat. Mus., III. p. 360, 1880; Trans. Conn. Acad., V., Pl. XLVI. figs. 2–2 *d*, 3–3 *b*, 1881.

Plate III. Figs. 5, 5b. Plate VII. Figs. 2–2d, 3–3b.

A small and delicate species, very soft, translucent, and delicately colored when living.

Body short, cylindrical, scarcely twice as long as broad, posteriorly usually round, but in strongly contracted, preserved specimens, often narrowed and even obtusely pointed; front edge of mantle with a dorsal angle extending somewhat forward over the neck. Fins very large, thin, longer than broad, the outer edge broadly rounded, the anterior edge extending forward quite as far as the edge of the mantle, and considerably beyond the insertion of the fin, which is itself well forward. The length of the fin is about two thirds that of the body; the base or insertion of the fin equals about one half the body-length; the breadth of the fin is greater than one half the breadth of the body. Head large, rounded, with large and prominent eyes; lower eyelid slightly thickened. Arms rather small, unequal, the dorsal ones considerably shorter and smaller than the others. In the male the left dorsal arm is greatly modified, and very different from its mate. Lateral and ventral arms subequal. In both sexes, and even in the young, the suckers along the middle of the four lateral and two ventral arms are distinctly larger than the rest, but in the larger males this disparity becomes very remarkable, the middle suckers becoming greatly enlarged and swollen, so that eight to ten of the largest are often six or eight times as broad as the proximal and distal ones; they are deep, laterally attached, with a raised band around the middle, and a very small round aperture, furnished with a smooth rim. In the female the corresponding suckers are about twice as broad as the rest, on the lateral arms. The suckers are in two regular rows, on the lateral and ventral arms in both sexes. In the male, the left dorsal arm becomes thickened, and larger from front to back, and is usually curled backward; its suckers become smaller and much more numerous than on the right arm, being arranged in four crowded rows, except near the base, where there are but two; the sucker-stalks also become stout and cylindrical, or tapered, their diameter equalling that of the suckers. The right arm remains normal, with two alternating rows of suckers, regularly decreasing to the tip, as in both the dorsal arms of the female. Tentacular arms long, slender, extensible; club distinctly enlarged, usually curled in preserved examples. The suckers on the club are numerous, unequal, arranged in about eight close rows; those forming the two or three rows next the upper margin are much larger than the rest, being three or four times as broad, and have a row of small scale-like denticles around the rims.

Color, in life, pale and translucent, with scattered rosy chromatophores. In the alcoholic specimens, the general color of body, head, and arms is reddish, thickly spotted with rather large chromatophores, which also exist on the inner surface of the arms between the suckers, and to some extent on the tentacular arms and bases of the fins; outer part of fins translucent white; anterior edge of mantle with a white border.

Length of body 25 to 40 mm.

Pen small and very thin, soft, and delicate. It is angularly pointed or pen-shaped anteriorly, the shaft narrowing backward; a thin lanceolate expansion, or margin, extends along nearly the posterior half.

Upper jaw with a sharp strongly incurved beak, without a notch at its base. Lower jaw with the tip of the beak strongly incurved, and with a broad but prominent rounded lobe on the middle of its cutting edges.

Odontophore with simple, acute-triangular median teeth; inner laterals simple, nearly of the same size and shape as the median, except at base; outer laterals much longer, strongly curved forward.

Twenty-six specimens of this species were obtained, from six stations, ranging in depth from 71 to 233 fathoms. It was taken, later in the season, in great abundance, by the U. S. Fish Commission, off Newport, R. I., in 65 to 192 fathoms, and off the mouth of Chesapeake Bay, in November, by Lieut. Z. L. Tanner, on the "Fish Hawk," in 18 to 57 fathoms.

It is easily distinguished from the species of *Rossia* by the large size of the suckers along the middle of the lateral arms; by the inequality of the suckers on the tentacular clubs; and by the peculiar hectocotylized condition of the left dorsal arm of the male.

SPECIMENS EXAMINED.

No.	Stat.	Locality.	Fath.	When rec'd.	Specimens. No. and Sex.
17, 18	313,	off Charleston, S. C.	75	1880	7♂ 5♀
19	314,	N. Lat. 32° 24′, W. Long. 78° 44′	142	1880	2♂ 1♀
20	316,	N. Lat. 32° 7′, W. Long. 78° 37′ 30″	229	1880	1♀ jun.
21	321,	N. Lat. 32° 43′ 25″, W. Long. 77° 20′ 30″	233	1880	5♀
22	327,	N. Lat. 34° 0′ 30″, W. Long. 76° 10′ 30″	178	1880	1♂ 3♀
23	345,	N. Lat. 40° 10′ 15″, W. Long. 70° 4′ 30″	71	1880	1♀ jun.

Rossia sublevis Verrill.

Rossia sublevis Verrill, Amer. Jour. Sci., XVI. p. 209, 1878; XIX. p. 291, Pl. XV. fig. 3, 1880; Trans. Conn. Acad., V., Pl. XXX. fig. 2, Pl. XXXI. fig. 3.

Plate III. Fig. 2-4. Plate VII. Fig. 4.

Specimens of the female of this species are in the collection, showing that its range extends farther southward than has hitherto been known. It was also trawled in some numbers, and of both sexes, by the U. S. Fish Commission, this season, off Newport, R. I., in 155 to 365 fathoms ; and in November by Lieut. Z. L. Tanner, on the "Fish Hawk," off the mouth of Chesapeake Bay, in 157 fathoms.

It had previously been taken, by the dredging parties of the U. S. Fish Commission, in the trawl-net, at various localities, in 1877, 1878, and 1879, in 50 to 140 fathoms, off Massachusetts Bay, in Massachusetts Bay, off Cape Cod, off Cape Sable, N. S., and off Halifax. It has been brought in by the fishermen of Gloucester, Mass., from the banks off Nova Scotia and Newfoundland.

One of the specimens (No. 16) is a young female differing somewhat from the others in having the arms shorter, with the suckers more crowded, so that they apparently form more than two rows. Possibly this should be referred to *R. Hyatti* Verr. Its back is smooth. All three specimens differ somewhat from those taken farther north, in shallower water, in having larger eyes and shorter and stouter arms.

The males in this genus differ from the females in the relatively greater size of the suckers on the middle of the lateral and ventral arms, those toward the tips becoming abruptly smaller, while in the female they decrease more gradually (see Plate III. figs. 3, 4).

This species very closely resembles the *Rossia glaucopis* Lovén, of Northern Europe, as figured by G. O. Sars. The latter is, however, more papillose, and has smaller eyes and head, if correctly figured.

SPECIMENS EXAMINED.

No.	Stat.	Locality.	Fath.	When rec'd.	Specimens.
14	310,	N. Lat. 39° 59′ 16″, W. Long. 70° 18′ 30″	260	1880	1 ♀ ad.
15	320,	N. Lat. 32° 33′ 15″, W. Long. 77° 30′ 10″	257	1880	1 ♀ ad.
16	321,	N. Lat. 32° 43′ 25″, W. Long. 77° 20′ 30″	233	1880	? 1 ♀ jun.

Eledone verrucosa sp. nov.

Plates V. and VI.

A stout species covered above with prominent, rough, wart-like tubercles, and with a circle of the same around the eyes ; four or five of those above the eyes are larger and more prominent. Body thick, broad ovate, swollen beneath, moderately convex above, obtusely rounded posteriorly.

Male. Head as broad as the body, whole upper surface of body and head to base of arms covered with prominent and persistent, unequal warts, which are roughened by sharp conical papillæ, eight or ten on the larger warts, but only two or three on the smaller ones ; the warts diminish in size anteriorly, and on the sides, before they disappear ; around the eyes they form irregular circles ; just above each of the eyes there are two much larger ones, bearing more than twenty conical papillæ ; there is one before and one behind these of somewhat smaller size. Eyes large, the lower lid purple and thickened, overlapping the upper one, which is thin and whitish.

Arms considerably longer than the head and body, not very stout, compressed, bearing a single crowded row of large whitish suckers, which are mostly separated by spaces less than half their diameter, margins of suckers soft and much thickened. The three lower pairs of arms are very nearly equal in length and size; the dorsal ones are a little shorter and smaller. A thin web unites all the arms for about one fourth of their length, and runs up along their sides for about half their length. The male has the third right arm (Plate V. fig. 1) hectocotylized at the tip; the modified tip is preceded by 45 suckers, and is bordered ventrally by a broad membrane, having a white groove along its inner surface; the terminal organ (Fig. 1a) consists of a small, ovate-triangular, fleshy disk, with its inner surface slightly concave and finely wrinkled transversely, and terminating proximally in a small point.

Color dark purplish brown, darker purple beneath. Chromatophores small and densely crowded.

The female is considerably larger than the male, and has the warts over the back and around the eyes relatively smaller, but of the same character. The arms appear to be larger than those of the male, but this is probably due to the fact that the male has become more contracted by the stronger alcohol in which it was placed.

This female specimen illustrates well the uselessness of the attempts to divide the species of *Octopus* and allied genera into groups or sections according to the relative lengths of the arms, as J. E. Gray and others have done, for in this and many other cases the proportions of the arms of the right side would throw it into one section; those of the left side into another. The male would have to be put into a third section.

MEASUREMENTS IN MILLIMETERS.

	No. 12. Male.	No. 13. Female. Right side.	No. 13. Female. Left side.
Total length	202.	360.	
End of body to centre of eye	58.	100.	
Breadth of body	55.	65.	
Breadth across eyes	49.		
Length of dorsal arms, from mouth	135.	255.	260.
Length of 2d pair of arms	155.	260.	235.
Length of 3d pair of arms		225.	240.
Length of hectocotylized arm	130.		
Length of modified tip	4.5		
Length of ventral arms	145.	210.	225.
Greatest breadth of lateral arms	12.	18.	18.
Diameter of largest suckers	3.	5.	5.

SPECIMENS EXAMINED.

No.	Stat.	Locality.	Fath.	When rec'd.	Specimens No.	Specimens Sex.
12	305,	N. Lat. 41° 33′ 15″, W. Long. 65° 51′ 25′	810	1880	1	♂
13	312,	N. Lat. 39° 50′ 45″, W. Long. 70° 11′	466	1880	1	♀

Octopus Bairdii Verrill.

Octopus Bairdii Verrill, Amer. Jour. Sci., V. p. 5, Jan. 1873; XIX. p. 294, 1880.
American Naturalist, VII. p. 394, figs. 76, 77, 1873.
Am. Assoc. Adv. Sci. for 1876, p. 348, Pl. I., figs. 1, 2, 1874.
G. O. Sars, Mollusca Regionis Arcticæ Norvegiæ, p. 339, Pl. 33, figs. 1–10 (♀), Pl. XVII. figs. 8ª to 8ᵈ (dentition and jaws), 1878.
Tryon, Man. Conch., I. p. 116, Pl. XXXII. figs. 37, 38 (description and figures from the papers by A. E. V.).
Verrill, Trans. Conn. Acad., V., Pl. XXXIII. figs. 1, 1*a*; Pl. XXXIV. figs. 5, 6; Pl. XXXVI. fig. 10; Pl. XXXVIII. fig. 8; Pl. LI. figs. 1, 1*a*.

Plate II. Figs. 4, 4ª. Plate IV. Figs. 1, 1ª.

Several specimens of this species, agreeing with the ordinary northern form, are in the collection. They are mostly of small size.

This species proves to have a very extensive range, both geographically and in depth. It is one of the most common and characteristic inhabitants of the bottom, in 100 to 500 fathoms, along our entire coast, from South Carolina to Newfoundland. It was taken in the trawl, by the U. S. Fish Commission, in 1872, 1873, 1874, 1877, 1878, 1879, and 1880, in depths ranging from 50 to 500 fathoms, at numerous localities, from off Halifax, N. S. and the Bay of Fundy to the region 90 to 100 miles south of Newport, R. I., where it is common and of large size.

In November it was taken by Lieut. Z. L. Tanner, on the "Fish Hawk," off the mouth of Chesapeake Bay, in 157 to 300 fathoms.

The Gloucester fishermen have brought in many specimens from the banks, off Nova Scotia and Newfoundland.

Professor G. O. Sars has taken it, off the Norwegian coast, in 60 to 300 fathoms.

One of the specimens obtained by Mr. Agassiz is remarkable for the length and slenderness of the cirrus above the eyes (Plate IV. fig. 1). This is an immature male, and does not appear to differ in any other way from ordinary specimens of similar size. The appendage of the hectocotylized arm is small, and not fully developed (as is always the case in young males), and has an ovate-triangular form, slightly concave surface, and only a few transverse lamellæ.

SPECIMENS EXAMINED.

No.	Stat.	Locality.	Fath.	When rec'd.	Specimens. No. and Sex.
1	303,	N. Lat. 41° 34′ 30″, W. Long. 65° 54′ 30″	306	1880	1♂ (fig'd.)
2	332,	N. Lat. 35° 45′ 30″, W. Long. 74° 48″	263	1880	4♂ 1♀ jun.
3, 6	327,	N. Lat. 34° 0′ 30″, W. Long. 76° 10′ 30″	178	1880	1♂ 1♀
4	310,	N. Lat. 39° 59′ 16″, W. Long. 70° 18′ 30″	260	1880	1♂
5	336,	N. Lat. 38° 21′ 50″, W. Long. 73° 32″	197	1880	1♂ jun.
8	321,	N. Lat. 32° 43′ 25″, W. Long. 77° 20′ 30″	233	1880	1♂ 1♀ jun.
9	306,	N. Lat. 41° 32′ 50″, W. Lat. 65° 55′	524	1880	1♂ jun.

Octopus lentus Verrill.

Amer. Jour. Sci., XIX. pp. 138, 294, 1880 ; Trans. Conn. Acad., V., Pl. XXXV.

Plate IV. Fig. 2.

Male. Body depressed, rounded posteriorly, with only a trace of a lateral and posterior fold ; surface soft and nearly smooth, but showing a small number of minute white papillæ sparsely scattered over the dorsal surface. Cirrus above the eye small and simple, usually contracted into a small wart-like papilla. Head broad and flattened ; eyes large. Arms rather long and slender, with slender tapering tips, their bases united by a rather wide web. Suckers small, very prominent, forming two regular rows quite to the base.

The first two pairs of arms are nearly equal and somewhat longer than the two lower pairs, which differ but little between themselves. The hectocotylized arm (third of right side) bears thirty-five suckers, in two rows, and a remarkably large, terminal spoon-shaped organ, which occupies more than a third of the total length of the arm ; its sides are bent up and the edges inrolled, so as to form a deep cavity ; its outer end is broadly rounded laterally, and terminates in a central, narrow, acute lobe ; internally there are nine large, high, oblique lamellæ, with deep fossæ between them ; the proximal end has a large, acute, triangular lobe, with involute margins ; from this lobe a broad groove extends along the lower edge of the arm to the margin of the web ; where it terminates there is a distinct thickening of the bounding membrane.

Two males of this species are in the collection. They agree well in the peculiar characters and large size of the appendage of the hectocotylized arm. The females only were previously known. Although these males have a mere trace of the loose membranous fold of skin, along the sides and around the posterior end, so conspicuous in the original female specimen of this species, they agree so well in other characters that I unite them without much hesitation. It is probable that the presence or absence of the membranous fold, in this and other species, may be due merely to differences in the state of contraction when they die, or even to differences in the strength of the alcohol.

MEASUREMENTS IN MILLIMETERS.

	Right Side.	Left Side.
Total length	95.	
Posterior end to centre of eye	34.	
Eye to top of dorsal-arms	64.	
Breadth of body	28.	
Breadth of head	22.	
Length of dorsal arms, from mouth	65.	61.
" second pair "	61.	
" third " "		52.
" hectocotylized arm, from mouth	58.	
" fourth pair		53.
" spoon-shaped appendage	23.	
Breadth of the same	16.	

SPECIMENS EXAMINED.

No.	Stat.	Locality.	Fath.	When coll'd.	Specimens. No. and Sex.
7	326,	N. Lat. 33° 42′ 15″, W. Long. 76° 0′ 50″	464	1880	1♂ 1♀
10	329,	N. Lat. 34° 39′ 40″, W. Long. 75° 14′ 40″	603	1880	1♂ (fig'd.)

Octopus (?) sp.

Plate IV. Fig. 3.

Two detached and somewhat mutilated arms, with portions of a third arm and of the basal web of a large Octopod, were taken at Station 336, N. Lat. 38° 21′ 50″, W. Long. 73° 32′, in 197 fathoms.

The largest of these arms is 420 mm. long and 36 mm. broad. The suckers are large, prominent, subglobular, with a contracted aperture, and having a thin membrane around the outer margin. They form two alternating, rather distant rows, except near the base, where several that are somewhat smaller than those farther out stand nearly in one row with wide spaces between them. Diameter of largest suckers, 9 to 11 mm.; distance between their centres, 20 to 35 mm. Color, dark purple.

Additional Species dredged in the same Region by the U. S. Fish Commission Steamer "Fish Hawk."

In order to complete the list of Cephalopods from the region explored last season along the United States coast, descriptions and figures are here given of four remarkable additional species, obtained by the U. S. Fish Commission party, on the "Fish Hawk," Lieut. Z. L. Tanner, Commander. Some of these were also obtained by Lieut. Tanner on an independent trip, made, November 16th, to the region off the mouth of Chesapeake Bay.

CHELOTEUTHIS Verrill.

Trans. Conn. Acad., V. p. 292, Pl. XLIX., Jan. 1881.

Related to Enoploteuthis, Abralia, and Lestoteuthis, but with the armature of the tentacular arms more complicated than in either of these genera.

Sessile arms with sharp incurved claws arranged in four rows on the ventral arms, and in two rows on the other arms (absent on the distal portions).

Tentacular arms long, with broad clubs, strongly keeled on the outer side, distally, and with series of small connective suckers and tubercles extending for some distance along the inner surface of the arms. Tentacular club provided with a marginal series of larger connective suckers, alternating with rounded tubercles, along one margin; with a central row of unequal hooks, some of them very large; with subcentral groups of small, slender-pedicelled suckers (or hooks); with marginal series of small suckers; and with several rows of minute suckers covering the prolonged distal face of the club. Connective cartilages, on the base of the siphon, long-ovate; corresponding cartilages of the mantle simple longitudinal ridges. Radula with only five rows of teeth; median tooth tridentate; inner laterals absent; outer ones simple, acute.

Cheloteuthis rapax Verrill.

Plate III. Figs. 1 – 1^{f}.

Head large, with very large eyes; pupils round. The body is rather short and thick, tapering rapidly backward. The arms are long, and taper to slender tips; the dorsal ones are smaller and shorter than the others; the lateral and ventral pairs are nearly equal in length, and about as long as the mantle; the ventral arms are somewhat more slender than the lateral ones. All the arms appear to have borne slender-pedicelled, horny claws or hooks, with strongly incurved points, but only the fleshy parts of these are left, in most cases, and all are gone from the tips of the arms. On the ventral arms these hooks were smaller, and in four rows; the fleshy portion of these consists of a small rounded head, with lateral expansions on each side, and running up, on the outer side, into an incurved hood, or sheath for the horny claw. On the other arms the hooks were in two rows only, but they were much larger, though of similar form; in a few cases, on the lateral arms, the horny claws are left. These are strongly compressed, and deeply imbedded in the muscular sheath, so that only the sharp, strongly incurved point projects (Plate III. figs. 1^{c}, 1^{d}).

The tentacular arms (Fig. 1) are long and strong, their length being more than twice that of the sessile arms. The club is rather stout, long, decidedly expanded, and has an elevated, crest-like keel on the distal half of its outer surface; this keel rises abruptly, at its origin, and is colored on the outer side, but white on the face next to the inner surface of the club. The club is broadest near its base, the distal third is narrow and the tip rounded. The armature is remarkable; in the middle line there is a row of six medium-sized hooks (a''), followed by two much larger ones situated near the middle; these have lost their horny claws (Fig. 1, a, a'); series of minute, slender-pedicelled suckers run along the club, either side of the median line, and beyond the large hooks these rows unite and entirely cover the face of the distal third of the club, there forming about eight rows (Fig. 1, d); at the tip there is a circular group of minute suckers (d'); toward the base of the club, the lower edge is abruptly expanded and bears a row of five peculiar suckers (Fig. 1, e), having very thick basal processes, which are appressed and directed toward the central line of the club, bearing the suckers on their inner ends, attached by short pedicels; beyond these there is a triangular marginal group of slender-pedicelled suckers (Fig. 1, c) of about the same size; other rows of minute pedicelled suckers (or hooks) occupied the subcentral area, between the marginal ones and the central line, which is indicated by a strong white cord; the opposite margin of the club appears to have borne several rows of small suckers, but this part is badly injured.

A series of minute papillæ, apparently the remnants of suckers and rounded, alternating, connective tubercles (Fig. 1, e'), extends downward for more than half the length of the tentacular arm. The surface adjacent to them is, at first, crossed by transverse grooves or furrows ; but farther down the arm this modified surface is broader, and there may have been two or more series of suckers, which have been destroyed.

MEASUREMENTS IN MILLIMETERS.

Length of body	78	Breadth of tentacular arms	5
Length of dorsal arms	58	Breadth of lateral arms, at base	6
Length of 2d pair of arms	86	Breadth of dorsal arms	5
Length of 3d pair "	87	Diameter of eyeball	19
Length of ventral arms	85	Length of connective cartilages on siphon	14
Length of tentacular arms	225	Breadth of the same	4
Length of club	29		
Breadth of club	7		

A specimen of this remarkable squid, in bad condition, was taken from the stomach of a fish trawled at Station 893, in 372 fathoms, about 100 miles south of Newport, R. I. It was accompanied by a specimen of *Ommastrephes illecebrosus*, in a similar condition. It has lost its pen, its epidermis, and most of the horny hooks and sucker-rings ; the head is detached from the body, and the caudal fin is nearly destroyed ; the eyelids are gone, but the eyeballs remain. The description must, therefore, remain incomplete till other specimens can be obtained.

CALLITEUTHIS Verrill.

Amer. Jour. Sci., XX. p. 393, for Nov. 1880 (published Oct. 25) ; Proc. Nat. Mus., III. p. 362, 1880.

Body short, tapering to a small free tip ; fins small, united behind the tip of the body. Siphon united to the head by a pair of dorsal bands; not sunken in a furrow ; an internal valve. Mantle united to the sides of the siphon by simple, linear, longitudinal, lateral ridges, and corresponding connective cartilages on the sides of the siphon, which are long-ovate, with a raised margin all around. A dorsal elongated connective cartilage on the neck, opposite the pen. A pair of subdorsal muscular commissures within the mantle cavity. Arms long, not webbed ; suckers in two rows, largest on the middle of the lateral and dorsal arms ; horny rings of suckers smooth on most of the suckers, simply dentate on the distal ones. Eyes large, with rounded openings and thin, free lids. Buccal membrane simple, sac-like, with seven connective bridles. Internal anatomy of the female similar to that of Ommastrephes. Oviducts and nidamental glands symmetrically developed on the two sides. Pen broad, lanceolate, as in *Loligo*.

Calliteuthis reversa Verrill.

Amer. Jour. Sci., XX. p. 393, Nov. 1880; Proc. Nat. Mus., III. p. 362, 1880; Trans. Conn. Acad., V., p. 295, Pl. XLVI. figs. 1–1^b, Jan. 1881.

Plate VII. Figs. 1–1^b.

Female. Body rather short, tapering backward, subacute posteriorly; front edge of mantle advancing somewhat in the middle, and forming an obtuse angle; considerably emarginate beneath. Caudal fin small, short, thin, each half nearly semicircular, attached subdorsally, posterior end emarginate and free from the tip of the body, but not extending much beyond it. Head large, flattened above. Eyes very large, with simple, thin, free, circular lids, without any sinus. Openings of the ears, behind the eyes, minute, with a small, erect, clavate, fleshy process from the skin. Arms long, tapering, equal to the length of head and body combined; the lateral pairs are equal; the dorsal and ventral nearly equal, somewhat shorter than laterals; suckers deeper than broad, well rounded, laterally attached by slender pedicels; horny rings, with smooth circular, thin edges, except on the small suckers, toward the tips of the arms, in which the outer edge is divided into a number of small narrow, blunt teeth. On the ventral arms the suckers are much smaller; basal web rudimentary; a narrow, thin, simple membrane along each side, outside the suckers. Tentacular arms rather slender, compressed, smooth at base, the ends absent.

Color reddish brown. The ventral surface of the body, head, and arms is more ornamented than the dorsal surface, being covered with large, rounded verrucæ, their centre or anterior half pale; the border, or posterior half, dark purplish brown; upper surface of body with much fewer and smaller scattered verrucæ; a circle of the same around the eyes; inner surfaces of sessile arms and buccal membranes chocolate-brown, tentacular arms lighter; suckers pale yellow, with a light brown band. Caudal fin white, translucent. Iris, in the preserved specimens, brown. Gills with the free edge brown, and a brown line on the outer edges of all the laminæ. Total length to end of lateral arms, 133 mm.; to base of arms, 67 mm.; mantle, 51 mm.; length of fin, 17 mm.; breadth of fins, 24 mm.; of body, 20 mm.; diameter of eyeball, 16 mm.; length of dorsal arms, 58 mm.; of second pair, 67 mm.; of third pair, 68 mm.; of ventral pair, 60 mm.; breadth of dorsal arms at base, 5 mm.; of lateral, 6 mm.; diameter of largest suckers, 1.2 mm.

Dredged by the steamer "Fish Hawk," of the U. S. Fish Commission, at Station 894, about 100 miles south of Newport, R. I., N. Lat. 39° 53′, W. Long. 70° 58′ 30″, in 365 fathoms. One specimen only.

ALLOPOSUS Verrill.

Amer. Jour. Sci., XX. p. 393, Nov. 1880; Proc. Nat. Mus., III. p. 362, Dec. 1880.

Allied to Philonexis and Tremoctopus. Body thick and soft, smooth; arms (in the male only seven) united by a web extending nearly to the ends, the length of the arms decreasing from the dorsal to the ventral ones ; suckers sessile, simple, in two rows ; mantle united firmly to the head by a ventral and two lateral muscular commissures, the former placed in the median line, at the base of the siphon ; free end of the siphon short, well forward.

In the male the right arm of the third pair is hectocotylized, and developed in a sac in front of the right eye (Pl. VIII. figs. 1, 1, *a*) ; as found in the sac, it is curled up, and has two rows of suckers ; the groove along its edge is fringed ; near the end the groove connects with a rounded, obliquely placed, broad, flat or slightly concave lateral lobe, with transverse wrinkles or plications on the inner surface ; the terminal portion of the arm is a long-fusiform smooth process.

The permanent attachment of the mantle to the siphon, by means of commissures, is a very distinctive character.

Alloposus mollis Verrill.

Amer. Jour. Sci., XX. p. 394, Nov. 1880 ; Proc. Nat. Mus., III. p. 363, 1880 ; Trans. Conn. Acad., V., Pl. L. figs. 1, 1 *a*, 2, 2 *a* ; Pl. LI. fig. 4.

Plate IV. Fig. 4. Plate VIII. Figs. 1, 1a, 2, 2a.

Body stout, ovate, very soft and flabby. Head large, as broad as the body; eyes large, their openings small. Arms rather stout, not very long, webbed nearly to the ends, the dorsal much longer than the ventral arms ; suckers large, simple, in two alternating rows. Color deep purplish brown, with a more or less distinctly spotted appearance. Total length of a medium-sized specimen, 160 mm. ; of body, to base of arms, 90 mm. ; of mantle beneath, 50 mm. ; of dorsal arms, 70 mm. ; breadth of body, 70 mm. Other specimens are about one third larger. The sexes scarcely differ in size.

One mature, detached, hectocotylized arm (Pl. IV. fig. 4) was taken, November 16. This has two rows of large six- or seven-lobed suckers, a very long fringe composed of thin flat lacerate processes along each side ; the terminal process is fusiform, acute, and loosely covered with a thin, translucent membrane, beneath which the inner surface, bearing chromatophores, can be seen. Length of this arm, 200 mm. ; its breadth, 20 mm. ; length of terminal process, 30 mm. ; its diameter, 7 mm. ; diameter of largest suckers, 6 mm. ; length of fringe, 15 mm.

Taken by the "Fish Hawk," at Stations 880, 892, 893, 895, about 100 to 115 miles south of Newport, R. I., in 225 to 487 fathoms. Also off the mouth of Chesapeake Bay, at station 898, Nov. 16, in 300 fathoms.

Argonauta argo Linné

Shells of this species, some of them entire, were taken by the "Fish Hawk" at several of the stations 70 to 115 miles south of Martha's Vineyard and Newport, R. I., in 64 to 365 fathoms. At least eight specimens were dredged.

EXPLANATION OF PLATES.

PLATE I.

Fig. 1. *Mastigoteuthis Agassizii* (sp. nov.). Dorsal view, slightly enlarged.

PLATE II.

Fig. 1. *Cheloteuthis rapax* Verr. Club of tentacular arm, front view, enlarged two diameters. The horny hooks are lost from the large claws, *a, a′, a″*; *b*, small hooks (or suckers); *c*, suckers; *d, d′*, small suckers of distal portion; *e e′*, connective suckers and tubercles.

Fig. 1ª. The same. One of the suckers corresponding to *c* of Fig. 1, front view, much enlarged.

Fig. 1ᵇ. The same. A small sucker, corresponding to *d* of Fig. 1.

Fig. 1ᶜ, 1ᵈ. The same. Front and side views of one of the claws, with its enclosed horny hook or "nail," from the middle of a lateral arm, enlarged eight diameters.

Fig. 1ᵉ. The same. Connective cartilage from base of mantle, front view, enlarged two diameters.

Fig. 1ᶠ. The same. Beak and pharynx, side view, enlarged two diameters.

Fig. 2. *Mastigoteuthis Agassizii* Verr. Front view of the beak, buccal membranes (*b, d*), and bases of the arms, enlarged two diameters.

Fig. 3ª. The same. Side view of head, siphon, and anterior part of mantle, showing the cartilage (*c*), on the inner surface of the mantle, which interlocks with *c′* on the base of the siphon; *e*, the ear; *p*, the aquiferous pore; *s*, siphon; *t a*, base of tentacular arms; 1, 2, 3, 4, bases of corresponding pairs of arms.

Fig. 3ᵇ. The same. Pen, ventral view, enlarged two diameters.

Fig. 3ᶜ. The same. Side view.

Fig. 3ᵈ. The same. Portion from near the end of one of the tentacular arms, enlarged sixteen diameters.

Fig. 3ᵉ. The same. Suckers from the tentacular arm much enlarged: *a*, side view; *a′* and *a″*, front views.

Fig. 3ᶠ. The same. One of the suckers from the middle of a lateral arm, front view, much enlarged.

Fig. 4. *Octopus Bairdii* Verr. Portion of odontophore, much enlarged.

Fig. 4ª. The same. Jaws; *s*, superior; *i*, inferior mandibles, enlarged two diameters.

PLATE III.

Fig. 1. *Chiroteuthis Bonplandi?* One of the tentacular arms, outer side, natural size.

Fig. 1ª. The same. Front view of club, enlarged two diameters.

Fig. 1^b. The same. One of the suckers, enlarged.
Fig. 2. *Rossia sublevis, var.* Verr. ♀ Dorsal view, natural size.
Fig. 2^a. The same. One of the suckers of the tentacular club, side view, much enlarged.
Fig. 2^b. The same. Edge of the same sucker more enlarged.
Fig. 3. The same. Arm of third pair, from another female example, enlarged two diameters.
Fig. 4. The same. Corresponding arm of the male.
Fig. 5. *Heteroteuthis tenera* Verr. Dorsal view of male, enlarged two diameters.
Fig. 5^a. The same. One of the larger marginal suckers of the tentacular club, front view, much enlarged.
Fig. 5^b. The same. Portion of the margin of the sucker, more enlarged, to show the scales.

PLATE IV.

Fig. 1. *Octopus Bairdii, var.* Verr. Side view of young male, enlarged about two diameters.
Fig. 1^a. The same. Terminal appendage of the hectocotylized arm.
Fig. 2. *Octopus lentus* Verr. Side view of male, enlarged about two diameters.
Fig. 3. *Octopus ?* Portion of an arm, with suckers, from near the base, natural size.
Fig. 4. *Alloposus mollis* Verr. Terminal portion of a mature hectocotylized arm, natural size.

PLATE V.

Fig. 1. *Eledone verrucosa* sp. nov. Side view of male, natural size.
Fig. 1^a. The same. Distal portion of the hectocotylized arm, to edge of basal web, showing the terminal appendage and the lateral groove.

PLATE VI.

Fig. 1. *Eledone verrucosa* sp. nov. Dorsal view of the male, natural size.

PLATE VII.

Fig. 1. *Calliteuthis reversa* Verr. Ventral view, natural size.
Fig. 1^a. The same. Beak, buccal membranes and base of arms, front view, natural size.
Fig. 1^b. The same. One of the larger suckers from a lateral arm, much enlarged.
Fig. 2. *Heteroteuthis tenera* Verr. Dorsal view of female, enlarged two diameters.
Fig. 2^a. The same. Tentacular club, enlarged four diameters.
Fig. 2^b. The same. Pen, enlarged four diameters.
Fig. 2^c. The same. Jaws, side view, enlarged four diameters; *a*, superior; *b*, inferior mandible.
Fig. 2^d. The same. Part of the odontophore, much enlarged.
Fig. 3. The same. Front view of male, enlarged two diameters.
Figs. 3^a, 3^b. The same. Front and side views of one of the suckers of the lateral arms of the same specimen.

Fig. 4. *Rossia sublevis* Verr. Pen from ♀ (see Plate III. fig. 2), enlarged four diameters.

Fig. 5. *Rossia Hyatti* Verr. ♀ Suckers, enlarged fifteen diameters; *a*, one of the largest from third pair of arms, side view; *b*, *c*, two forms of suckers from tentacular club.

Fig. 6. *Rossia megaptera* Verr. ♀ Suckers, enlarged fifteen diameters; *a*, front view of one of the largest from third pair of arms; *b*, *c*, *d*, three suckers from the tentacular club.

PLATE VIII.

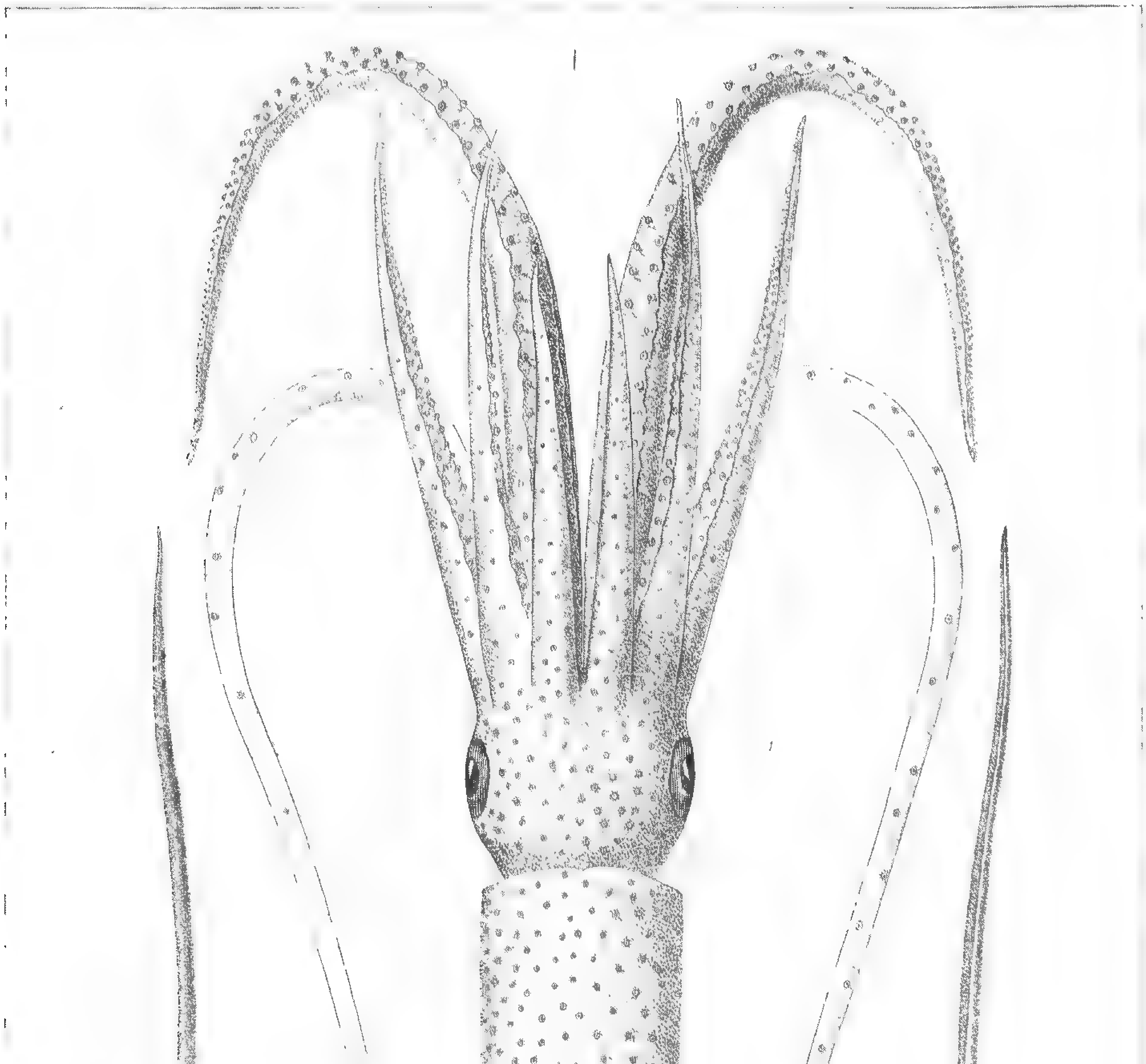
Fig. 1. *Alloposus mollis* Verr. ♂ Side view, showing the sac containing the hectocotylized arm, cut open, so as to expose the partially developed arm. One half natural size.

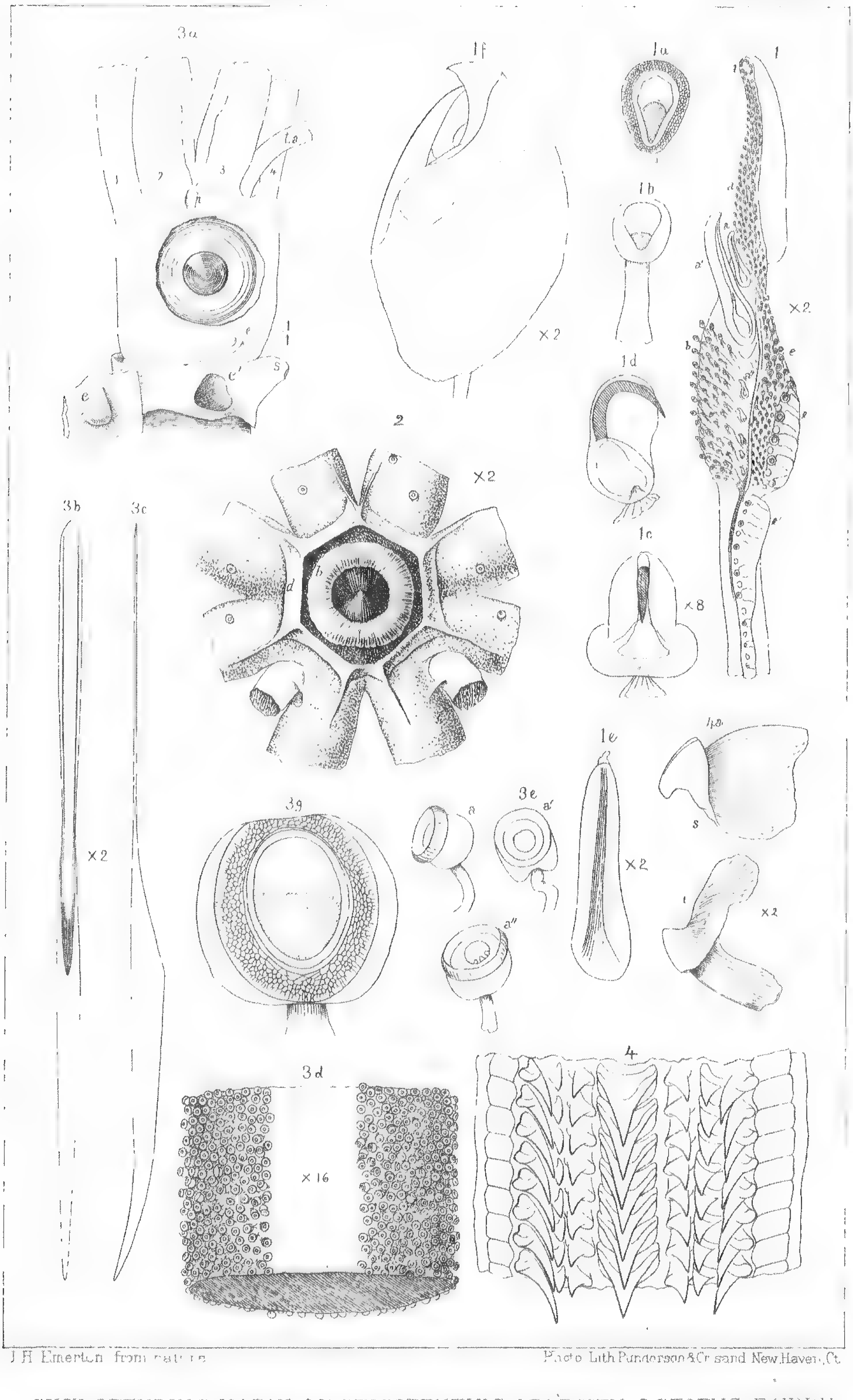
Fig. 1ª. The same. Hectocotylized arm removed from the sac, enlarged two diameters.

Fig. 2. The same. ♀ Ventral view, one half natural size.

Fig. 2ª. The same. ♀ Dorsal view, one half natural size.

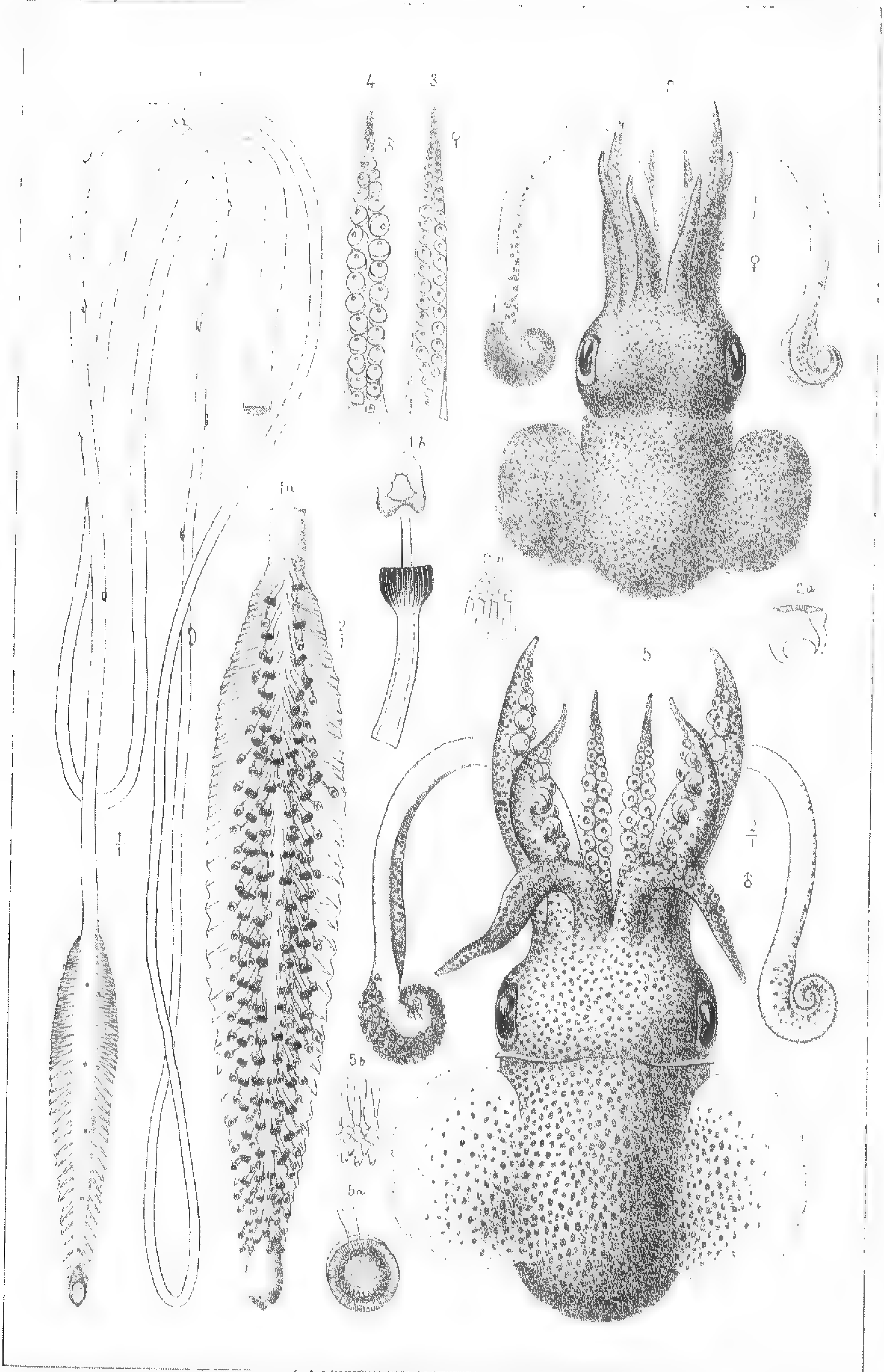
March, 1881.





J. H. Emerton from nature. Photo. Lith. Punderson & Crisand, New Haven, Ct.

CHELOTEUTHIS RAPAX. MASTIGOTEUTHIS AGASSIZII. OCTOPUS PAIRII.



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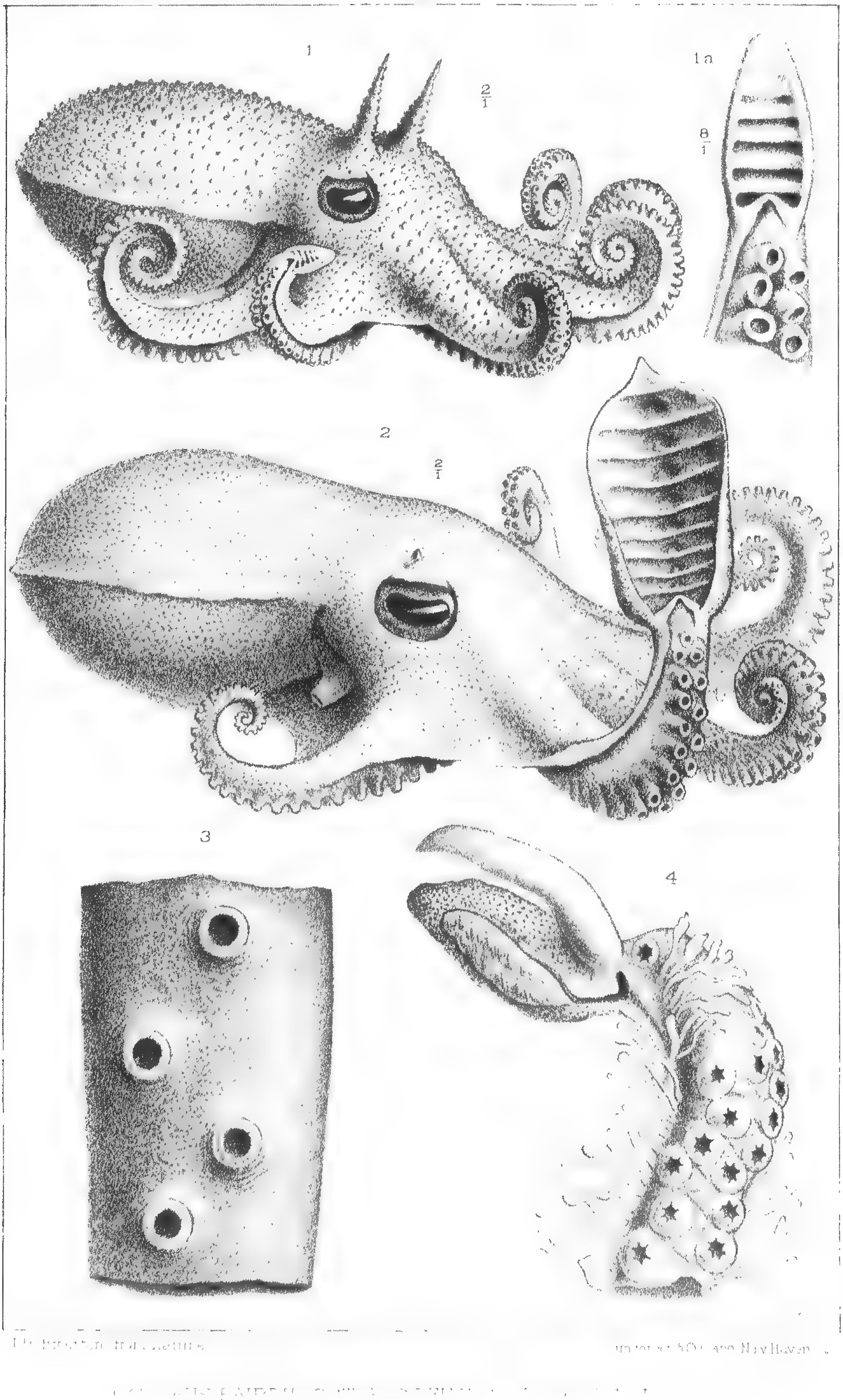
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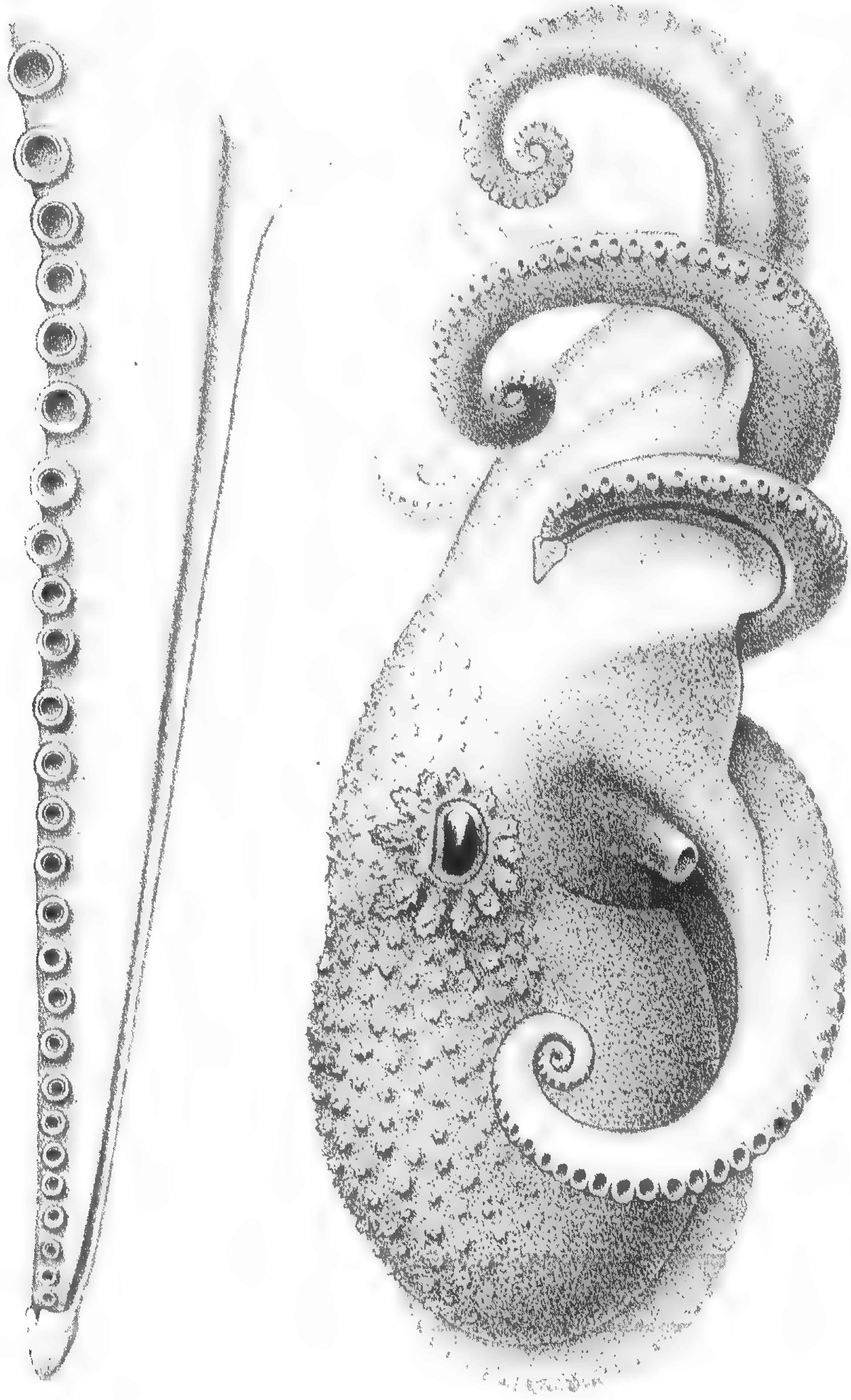

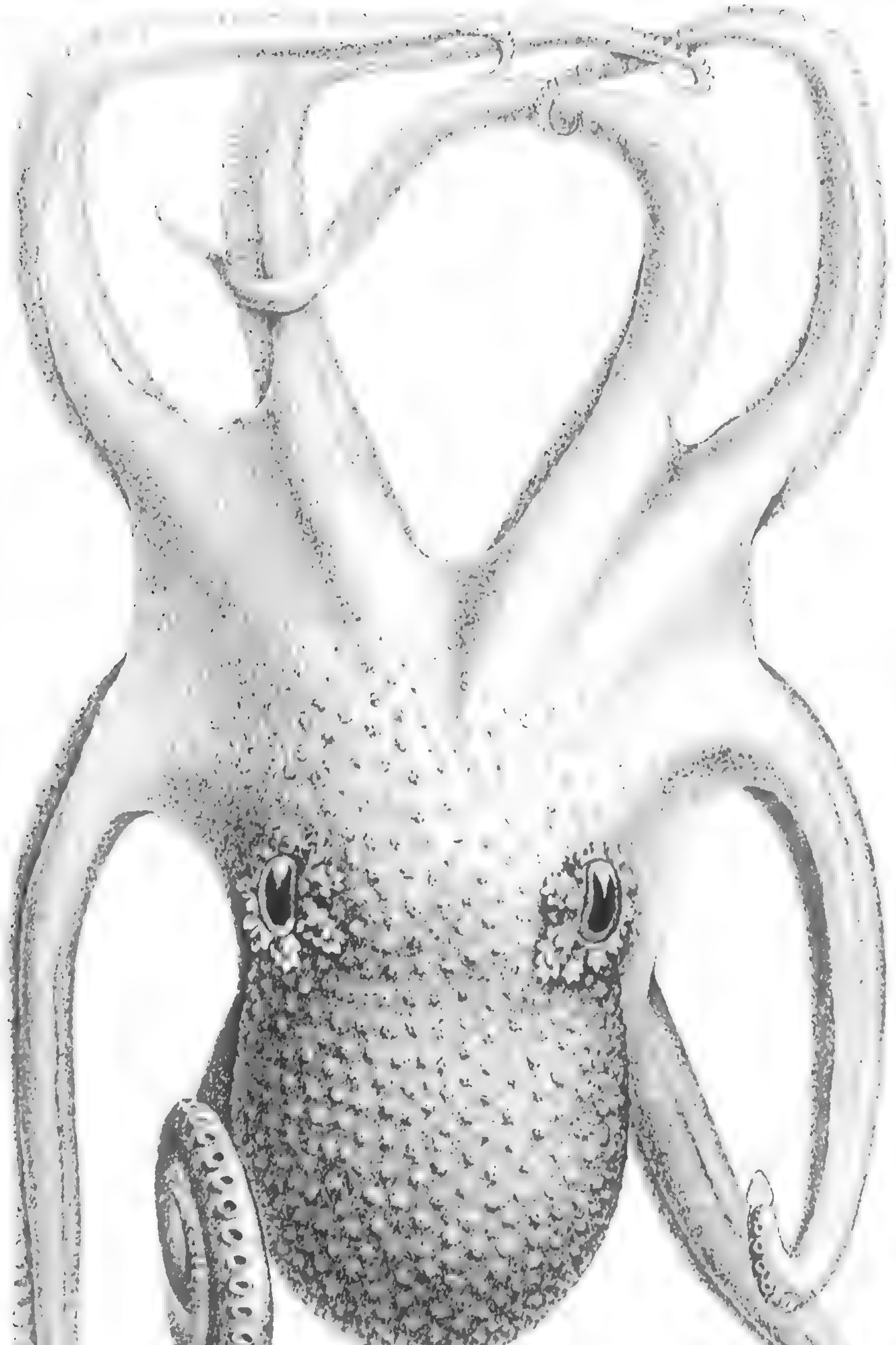

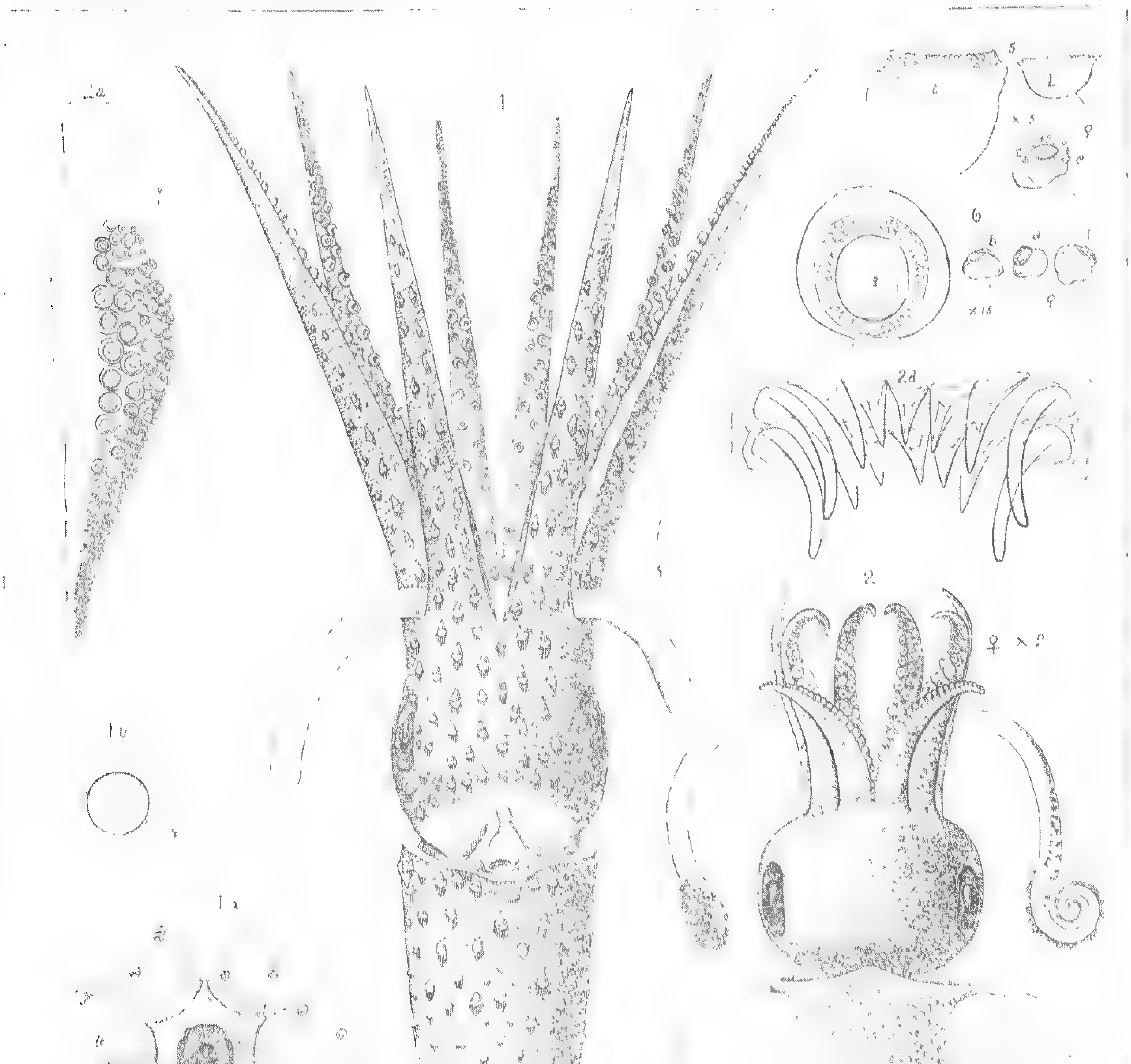
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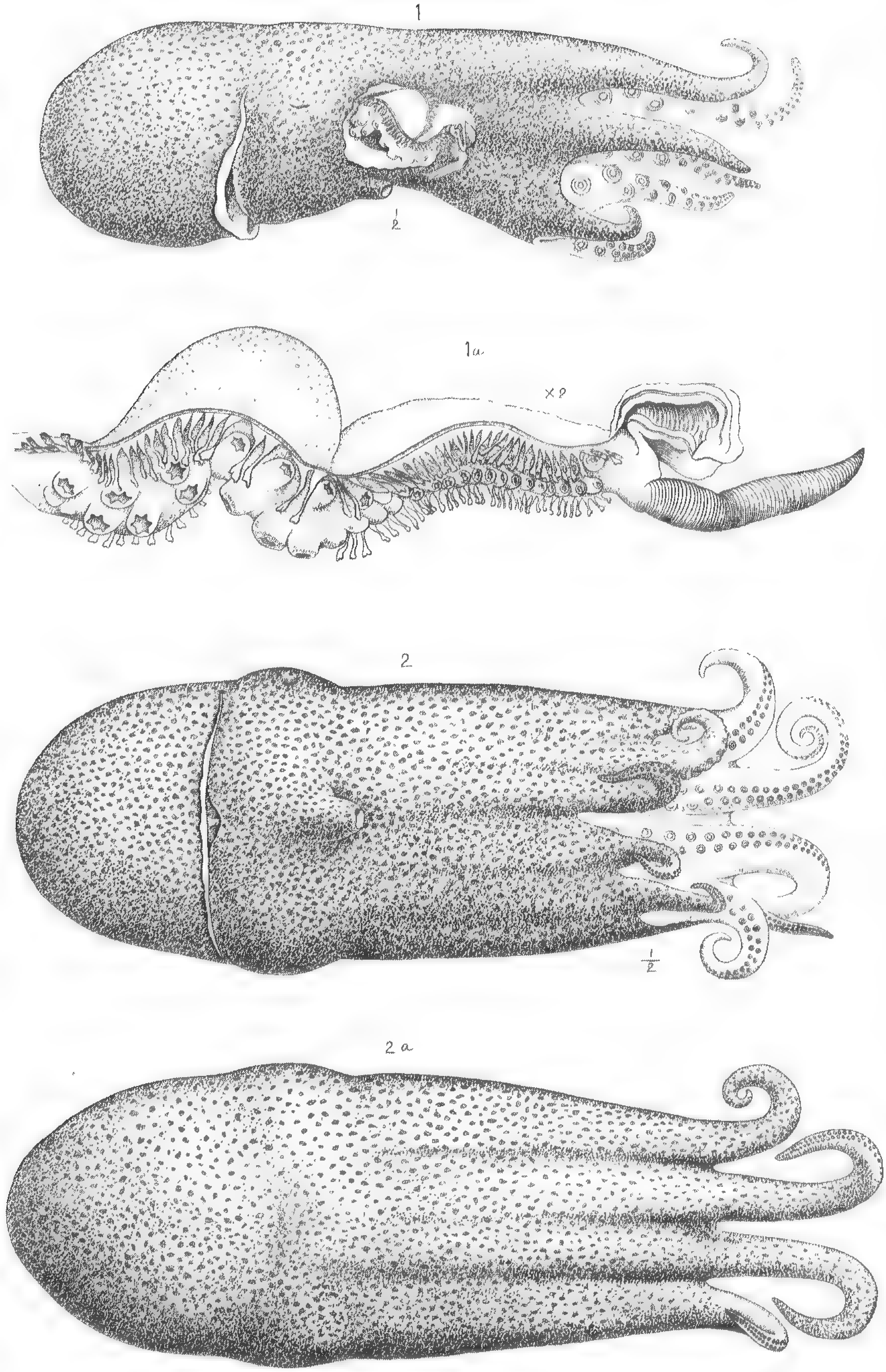

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ALLOPOSUS MOLLIS VERRILL.

No. 6. — *The Stomach and Genital Organs of Astrophytidæ.*
By Theodore Lyman.

(Published by Permission of the Lords Commissioners of the Treasury, and of the Hon. C. P. Patterson, Supt. U. S. Coast Survey.)

In typical Ophiurans, the mouth, just above the teeth, opens by a round contractile aperture (the stomach-sphincter) into a large flattened sack (the stomach), which spreads over the bases of the arms and into the interbrachial spaces. This stomach is commonly separated by a greater or less space from the outer disk-wall, to which it is suspended by delicate threads. Although sometimes a little wrinkled or pleated, it is usually simple, and destitute of pouches, convolutions, or cœcal appendages. Such is the form that runs through the whole series of true Ophiurans, so far as I know them, not excepting the archaic Ophiomusium. Between the stomach and the disk-wall lie the reproductive organs. Proceeding inward from a genital opening there is, first, an elongated bag (*bursa*, Ludwig), which is a fold or bubble of the lining membrane, and which, by minute holes, communicates with other little bags, simple or contorted, the egg- or spermatozoa-bearing tubes (*ovarial Schläuche*). It will be noted that these bursæ, as Ludwig has shown,* are *closed sacks*, having no communication with the body-cavity, and in this respect hold the same relation to the genital openings that the stomach holds to the mouth.

A similar structure might reasonably have been looked for among the Astrophytons, which, despite their curiously branching arms having special joints and a peculiar covering, are, especially in the young stage, very closely allied to the Ophiurans. Indeed Ophiuridæ are in some sort connected with Astrophytidæ, albeit in no straight or unbroken line, by such genera as Ophiomyxa, Ophiochondrus, Hemieuryale, Astroschema, Astrogomphus, and Astrocnida.

When, therefore, I made a first section of a fine Gorgonocephalus Pourtalesii, brought back by the "Challenger," and whose swollen disk indicated a gravid individual, I expected to find a general arrangement of organs quite similar to that already known in such genera as Ophio-

* Hubert Ludwig: Beiträge zur Anatomie der Ophiuren. Zeitschr. für Wissenschaftl. Zoologie, Bd. XXXI., 1878.

myxa. My astonishment was considerable when there was brought to light an internal economy which reminded one rather of an orange than of an Echinoderm. A horizontal cut, just above the joint of the radial shields, disclosed a quantity of membranous partitions stuffed with a sort of pulp and radiating in a confused manner; while a vertical section showed a cavity, which might be the stomach, surrounded by and communicating with a number of convolutions or blind-sacks. The matter became clear only by giving up the idea that a strict correspondence with known forms was to be looked for.

Passing upward through the mouth of a Gorgonocephalus, and getting above the mouth-papillæ, *d* (Plate I. fig. 1), and tentacles, *r*, we come to the usual contractile aperture, which may well be called the stomach-sphincter, *d u*. It is considerably wrinkled, or even a little papillose on its border, and opens into a flattened cavity, the stomach, *St.* Thus far, the structure is normal, but beyond this point all is novel. Instead of remaining simple, the stomach passes outward and upward into a number of membranous pouches, which, in profile, present a fluted aspect, *St′*, *St″*. Their outer ends are attached in three ways; first, *St″*, they stretch upwards and are strongly fixed to the roof of the disk-wall; secondly, they reach horizontally and grow to the inner points of the egg-bearing lobes, δ, δ; thirdly, they incline downwards, and are powerfully attached at ten points encircling the mouth. Of these points five are brachial, *St′* (Fig. 2); and five interbrachial, *St.* It is to the outer open angle of the mouth-frames that the latter are attached, by a part of the floor of the stomach, which is there much thickened, δ*f* (Fig. 1). Immediately above this attachment opens out the much folded and fluted interbrachial stomach-pouch, *St″* (Fig. 2), which, at its outer end, adheres to the inner points of the corresponding genital lobes; and, above, grows fast to the roof of the disk. In like manner there is a brachial attachment to the upper side of each arm, *St′*; and above it opens a brachial stomach-pouch which has a similar shape, and is made fast at corresponding places. From these ten points the attachment of the stomach-floor is continued outward over radiating lines, respectively across the interbrachial spaces and along the tops of the arms, quite to the body-wall. This structure would divide the body-cavity in ten radiating compartments *completely separated from each other*, were it not that an open space exists between the inner point of each attachment and the stomach-sphincter, δ*f* (Fig. 1). This open space corresponds to the ring-canal surrounding the entrance to the stomach of Ophiurans (*inner perihæmal canal*, Ludwig), but differs in being a mere continuation of the body-cavity, and not a closed annular tube. It may be seen in wider section in Fig. 2. The main stomach, directly above its own centre, passes upward to the roof of the disk as a simple cone, round which appear the folds of the radiating pouches (Fig. 1). To give a general notion of this complex organ, we may suppose a large loose bag, having a hole at the bottom (mouth), and whose periphery is gathered in numerous radiating folds, leaving, within, a central flask-shaped open space communicating directly with these folds; and, further, that the folds are divided into ten lobes, and each lobe is attached at the bottom by a radiating adhesion.

The central cavity of the stomach was empty, but its lobes were stuffed with a coagulated, yellowish, pasty substance, which, either simple or with reagents, presented no special structure under the microscope, and which contained no organic remains.

The ovaries consist of deep, lobed and contorted folds of the lining membrane of the disk-wall on its floor, sides, and a portion of its roof. These folds are crammed with egg-clusters, so as to resemble puddings or sausages (Figs. 1 and 3, δ, δ); and, whatever their form, all end by adhering at their inner margins to the outer ends of the corresponding stomach-pouches, whose basal lines of adhesion they also continue along the arms, and along the median line of each interbrachial space. As has been said before, the body-cavity is thus divided into ten radiating compartments freely communicating at their inner ends by large holes through the partitions. A genital opening enters each of the compartments (Fig. 3, *n o*). Gorgonocephalus, therefore, has no closed bursa, with its cluster of genital tubes, but the *entire body-cavity*, except the open (perihæmal) ring outside the mouth, is also the *genital cavity*. It was a similar arrangement that the older anatomists attributed to Ophiurans; and it is strange that their observations were true only of genera they had never dissected.

As to internal composition, the ovarial lobes are uniform, and everywhere contain, under a thin, membranous envelope, crowded masses of egg-clusters averaging about 1 mm. in length, and separated from each other by delicate membranous partitions (Fig. 4). The eggs which compose each cluster are round, and about $\frac{1}{7}$ of a mm. in diameter. The general envelope, as may be seen in the figure, becomes thicker at the free margin, and especially so at points where it grows to the stomach-pouches. Its function of supporting the stomach points to its homology with those slender threads that suspend the Ophiuran stomach to the body-wall. I was not able to detect on the surface of the ovarial lobes any pores for the egress of eggs, such as exist in the bursa of Ophiurans. It is therefore probable that the membrane ruptures at the breeding season, and the eggs are poured into the radiating compartments of the body-cavity. Here the sea-water might bring in spermatozoa for impregnation, after which the eggs of any compartment could be discharged through any one of the ten genital openings.

The chief difference between these organs in Gorgonocephalus and among Ophiurans is the greater specialization in the latter, where the lining membrane of the disk-wall becomes free, and enlarges opposite each genital opening into a closed pouch (bursa), which is extended in the form of finger-like tubes (ovarial tubes). In other words, the lining membrane, instead of being pierced by the genital opening, is continuous and simply becomes free and voluminous. In Gorgonocephalus, on the contrary, the genital opening pierces not only the disk-wall, but its lining membrane, and enters the body-cavity, while nearly the whole of the lining membrane takes on the egg-bearing function, and by the growth of the eggs is gradually stretched and thrown into folded lobes.

A section of a Euryale (Fig. 5) will show the different aspect of a non-gravid individual, whose stomach pouches are nearly empty, instead of being stuffed with the clotted substance already mentioned. Above is seen the stomach, which, on the right and left, passes into pouches, *St'*; and similar partitions, forming pouches, may be seen on the farther side of the centre. Above the lateral pouches are the radial shields, *l, l*, cut through. On the extreme right and left are greatly dilated genital openings, *n o*, which lead directly into the body-cavity; and this, passing under and outside the stomach, is connected, about the mouth, by the perihæmal canal, a cross-cut of which appears at δf. A section of the disk-skin, above the body-cavity, exhibited a uniform, tough, slightly fibrous texture, with a thin lining membrane, not well defined, and of a granular texture under a high power indicating perhaps egg-cells. Of fully formed eggs, however, there were none, and the lining membrane was not thrown into lobes or convolutions. If, however, the ovaries were distended and the stomach-pouches filled with matter, the general appearance would approach that of Gorgonocephalus, except that the stomach-pouches would be simpler; and the ovaries would be much more restricted in area, unless indeed the lining membrane of the body-cavity to which the stomach-wall adheres has the power to develop egg-clusters, and thus form lobes, and push the stomach inward towards the mouth.

It will be noticed that the genital openings are greatly distended, which shows that the animal can contract or expand them; since, in other specimens, they were tightly shut and reduced to a small slit. The attachments of the stomach to the inner open angle of the mouth-frames are not so thick and muscular as in Gorgonocephalus, so that the perihæmal canal is flattened, instead of more or less erect and rounded. Nevertheless there are the same ten radiating attachments respectively along the tops of the arms and the middle of the interbrachial spaces, dividing the body-cavity into ten compartments, which freely communicate at their inner ends by the perihæmal canal. In the lining membrane of these compartments were found numerous fragments of microscopic lime network similar to that which exists in the walls of the bursa of Ophiura lævis and Ophiocoma scolopendrina (Ludwig, *loc. cit.*, Figs. 27, 28). It is these that, by their further growth, make the thin scales which clothe the wall of the bursa in Ophiothamnus vicarius.

A section of a species from an allied genus, Astrophyton costosum, showed a general structure very like that of Gorgonocephalus; but, on passing from the true Astrophytons, a decided anatomical change was at once manifest.

A specimen of the rare Astrocnida isidis, from the "Blake" dredgings, afforded a chance to examine a branching star, like Astrogomphus in outward appearance, but resembling Trichaster in its few and widely spaced arm-forks. On making a vertical section (Plate II. fig. 6), a curious and quasi intermediate structure was exposed. The stomach recalled Gorgonocephalus in that it was more or less pleated and pouched (*St′*), and was firmly attached to the roof of the disk-wall; but it was Ophiuroid in being entirely free below, and partly so on its sides, having no radiating lines of attachment, either along the arms, or in the interbrachial spaces. The only vestige of such attachments was a stout septum, such as is found in Ophiurans, lying outside the wall of the mouth-sphincter, *d u*, and thus forming a *closed* ring-tube (inner perihæmal canal). It may more properly be called an adhesion of the floor of the stomach to the wall of the mouth, where they are doubled over each other. Between the upper side of the stomach and the disk-wall, and on top and on either side of each arm, lie the ovaries, δ, which consist of almost separated ovoid egg-clusters, rather more than 1 mm. in length, containing round eggs about .2 mm. in diameter. They are not connected with or surrounded by any bursa, but lie directly in the body cavity, into which penetrate the genital openings. The genital organs are therefore strictly of an Astrophyton type, and discharge their products into the body-cavity, which is continuous and uninterrupted by radiating partitions.

Astrogomphus might very well be called an Astrocnida whose arms do not fork; and we should expect a genus so closely allied to have a similar internal structure. And so it is. The arrangement of the organs of digestion and reproduction is entirely comparable, except that the folds of the stomach are less complex and numerous.

Ophiocreas œdipus brings us a long step nearer the true Ophiurans. An opening, somewhat inclined from the vertical, through the base of an arm and the outer corner of the disk, is sketched in Fig. 7. The integument of the arm, cut through on the side, is lifted and thrown back, while the side of the disk is wholly cut away. Above the arm-bones, at the base of the arm, lie the double-lobed spermaries, δ, δ, long, cylindrical, smooth bodies, a little curved, and tapering at each end. On the opposite side of the arm lies a corresponding pair. The genital opening, *n o*, enters a spermatic pouch, or bursa, separated from the body-cavity, as in Ophiurans. An extension of the lining membrane of this bursa encloses the spermatic lobes, δ, δ, which discharge into it by a pore at their inner end. I have already remarked (Bull. Mus. Comp. Zoöl., VI. 2, p. 66) that the ovaries of this species lay in the same position, at the base of the arm. I made, however, a mistake as to the "large eggs which are about .7 mm. long." They are not eggs, but *clusters* of eggs, each wrapped in its membrane and comparable to those of Astrogomphus. The position of the genital organs, though curious, is not so exceptional as might at first appear. Among true Ophiurans, the space between the stomach and the sides and roof of the disk-wall is crammed with these organs when gravid. In Ophiocreas, however, not only is the disk small, but its body-cavity is limited to the perihæmal canal and to a sinus over each arm. Everywhere else the stomach adheres to the body-wall; therefore the genital organs are, as it were, forced into the space between the skin of the arm and the arm-bones.

The dissection of a female Ophiocreas (an undescribed species from the "Blake" dredgings) demonstrated the homology of the genital organs with those of Ophiurans. There were two long lobes, or tubular membranous bags, on either side of the upper surface of the arm. These were in process of discharging their eggs, which takes place by the breaking up of the egg-clusters and the passage of the eggs to the inner end of the bag, where they go, through a pore, into the bursa, which is merely a lobed indentation of the disk-wall, and is even somewhat colored on the inside. In that respect it is not quite like the bursa of most Ophiurans, which is composed of the lining membrane, or layer, of the body-wall.

The spermatozoa of Ophiocreas œdipus after their long immersion in alcohol, were doubtless much altered. Strongly magnified, they resembled little translucent grains of boiled sago, but showed no projection or ciliary tail.

In Fig. 7 the floor of the stomach, *St*, *St*, is slit to expose the spermatic pouch, so that the lower portion is separated from the upper one, which lies under the radial shield, *l*, and whose roof grows closely to the disk-wall, as in Astrophytons. It also adheres, as mentioned above, to the interbrachial floor of the disk-wall. Indeed, it is scarcely free at any point save a space along the top of the arm, which forms an oblong sinus. The interior of the stomach is lightly marked by radiating pleats, and there are also five pairs of strong radiating ridges, a pair over each arm, which form partial partitions.

These brief observations show that Astrocnida, and behind it Astrogomphus, is nearest in relationship to the true Astrophytons. Not only does the arm-covering, with its double rings of minute hooks, shadow forth an affinity, but the internal structure, with a pouched stomach, and ovaries lying free in the general body-cavity, is similar; while the want of adhesions on the under side of the stomach and the closed ring-tube about the mouth remind us of the Ophiurans. But, in reaching after some form which may bridge the way to these last, we find, as generally happens in the animal kingdom, no piece that will fit. Ophiocreas, which is properly a simple-armed Astrophyton, is not *intermediate.* It is a *synthetic* form. It has the teeth of Euryale, the pleated stomach suggestive of Gorgonocephalus, the genital bursa and ovarial tubes similar to, yet not the same as, those of Ophiurans in general, the arm-plates that recall Ophiomyxa; nay, one Astrophyton character, the adhesion of the stomach to the disk-wall, is carried farther than in Astrophyton itself.

In conclusion, it is proper to suggest a slight resemblance which the branching Astrophytidæ have to the order of Starfishes. This is in the stomach-pouches filled with a clotted matter, which suggest the varied cœcal appendages characteristic of different genera among Asteroidea.

DESCRIPTION OF PLATES.

PLATE I.

Fig. 1. $\frac{2}{1}$. Vertical cross-cut through a part of the disk of a female Gorgonocephalus Pourtalesii, and through one arm not quite parallel to its axis, exposing a section of the mouth-frame, *f*, and of the arm-bones, *w′*: — *r*, mouth-tentacles; *d*, mouth-papillæ; *d u*, mouth-sphincter, above which is the passage into the stomach, *St*, whose floor has a stout attachment to the open angle of the mouth frames, leaving a large ring, δf, which gives free communication between the radiating compartments of the body-cavity. Above and beyond the cavity of the stomach are the stomach-pouches, *St′*, *St″*, which are attached at their outer ends to the roof of the disk-wall, and to the inner points of the ovarial lobe, δ.

Fig. 2. $\frac{2}{1}$. Vertical section of a part of Gorgonocephalus Pourtalesii just above the mouth, showing a portion of one brachial and two interbrachial spaces of the body-cavity, looking from the centre outward. The stomach is cut away along its floor, *St*, and again above, where it passes into the thin-skinned lobes, *St″*, *St″*, which have powerful attachments below at the outer open angle of the mouth-frames. In the centre is the inner end of the arm, *A m*, to whose upper side is strongly attached a stomach-pouch, *St′*. These pouches have therefore ten strong attachments round the mouth, five brachial and five interbrachial. In their midst, like a cylindric bag, rises the base of the stomach proper, which leaves between its wall and these attachments a large annular space, giving free communication from the radiating compartments of the body-cavity to outer surfaces of the stomach-pouches and the ovarial lobes. Thus, an egg from any of the ovarial lobes could pass out by any one of the ten genital openings.

Fig. 3. $\frac{1}{1}$. A horizontal cross-cut through a part of the disk of Gorgonocephalus Pourtalesii, just above the arms, and passing through the outer ends of the radial shields, *l*, *l*, the ovarial lobes, δ, δ, and the stomach-pouches, *St″*, which radiate from the stomach, *St*, and adhere by their outer ends to the inner points of the ovarial lobes, δ, δ. These adherent ovarial lobes and stomach-pouches are arranged in ten radiating groups, which are attached also below (compare Fig. 2), and thus divide the body-cavity into ten radiating compartments, each emptying outwardly by a genital opening, *n o*, and communicating within, by a ring-tube (δf, Fig. 1), with the other compartments. The stomach-pouches are usually filled with a coagulated, pasty substance, while the stomach proper is empty.

Fig. 4. $\frac{10}{1}$. Cross-cut of the inner end of an ovarial lobe of Gorgonocephalus Pourtalesii showing the egg-clusters and the enclosing membrane, which is thickened at its extremity.

PLATE II.

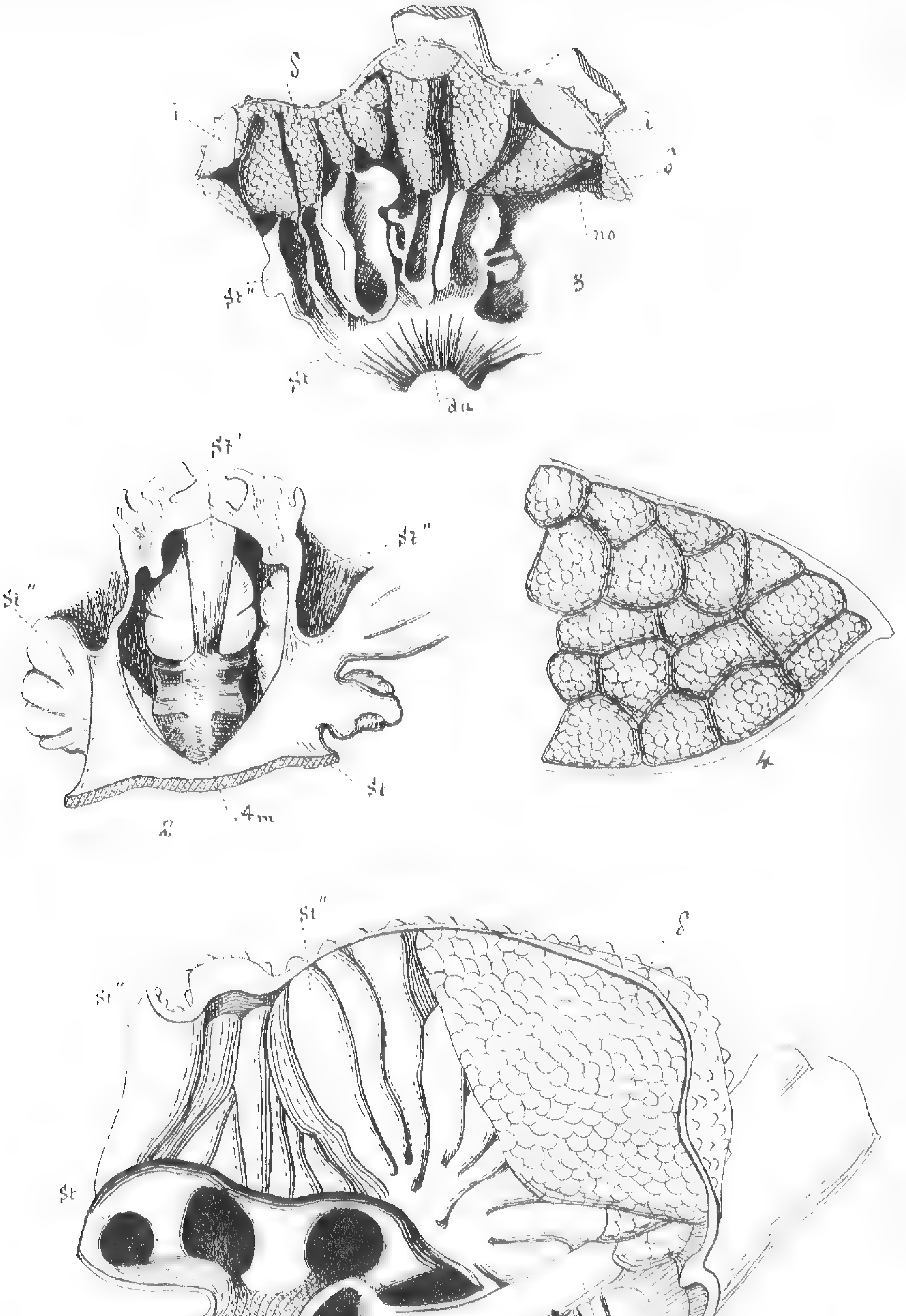
Fig. 5. $\frac{2}{1}$. Vertical cross-cut of Euryale aspera, including three arms, one mouth-angle complete, and sections of two others, *f*. At the ends are two much dilated

genital openings, *n o*, *n o*, one natural, the other partly cut away. The central cavity above the mouth is the stomach proper, from which radiate pouches, *St′*, more simple than in Gorgonocephalus, and adherent above and below on ten radiating lines, as may be seen under the radial shields, *l*, *l*. The genital organs were wholly undeveloped, and there were to be found only the ten radiating compartments of the body-cavity, whose lining membrane, as in Gorgonocephalus, doubtless takes on the reproductive function. They were continued from the genital openings, *n o*, under and between the pouches of the stomach, and intercommunicated by a ring-tube round the mouth, sections of which are seen at *δ f*, *δ f*. — *r*, mouth-tentacles; *d″*, teeth.

Fig. 6. $\frac{3}{1}$. A vertical, radiating section through an arm, a little beside the median line, and a part of the disk of Astrocnida isidis. The type is Astrophyton-like, with Ophiuroid features. The stomach has pouches, *St′*, less folded and complex than those above described; and it is quite free on the under side. Where the stomach proper folds back from and over the mouth-wall, the two adhere to form a ring-tube (perihæmal canal) just outside the stomach-sphincter, *d u*. This and the want of attachments along the floor of the stomach are characters of Ophiurans. The ovaries, *δ*, consist of egg-clusters, and lie in the body-cavity, into which penetrate the genital openings, as in Gorgonocephalus. — *d*, mouth-papillæ; *f*, section of mouth-frame; *r*, mouth-tentacles; *u′*, passage for the nerve, bloodvessel, and water-tube of the arm; *w′*, arm-bones.

Fig. 7. $\frac{4}{1}$. Ophiocreas œdipus, male. Base of an arm tipped a little from the observer, with outer corner of the disk, whose side is cut away, while the integument of the arm is cut and folded back, showing a double-lobed spermary, *δ*, *δ*, whereof there is one on either side of the upper surface of the arm. The pleated floor of the stomach, *St*, *St*, is slit to expose the genital pouch, or bursa, below, which is an indentation of the disk-wall, debouching by the genital opening, *n o*. The spermary is enclosed by a thin continuation of the lining membrane of the disk, and at its inner end connects by a pore with the bursa. Under the outer end of the radial shield, *l*, may be seen a portion of the stomach, which adheres not only to the roof of the disk-wall, but also to the wall of the lower interbrachial space, so that the true body-cavity is reduced to a sinus over each arm, and to the closed ring-tube (perihæmal canal) about the mouth.

CAMBRIDGE, February, 1881.



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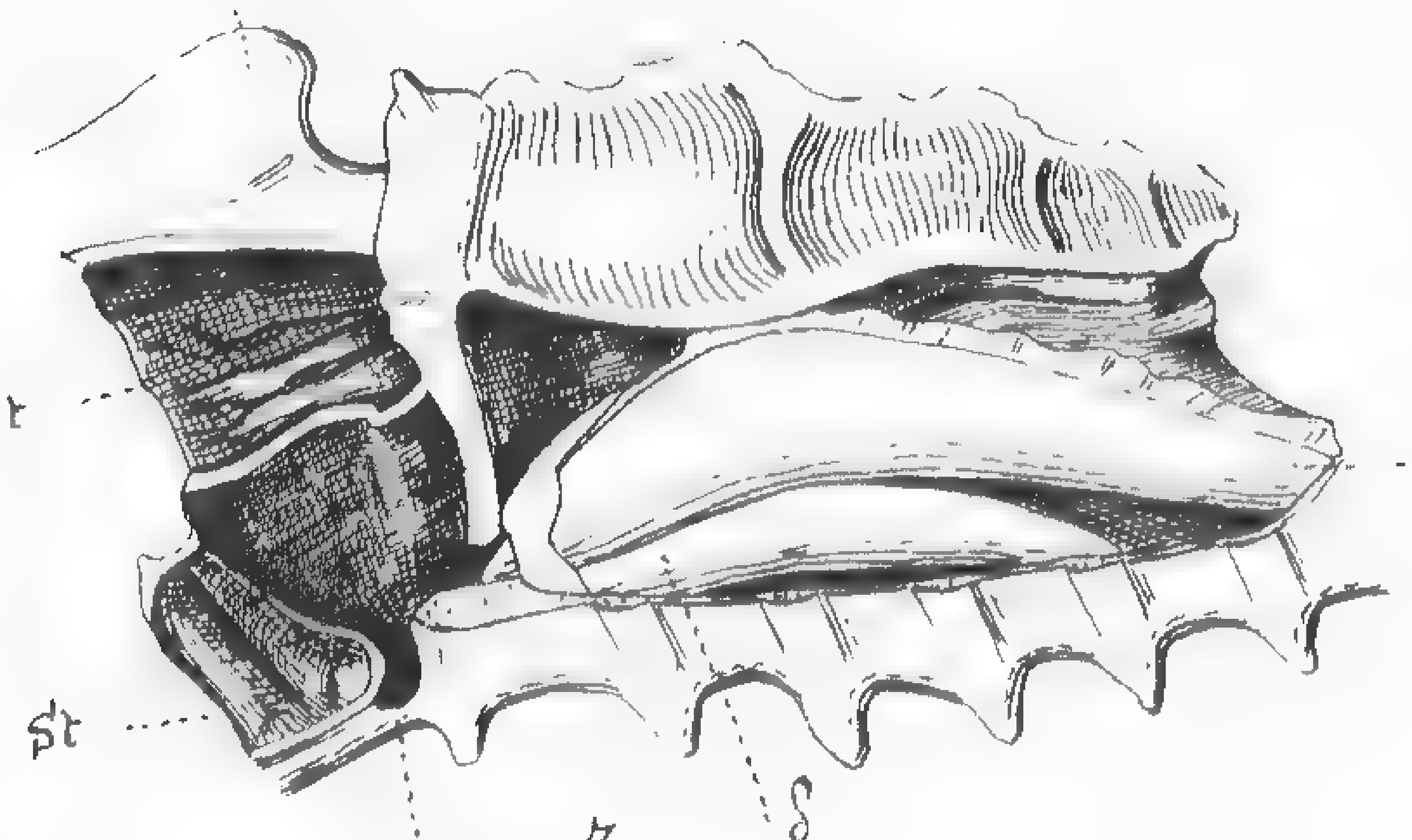

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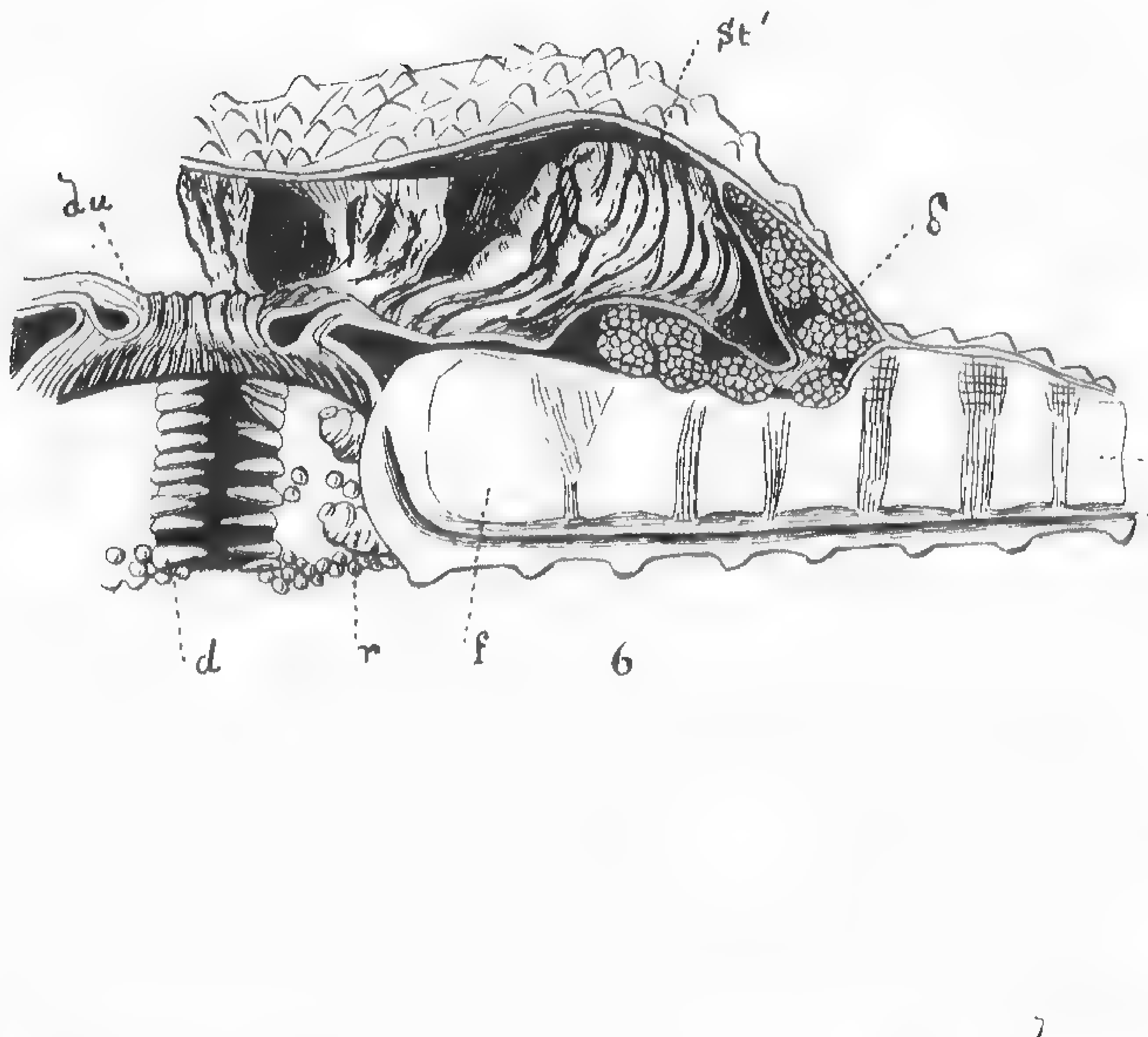

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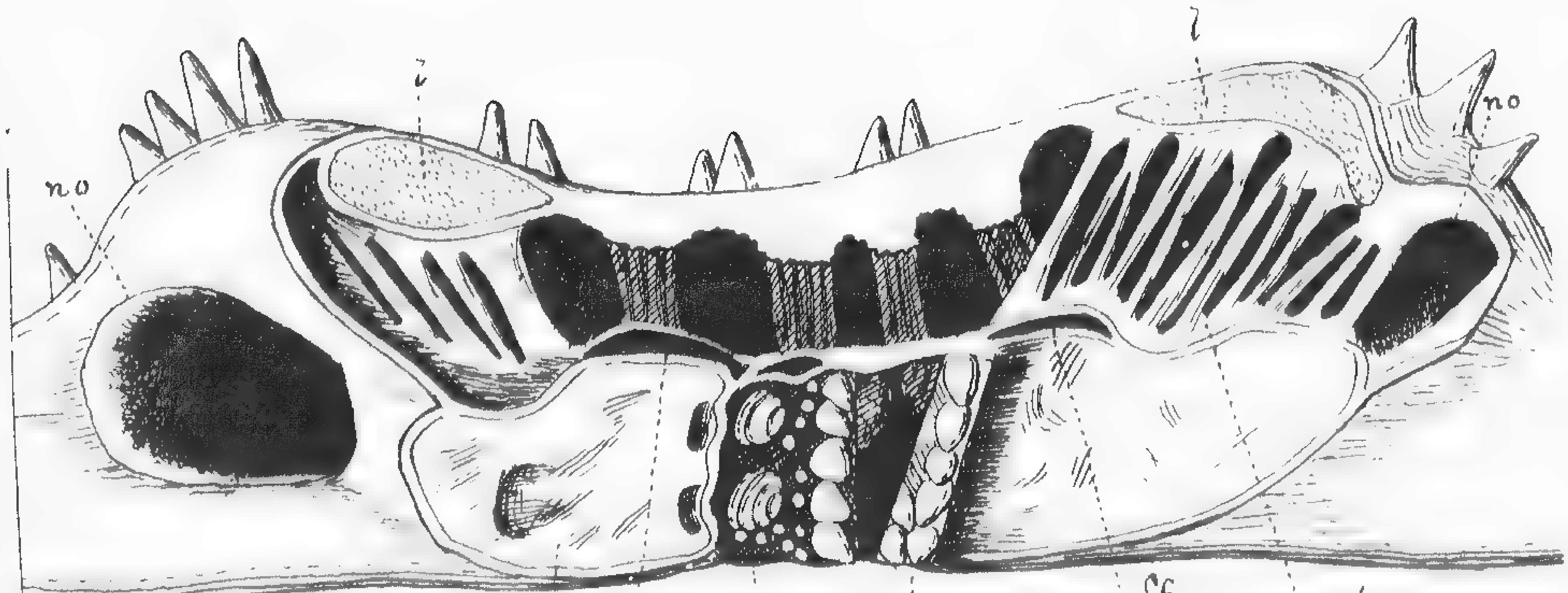

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No. 7. — *Reports on the Results of Dredging, under the Supervision of* ALEXANDER AGASSIZ, *in the Caribbean Sea, in* 1878, 1879, *and along the Atlantic Coast of the United States, during the Summer of* 1880, *by the U. S. Coast Survey Steamer "Blake,"* Commander J. R. BARTLETT, U. S. N., Commanding.

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XI.

Report on the Acalephæ, by J. WALTER FEWKES.

HYDROIDA.

The collection of hydroids obtained by Mr. Agassiz during the expeditions of the "Blake" in the Caribbean Sea, in 1878, 1879, and off the eastern coast of the United States, in the summer of 1880, contains the genera and species mentioned in the following pages. Two genera of gymnoblastic hydroids, *Eudendrium* and *Tubularia*, were collected. The latter is *T. indivisa* (?); the species of the former could not be determined. The majority of the remaining forms belong to the family of *Plumularidæ*.

The following genera and species have already been described.

Taken in the Caribbean Sea, 1878, 1879: —

Aglaophenia apocarpa, ALL., Milligan's Key, 124 fms.
gracilis, ALL., Martinique, 96 fms.
ramosa, ALL., St. Vincent, 95 fms.
ramulosa, KIRCH., Barbados, 94 fms.
Montserrat, 88 fms.
Barbados, 76 fms.
Antenella gracilis, ALL., Barbados, 56 fms.
Martinique, 96 fms.
Cryptolaria abies, ALL., Barbados, 94 fms.
Grenada, 154 fms.
Grenada, 170 fms.
Montserrat, 88 fms.
Sta. Cruz, 508 fms.

Cryptolaria conferta, ALL., Barbados, 73 fms.
Barbados, 94 fms.
Barbados, 120 fms.
Dominica, 118 fms.
longitheca, ALL., Dominica, 76 fms.
Martinique, 334 fms.
Barbados, 103 fms.
Eudendrium, sp. (?), Grenada, 291 fms.
Hippurella annulata, ALL., St. Vincent, 124 fms.
Lafoëa convallaria, ALL., Barbados, 76 fms.
Barbados, 94 fms.
Martinique, 76 fms.
Guadeloupe, 150 fms.
Monostæchas dichotoma, ALL., Yucatan Bank, 50 fms.
Plumularia attenuata, ALL., Grenada, 576 fms.
geminata, ALL., Barbados, 76 fms.
Sertularia tubitheca, ALL., Barbados, 76 fms.
distans, ALL., St. Vincent, 114 fms.
Sertularella Gayi, var. *robusta*, ALL., Dominica, 524 fms.
Thuiaria pinnata, ALL., Barbados, 56 fms.

There are also in the collection specimens of *A. ramulosa* and *C. abies*, with blank labels of 1878, 1879.

The following known species were taken in 1880 : —

Antennopsis hippuris, ALL., 32° 7′ N., 78° 37′ W., 229 fms.
Cladocarpus paradisea, ALL., 31° 57′ N., 78° 18′ 35″ W., 333 fms.
32° 7′ N., 78° 37′ 30″ W., 229 fms.
Cryptolaria conferta, ALL., 41° 29′ 45″ N., 65° 35′ 30″ W., 1242 fms.
Halecium macrocephalum, ALL., 38° 21′ 50″ N., 73° 32′ W., 197 fms.
Sertularella Gayi, var. *robusta*, ALL., 31° 57′ N., 78° 18′ 35″ W., 333 fms.
41° 30′ N., 66° W., 73 fms.
32° 43′ 25″ N., 77° 20′ 30″ W., 233 fms.
32° 25′ N., 77° 42′ 30″ W., 262 fms.
32° 7′ N., 78° 37′ 30″ W., 229 fms.
Tubularia indivisa (?), GOULD, 41° 35′ N., 65° 57′ 30″ W., 139 fms.

The following were obtained in the expedition of 1878, 1879 : —

Aglaophenia apocarpa, ALL., Sand Key, 35 fms.
Obelia marginata, ALL., Sand Key, Telegraph Cable, 15 fms. (SIGSBEE).
Sertularella Gayi, var. *robusta*, ALL., off Morro Light, 250 – 400 fms.
Obelia marginata, no locality.

The following undescribed genera and species were taken.
Obtained in 1878, 1879 : —

Aglaophenia insignis, Grenada, 262 fms.
gracillima, Martinique, 96 fms.
robusta, Montserrat, 88 fms.
Cladocarpus compressus, St. Vincent, 114 fms.
Lafoëa elegans, Barbados, 125 fms.
Barbados, 180 fms.
Plumularia caulitheca, Grenada, 416 fms.
Sertularella formosa, Martinique, 357 fms.
Pleurocarpa ramosa, St. Vincent, 95 fms.

Obtained in 1880 : —

Aglaophenia minuta, 32° 43′ 25″ N., 77° 20′ 30″ W., 233 fms.
crenata, 41° 24′ 45″ N., 65° 35′ 30″ W., 1242 fms.
Aglaophenopsis hirsuta, 32° 7′ N., 78° 37′ 30″ W., 229 fms.
Antennopsis ramosa, " " "
Campanularia insignis, " " "
Callicarpa gracilis, no locality.

DESCRIPTIONS OF NEW SPECIES.

Lafoëa elegans, n. s.

Hydrocaulus stout, widely branching. Stem fascicled. Ultimate branches pinnate, alternate. Hydrothecæ disposed alternately, cyathiform, arising from branches and ultimate ramuli. Margin smooth, edge slightly everted. One or two annular striæ.

Gonosome unknown.

Barbados, 180 fms., and Barbados, 125 fms.

Differs from *L. fruticosa* in having pinnately arranged ultimate branches. Resembles closely *L. helicioides*, All., but larger.

L. convallaria, All.

A specimen of *L. convallaria* bears along the stem gonosomes like those of *Cryptolaria conferta*, All. Clarke* refers these gonophores to the *Lafoëa*, upon which they are found, as Allman does the supposed gonophores of *C. conferta*.

Campanularia insignis, n. s.

A specimen of *Campanularia* is found in the collection. It resembles *C. macroscypha* in having a discoid internode just below the hydrotheca. It has

* Bull. Mus. Comp. Zoöl., Vol. V. No. 10.

a longer style, and fifteen instead of twelve teeth around the rim of the hydrotheca.

32° 7′ N., 78° 31′ 30″ W., 229 fms.

Cryptolaria abies, All.

A specimen of *C. abies* bears a structure which I have called the gonosome. The distal end of a pinna, which in its proximal extent is normal, is modified into a spherical body, which resembles imperfectly this organ. In it, however, there are no gonophores. Its walls are formed by the elongation of the hydrothecæ. Nothing else which can be likened to a gonosome has been described in *C. abies*. In none of the specimens were there structures similar to what Allman has described as the gonosome in *Cryptolaria conferta*.

Sertularella formosa, n. s.

Trophosome: — Hydrocaulus smooth, non-fascicled, pinnately branched, with root like base. Hydrothecæ borne on main stem and branches. Height, six to eight inches. Pinnæ alternate, zigzag, and jointed. Hydrothecæ alternate. A single hydrotheca arises from the axil of every pinna. Number of hydrothecæ on the stem between the pinnæ, variable. Hydrothecæ extend almost at right angles to the axis of pinna, and arise from distal ends of each joint. Margin of the hydrotheca smooth, upper surface or face without indentations.

Gonosome unknown.

The mode of origin of the ultimate branches, the want of indentations on the upper surface of the hydrotheca, and the smooth stem, separate this species from *Sertularella Gayi*, var. *robusta*, All.

Grenada, 170 fms.; Martinique, 357 fms.

Plumularia caulitheca, n. s.

P. caulitheca, unlike other species of *Plumularia*, has a large nematophore, not free as the others in the same species, which arises from the stem upon the upper side of a projection of the hydrocaulus from which the pinna springs.

Trophosome: — Hydrocaulus simple, fascicled, two inches high. Pinnæ alternate. Hydrothecæ deep, with smooth margin. Nematophores free. Mesial nematophores arise from a slight protuberance below the hydrotheca. Normal nematophores trumpet-shaped and free.

Gonosome unknown.

Grenada, 416 fms.

This species differs from *P. attenuata*, All., in the possession of a peculiar nematophore seated on a projection of the stem from which the pinna rises.

Aglaophenia insignis, n. s.

A. insignis resembles *A. gracilis* more closely than it does any other species of the genus. It differs from it in that the mesial, adnate nematophore projects almost at right angles to its hydrotheca. This nematophore is not as long as the mesial nematophore of *A. ramosa.* The corbula is short and thick, different in shape from that of *A. rhyncocarpa* and *A. rigida.*

Trophosome: — Hydrocaulus three inches high, branching, non-fascicled, with nematophores on the stem. Hydrorhiza creeping. Branches spring from opposite sides of main stem, but they are not exactly opposite in position of origin. Hydrothecæ closely approximated, short, stout, with the margin toothed. Supracalycine nematophores rise slightly above the orifice of the hydrotheca. Mesial nematophore adnate part of its length, and with the remainder extending at right angles to the surface of the hydrotheca. Ultimate ramuli borne on main stem as well as branches.

Gonosome: — Corbula short, stout, closed, bearing a hydrotheca on the peduncle. The nematophores borne on outer walls of the corbula in rows, with each nematophore long, tubular, and tapering slightly to a terminal opening. The number of nematophores in each row is six or seven on each side. Number of ribs, four and five. Peduncle of each corbula, short.

Grenada, 262 fms.

Aglaophenia gracilis, All.

An *Aglaophenia,* which resembles *A. gracilis* in size and shape of hydrotheca, has a corbula like that of *A. rigida.* The only differences which Allman points out between these two species is that in *A. gracilis* "the hydrothecal internodes are longer and narrower" than in *A. rigida,* and *A. rigida* is a much "more ramified and a taller form." Allman says of *A. gracilis,* "Gonosome wanting." In the hydroid, which has been identified as *A. gracilis,* there is a corbula which resembles that of *A. rigida. A. gracilis* and *A. rigida* may be the same hydroid.

Aglaophenia gracillima, n. s.

Trophosome: — Hydrocaulus not branching, attaining a height of three inches. Non-fascicled. Upper part of hydrocaulus bearing denticle-like nematophores. Pinnæ alternate. Hydrotheca deep, swollen below; margin with a medially placed tooth longer than the remaining dentition about the margin of the hydrotheca. A spur arises near the base of this tooth. Supracalycine nematophores slightly overtopping the margin of the hydrotheca. Mesial nematophore with two openings, one terminal; the other on side facing the hydrotheca. Hydrothecæ closely crowded together, each arising from a joint of the pinna.

Gonosome: — Corbula like that of *A. lophocarpa* in shape and size, but the distal end terminates bluntly in a single large nematophore, and not in a conical projection. Corbulæ closed, with long peduncles, which are jointed and bear hydrothecæ, one on each joint.

Martinique, 96 fms.

Aglaophenia minuta, n. s.

Trophosome: — Hydrocaulus one quarter to half an inch high, pinnately branched, not fascicled. Pinnæ alternate, with hydrothecæ closely crowded together. Hydrothecæ short, stout, and with dentate margin. Intrathecal ridge well marked. Supracalycine nematophores small. Mesial nematophore adnate to hydrotheca about half the depth of this organ.

Gonosome unknown.

Found in great abundance on an Alga over the fronds of which the hydrorhiza extends.

32° 43′ 25″ N., 77° 20′ 30″ W., 233 fms.

Aglaophenia crenata, n. s.

A. crenata differs from other members of the genus in having the margin of the hydrotheca almost smooth and crenate. In other respects it resembles *A. gracilis.*

Gonosome unknown.

41° 24′ 45″ N., 65° 35′ 30″ W., 1242 fms.

Aglaophenia robusta, n. s.

This species has a very large, thick, fascicled hydrosome, which is branching, and gives rise to alternate pinnæ. Hydrothecæ with very long teeth on the margin. Mesial nematophore large, adnate, almost as long as the hydrotheca is deep. Supracalycine nematophores rising slightly above the rim of the hydrotheca. Color of hydrosome bright yellow and brown.

Gonosome unknown.

Montserrat, 88 fms.

AGLAOPHENOPSIS, n. g.

Generic Characters. — This genus has many resemblances to Kirchenpaur's subgenus *Macrorhynchia* and to Allman's *Halicornaria.* Unlike the former, the pinnæ retain their normal form, and do not bear gonophores.

In *Aglaophenopsis* the mesial nematophore most proximally situated on the pinna is modified into a long, jointed stalk, which bears nematophores, and seems to protect gonangia, which arise from the stem below. In *Halicornaria*, as limited by Allman, there are similar jointed appendages, but they are not confined to the proximal hydrotheca. The two genera are easily distinguished. In *Cladocarpus* similar unjointed appendages are found, but these structures in this genus, called phylactogonia, are branched, antler-shaped.

Minor characteristics of the genus are that the pinnæ are very numerous, and always arise from one side of the hydrocaulus. The hydrothecæ have short, adnate, mesial nematophores, and the gonosomes have a single opening turned to one side.

Aglaophenopsis hirsuta, n. s.

Trophosome: — Hydrocaulus branching, fascicled, about two inches high, with branches wide spreading. The base of the trophosome with many root-like appendages. Pinnæ small, arising from the side of the stem, and branches. The small size of the pinnæ and their great numbers impart a hirsute appearance to the hydrocaulus. Pinnæ jointed, each joint bearing a single hydrotheca. Hydrothecæ closely crowded together. Margin of hydrotheca notched. Supracalycine nematophore rises slightly above tho margin of the hydrotheca. Mesial nematophore adnate to the hydrotheca about one third the depth of this organ.

Gonosome: — The gonophores are flask-shaped, borne on the primary branches. The gonangia in alcoholic specimens fill about half the cavity of the gonophore. Gonophores numerous, and never found on the main stem of the hydrosome. They spring from the same side of the branch as the pinnæ, and are protected by jointed extensions of the most proximal mesial nematophore of the pinna. This structure bears a single row of nematophores, and resembles a phylactogonium. It differs from the phylactogonia of *Cladocarpus* in being unbranched and jointed.

32° 7′ N., 78° 37′ 30″ W., 229 fms.

Antennopsis ramosa, n. s.

Trophosome: — Hydrocaulus irregularly branching, fascicled, bearing denticulate nematophores not unlike those found on one side of the stem of *Cladocarpus.* Height six to eight inches. Scattered pinnæ spring from the main stem. Ultimate ramuli arise irregularly from all sides of the branches as in *A. hippuris*, All. Hydrothecæ shallow. Nematophores free, long, trumpet-shaped. Margin of hydrotheca smooth. Mesial nematophores three in number, the infracalycine affixed to a slight prominence at the base of the hydrotheca. Mesial nematophore open along the inner side, and at the top. Supracalycine trumpet-shaped, extending above the orifice of the hydrotheca. Two trumpet-shaped nematophores on the projection of the branch from which the ultimate ramulus arises.

The gonophores, like those of *A. hippuris*, are borne in the axils of the branches. Gonophores without cobula or phylactogonia, slipper-shaped, mounted upon a short peduncle. The single specimen in the collection showed gonangia of a variety of forms, and I was unable to distinguish male from female, as Allman has done in *A. hippuris*. The species differs from *A. hippuris* in the branching habit and the number of mesial nematophores.

32° 7′ N., 78° 37′ 30″ W., 229 fms.

HIPPURELLA, Allman.

The genus *Hippurella* was founded by Allman for those hydroids in which the proximal ends of the branches are pinately branched, while the distal end of the same bears verticillately arranged branches. Allman speaks of the last as if they were the same as the pinnæ. They are, however, destitute of hydrothecæ, and simply bear a row of nematophores. Their function is the protection of the gonophores, which are confined to this region of the hydrosome.

Hippurella annulata, All.

Trophosome: — Hydrocaulus six to eight inches tall, for two thirds its length without branches. Branches alternate, bearing ultimate ramuli. Base of hydrocaulus developed into disk-shaped hydrorhiza. Stem fascicled. Pinnæ opposite, although those of opposite sides do not lie in the same plane. Insertions of pinnæ alternate. Hydrothecæ separated from each other on the stem. In the interval between two hydrothecæ, there are four or five partially formed annulations. Mesial nematophores free, long, and two in number. Margin of the hydrotheca smooth and circular. Supracalycine nematophore overtopping the orifice. A single ultimate branch, or pinna, arises from the main stem.

Gonosome: — The distal extremity of the branch is modified into a gonosome. The proximal end of each branch bears pinnæ regularly arranged as described. Those on each side lie in one and the same plane. They pass without great modification into the verticillately arranged ribs of a gonosome at the distal end of the branch. The ribs which compose this gonosome are undivided, and without branches. Each verticil is composed of six ribs of equal size and shape. At the base of the verticil, in the angle which the ribs make with each other, there is a single nematophore. The ribs arise at right angles to the stem, and at a short distance from their origin curve upward. Near this bend they bear a pair of nematophores, one on each side, while higher up in their course the ribs bear single rows of nematophores. Gonophores seated in the interval between successive verticils of these ribs.

St. Vincent, 124 fms.

CALLICARPA, n. g.

Callicarpa differs from all the other genera of hydroids yet described in the character of the gonosome. The gonosome resembles closely a spike of wheat, and springs by a short peduncle immediately from the main stem. It is morphologically speaking as if the proximal part of the branch which bears pinnæ in *Hippurella* was reduced to a peduncle, and the distal end with its verticillate ribs became the gonosome.

Callicarpa gracilis, n. s.

Trophosome: — Hydrocaulus rising to the height of six inches from a tangled mass of filaments which form the base of attachment. From a point about one fourth the distance between base and apex there is found what resembles the broken base of a single branch. Stem non-fascicled, bearing alternate pinnæ. Hydrothecæ deep, nearly cylindrical above, and tapering to the place of origin of the mesial nematophore. The hydrotheca has a single mesial nematophore, which is free, trumpet-shaped, and springs from a slight protuberance below the base of the hydrotheca. Supracalycine nematophores free, mounted on projections from the pinna, and overtopping the orifice of the hydrotheca. Depth of the nematophores about one quarter that of the hydrotheca.

Gonosome: — There are three gonosomes. They resemble spikes of barley, and arise directly from the stem by a short peduncle. The axis of the gonosome is about the size of the main stem, near the place of origin of the gonosome, and from it arise verticillate ribs. In each verticil there are three main branches, each of which divides into four ribs by two divisions. These ribs bear a line of nematophores along their upper side. There are no hydrothecæ on the ribs or at the base of the verticils. The gonangia are found in gonophores, which arise in the axils of the undivided verticils, from the axis of the gonosome. They seem to be protected by the ribs of the gonosome in somewhat the same manner that the gonophores in *Cladocarpus* are protected by phylactogonia.

The bottle which contains this specimen is without label. The gonosome of *C. gracilis* resembles in its staghorn-like ribs the "brush" of *Thuiaria thuja.* In other respects there is no likeness between these two hydroids. The "brush" of *T. thuja* is the whole hydrocaulus modified, while the gonosome of *C. gracilis* is a specialized branch. The gonosome of *Callicarpa* is homologous to the corbula of an *Aglaophenia.* I do not regard the corbula of this and some other genera as homologous to a pinna, and its ribs to modified mesial nematophores, but as a metamorphosed branch. The spike of *Callicarpa* is a modified branch, as its relationship to *Hippurella* shows. The discussion of the homology of the corbula of another genus is given under the genus *Pleurocarpa.*

Cladocarpus compressus, n. s.

Trophosome: — Hydrocaulus attaining the height of eight inches. The main stem consists of two sections, neither of which is fascicled. The lower part is of light brown color, and has a smooth surface without nematophores. It takes up about one third the whole length of the stem. The remaining portion of the hydrocaulus, or the second part of the stem, is of smaller diameter than the former, of light straw color, and bears a single row of denticulated nematophores. It terminates in the immediate proximity of the lowest pair of pinnæ, where it becomes twisted three times. Still a third division of the stem is that which carries the pinnæ. It bears no medial row of denticular nematophores, but in other respects resembles the second of the two divisions of the hydrocaulus. Hydrocaulus unbranched, with alternately arranged pinnæ. Hydrothecæ closely crowded together in the pinna. Margin toothed; shape cyathiform, with indentation on the face. Supracalycine nematophores not rising above the orifice of the hydrotheca. Mesial nematophore single, adnate, extending only a short distance up along the face of the hydrotheca.

Gonosome: — Phylactogonia springing from the proximal internodes of pinnæ on opposite sides of the stem. Number of phylactogonia twenty. Each phylactogonium with three branches formed by two bifurcations. The first of these bifurcations situated near the origin of the phylactogonium. Each branch of the phylactogonium bears a single row of nematophores.

Gonangia affixed to the main stem and protected by the branching phylactogonia.

This species resembles closely *C. ventricosus*, Allman. A bottle of type specimens contains the hydroid figured by him, Pl. XXXI. fig. 1, and fragments which resemble *C. compressus.*

In *C. compressa* the margin of the hydrotheca is simply toothed, and there is no prominent medially placed single spur as is found on the rim of the hydrotheca in *C. ventricosus* (Allman, Pl. XXXI. fig. 1). The hydrotheca is not ventricose, as in *C. ventricosus*, and the whole trophosome is smaller.

St. Vincent, 114 fms.

PLEUROCARPA, n. g.

The characteristic of this genus is a peculiar gonosome, which is formed from the proximal portion of a branch, while the distal end of the same retains the true character of the branch and bears pinnæ. Gonosome a corbula.

Pleurocarpa ramosa, n. s.

Hydrosome: — Hydrocaulus branching, eight to ten inches high. Stem stout, non-fascicled. The branches bear medially placed rows of nematophores. Pinnæ jointed, alternate, arise from upper surface of the branches. Hydrothecæ closely approximated on the pinna, short, thick, margin toothed. Intrathecal ridge prominent. Mesial nematophore in distally placed hydrothecæ, adnate along the whole face, and continued beyond the orifice of the hydrotheca. In proximal hydrothecæ, however, although adnate along the face of the hydrotheca, the mesial nematophores seldom rise above the margin.

Gonosome: — Corbula open, formed by many rib-shaped pinnæ on the proximal end of a branch. Each rib is destitute of hydrothecæ, and covered with tubular nematophores, which project at right angles to the axis of the rib from all sides. Proximal end of the branch of which the corbula is a modification destitute of pinnæ, forming a peduncle for the gonosomes. It bears several hydrothecæ. The branch beyond the corbula bears many alternately arranged pinnæ, with hydrothecæ, not unlike a normal branch of the trophosome.

St. Vincent, 95 fms.

This genus proves without doubt that the structure called a corbula is in some cases a modified branch, and not, as Allman has shown to be true in some genera, a modified pinna. According to Allman, the ribs of the corbula are homologous to the developed mesial nematophores of hydrothecæ, while the corbula itself is a metamorphosed pinna. To that theory the corbula of *A. bispinosa* seems to point, but even in it there are some difficulties to be explained before the corbula can be looked upon as a modified pinna. In *A. bispinosa* that pinna which bears the ribs of the corbula must be regarded as bearing two rows of hydrothecæ side by side, a condition which is found in the normal pinna of no member of the genus *Aglaophenia*. That the structures which have been described as corbulæ in *Pleurocarpa* are modified branches,* there can be no doubt. It seems also certain that they are homologous to the gonosomes open or closed of the genus *Aglaophenia*. *Pleurocarpa* has a corbula nearest related to that of *A. bispinosa*. It differs from this species, however, in possessing a terminal extension of the axis of the corbula, which bears pinna, and in the absence of hydrothecæ at the base of the ribs of the corbula. A minor characteristic of *Pleurocarpa* is found in the mesial nematophore, which is very long, being continued beyond the orifice of the hydrotheca. The nematophores on the ribs of the corbula of *Pleurocarpa* are longer and more tubular than those on the gonosome of any known *Aglaophenia*. If we look upon the corbula as a modified branch, and not a metamorphosed pinna, the morphology of the gonosome of *Callicarpa* becomes plain. The spike of *Callicarpa* can then be regarded as a modified branch, and as a corbula homologous to the corbula of *Aglaophenia*. If that is true, in the same way the distal extremities of the branches in *Hippurella* are also corbulæ.

The fact that the margin of the proximal hydrothecæ is not as deeply notched as that of the distal, and that the mesial nematophore of the former rises but little from the margin, while that of the latter extends far beyond the orifice, seems to indicate that the growth of the hydrothecæ on the pinnæ takes place proximally as regards the main stem. In other words, instead of growing at its distal end, it elongates at the proximal extremity, and the oldest formed hydrothecæ are always at the most distal end of the pinna.

CTENOPHORA.

Ocyroë maculata, Rang.

Specimens of *O. maculata* were taken by Mr. Agassiz off St. Vincent. From his drawings and notes, the following description has been compiled.

Ocyroë, as it floats in the water, is well marked by the presence on the walls of the oral lappets of four large spots, which are very prominent. These characteristic structures are situated on the inner walls of the oral lappets, and are formed by a great development of muscular fibres, concentrated in four areas. Similar muscular fibres, or rows of cells, are found on the inner wall of the oral lappets of all Bolina-like Ctenophores, where they are more regularly

* Forbes, Edw., Ann. and Mag. Nat. Hist., Dec. 1844. Forbes regarded these bodies in *Plumularia cristata* as branches.

arranged on the surface, and not concentrated, as in *O. maculata*, into prominent areas. The spots are most conspicuous when the medusa is seen from the aboral region. When the *Ocyroë* is seen from the side, and not from above or below, only two of these areas can be observed,

In general profile *O. maculata* resembles *Bolina*. The oral lappets are, however, much more developed, and when expanded are carried at a right angle to the axis of the medusa. At its distal end each lobe divides into two wings, which narrow until they become pointed. Plate IV. fig. 3.

The medusa is very active in its movements. The motion is due to the "jerky" contraction of the oral lappets. The quick contraction of the muscular areas forming the conspicuous brown "spots" is the main cause of this violent motion of the oral lappets.

The chymiferous tubes of the oral lappets have a very tortuous course, especially in that part of their extent near where they join the base of the auricles. The rows of combs differ but little from those of *Bolina*, except from the great development of the oral lappets, four are relatively much longer than the remainder.

The auricles are longer than in *Bolina*. The tentacles, if present, are short and inconspicuous.

This description is made up wholly from drawings and notes by Mr. Agassiz. I have never seen *O. maculata*.

St. Vincent and Barbados, 1879, March.

DISCOPHORA.

Dodecabostrycha dubia, Brandt.

A Discophore closely allied to *Dodecabostrycha dubia*, Br. was obtained by Mr. Agassiz * in the Gulf Stream, in the summer of 1880.

Bell low, disk-shaped, with thin walls. The interior in alcoholic specimens is filled by a dark purple mass composed of sexual tentacles, ovaries, and stomach. At the apex there is a slight prolongation of this mass into the bell substance, resembling the "scar" on the apex of the bell of a young hydroid medusa, where, however, it is the remnant of an attachment to a hydroid.

The lower part, or margin of the bell, is very much enlarged, forming the marginal lobules, which hang down on the rim far below the point of insertion of the tentacles. The marginal lobules are supported by sword-shaped bodies, blunt at one end and tapering at the other, which is their distally placed extremity. Each lobe is supported by one of these structures, which is medially placed as regards the lobe. The number of tentacles is twelve, while the number of marginal lobules is sixteen. The tentacles arise in the incisions between the marginal lobules.

The otocysts are four in number, and spring, like the tentacles, from the in-

* Letter to Mr. C. P. Patterson, No. 4, Bull. M. C. Z., Vol. IV. No. 8.

cisions between the marginal lobules. Each pair of otocysts is separated by three tentacles. From the alcoholic specimens I could not determine their ultimate structure. They are mounted on a short style, and seem to resemble closely the otocysts of *Pelagia*. The structure of the under floor of *Polybostrica* is very peculiar. The oral appendages are joined together, forming a cylindrical body with a terminal mouth opening. This complicated labial appendage hangs from the lower floor at four points, where the walls are thicker than in intermediate portions. The part of the cylinder between two supports is inflated, hanging down in a bag shape.

The ovaries were partially destroyed, but enough of them remained to show that in their position they alternate with the attachments of the oral appendages, and that the ovarian tentacles are very large.

The size of the jelly-fish in alcohol is more than eight inches in diameter. Smaller examples were also taken, which were an inch or an inch and a half across.

CAMBRIDGE, March 1, 1881.

EXPLANATION OF PLATES.

PLATE I.

Fig. 1. *Hippurella annulata,* All.
Fig. 2. *Aglaophenopsis hirsuta,* n. g. & s.
Fig. 3. *Cryptolaria abies,* All.
Fig. 4. Gonosome of *A. insignis,* n. s.
Fig. 5. Hydrotheca of *Cladocarpus compressus*
Fig. 6. Hydrotheca of *A. insignis,* n. s.
Fig. 8. Gonosome of *C. abies,* All.
Fig. 9. Denticled stem of *C. compressus,* n. s.
Fig. 10. Nematophores on the jointed appendage of *A. hirsuta.*

PLATE II.

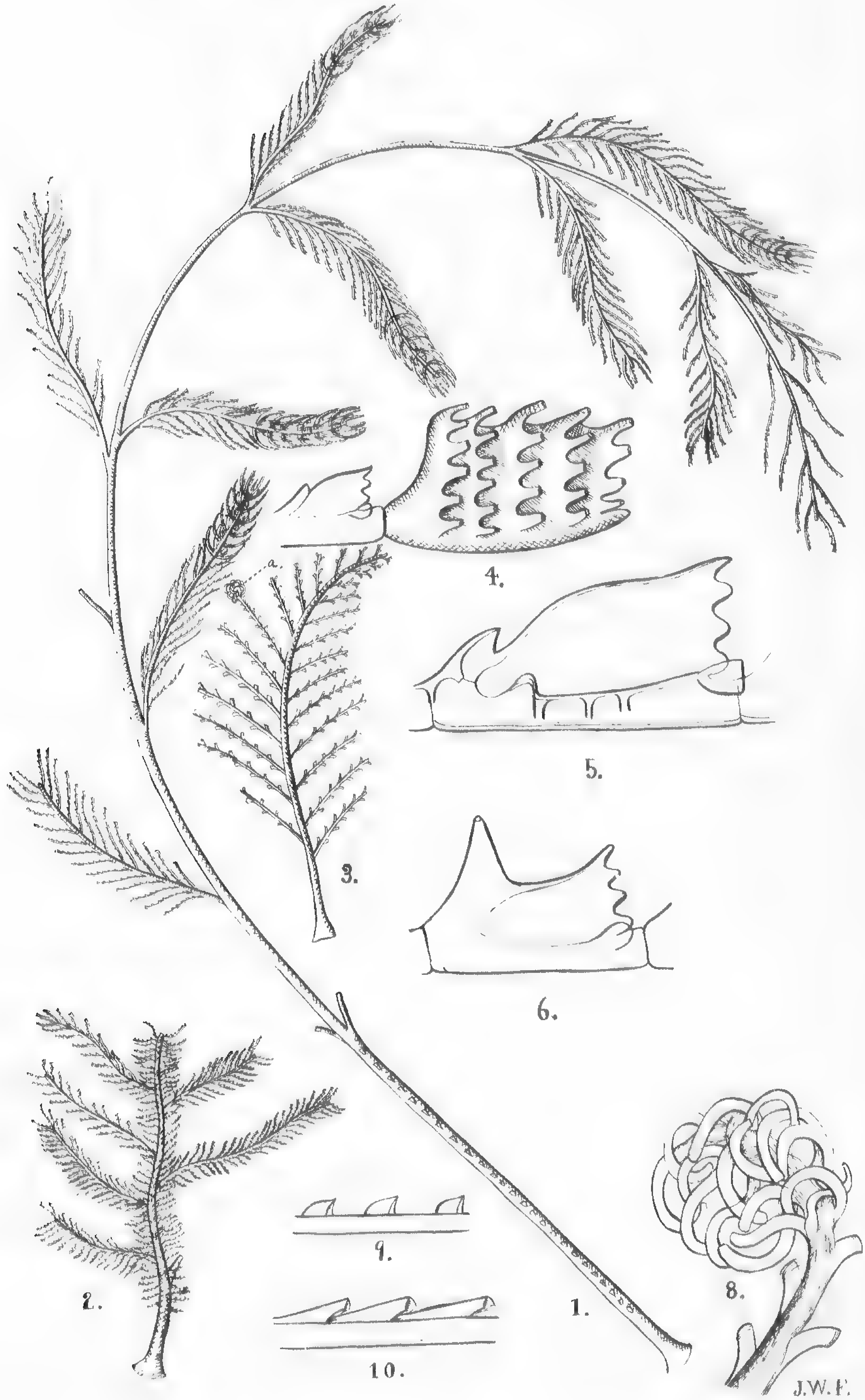
Fig. 1. *Callicarpa gracilis,* n. g. and s.
Fig. 2. Gonosome of *C. gracilis.*
Fig. 3. Gonophore of *Aglaophenopsis hirsuta.*
Fig. 4. Section of gonosome of *H. annulata,* All.
Fig. 5. Side view of the same.
Fig. 6. Hydrotheca of *C. gracilis.*
Fig. 7. Section of the gonosome of *C. gracilis.*
Fig. 8. Hydrotheca of *H. annulata,* All.

PLATE III.

Fig. 1. *Cladocarpus compressus.*
Fig. 2. Gonosome of *Pleurocarpa ramosa,* n. g. & s.
Fig. 3. Hydrotheca of *Antennopsis ramosa.*
Fig. 4. Base of a pinna of *Plumularia caulitheca.*
Fig. 5. Hydrotheca of *Pleurocarpa ramosa.*
Fig. 6. Hydrotheca of *A. gracillima,* n. s.
Fig. 7. Hydrothecæ of *A. minuta,* n. s.
Fig. 8. Gonosome of *A. gracillima.*

PLATE IV.

Fig. 1. *Ocyroë maculata,* Rang. (side view).
Fig. 2. *O. maculata* (oral lappets seen more in profile).
Fig. 3. *O. maculata* (aboral view of one quarter of the medusa).
Fig. 4. *O. maculata* (the oral lappets are closely drawn together). View from same side as Fig. 1.
Fig. 5. *Dodecabostrycha dubia,* Br.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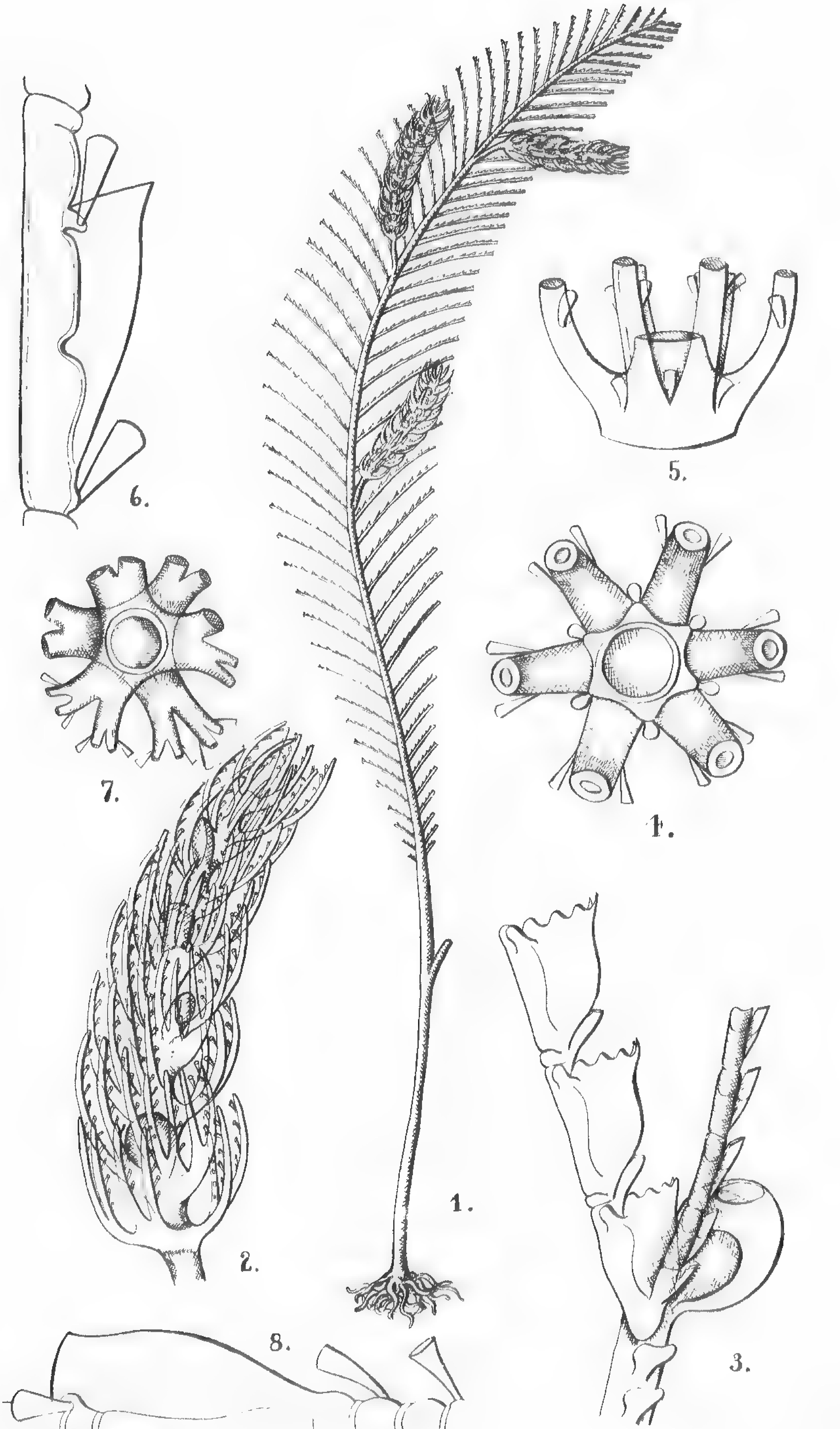
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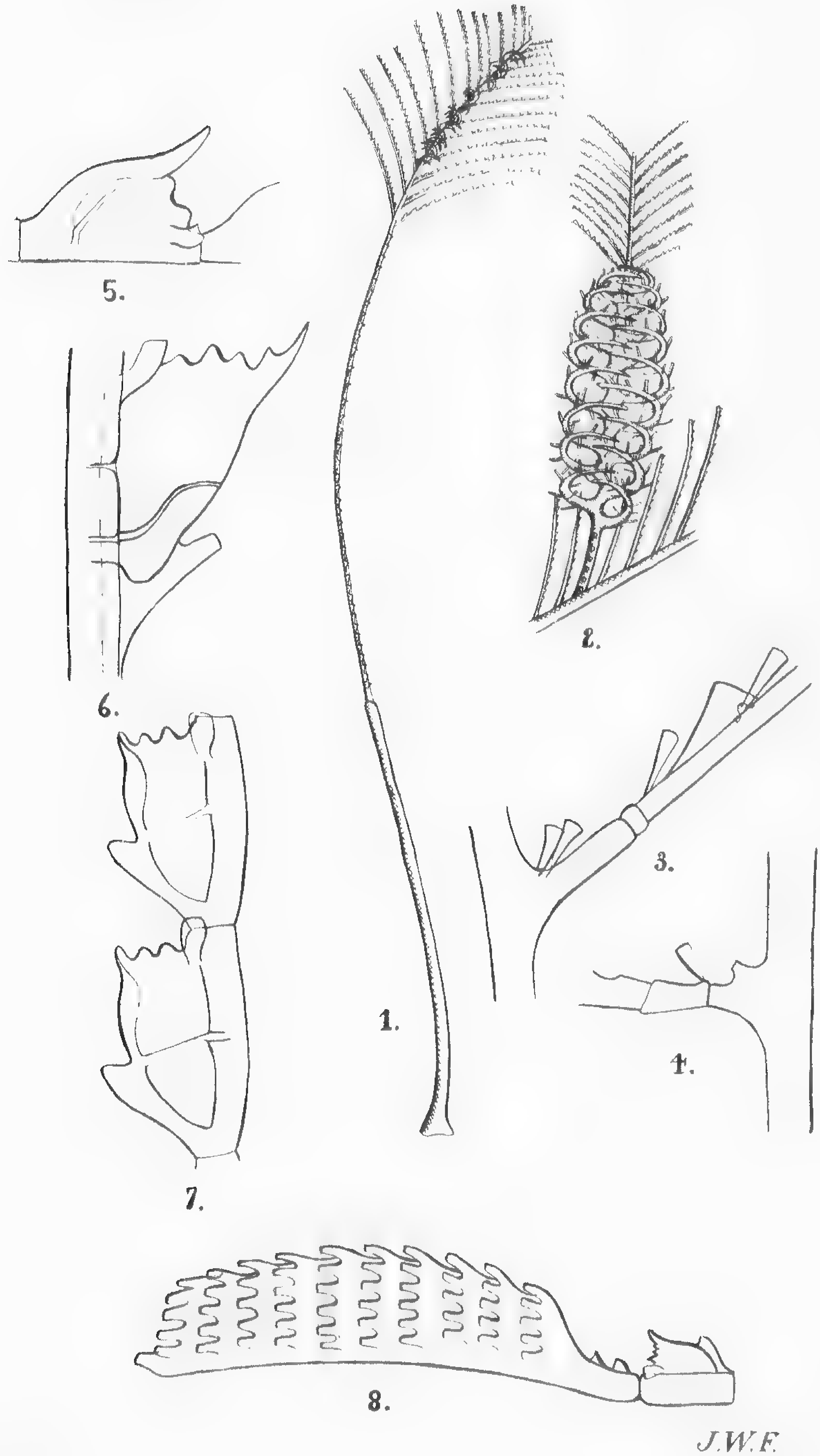
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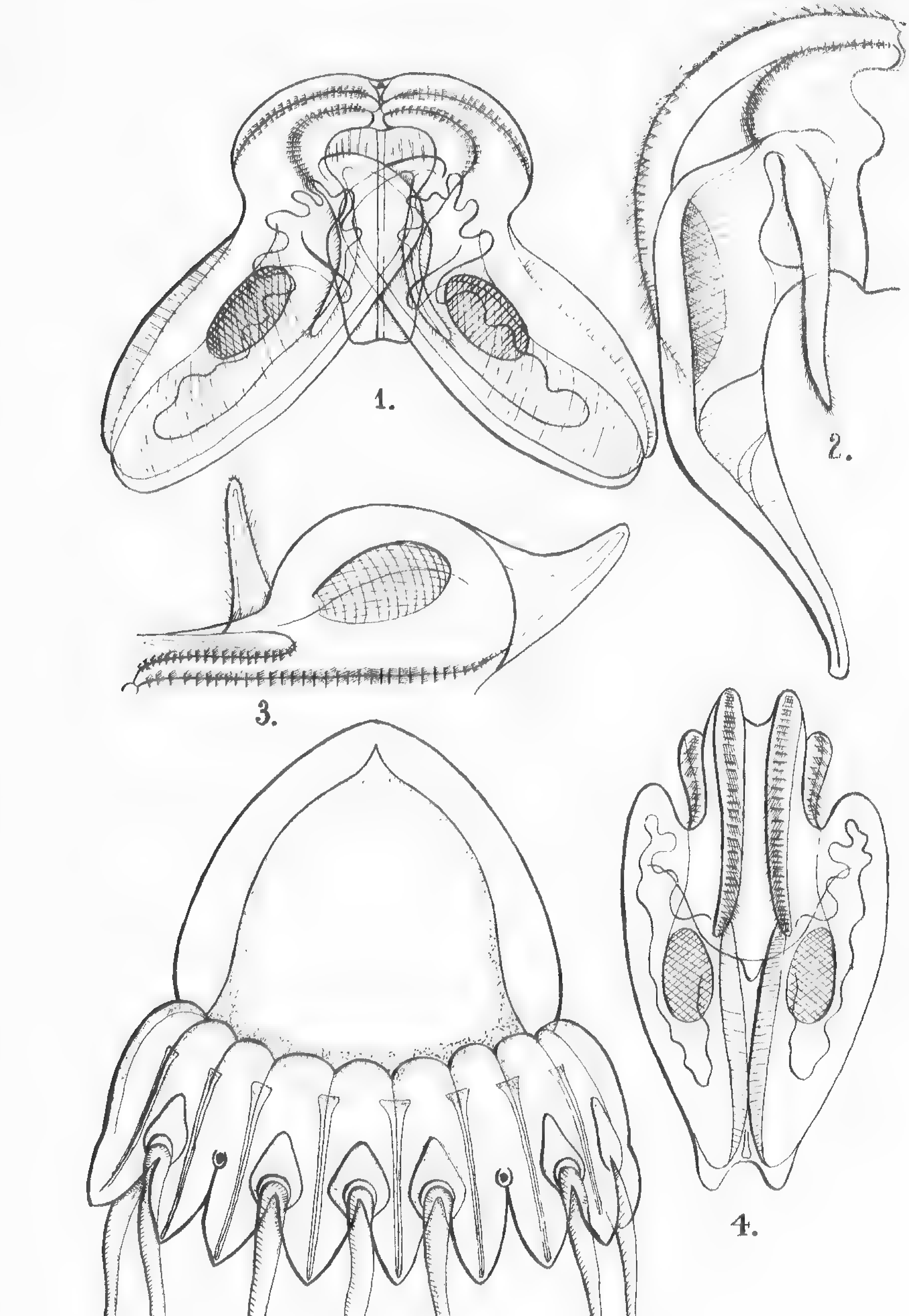

A.Ag. & J.W.F.

No. 8. — *Studies of the Jelly-fishes of Narragansett Bay.* By J. WALTER FEWKES.

THE following pages contain an account of certain new *Acalephæ* collected by me during three summers' work at Newport, R. I.,* with notes, anatomical and embryological, on those which have been previously known. A few jelly-fishes are also described from drawings and notes made by Mr. Alexander Agassiz, since 1865, at Newport and Naushon. These are mentioned in the appropriate places under the respective medusæ.

HYDROIDA.

Sarsia mirabilis, AGASSIZ.

Plate III. Figs. 11, 12.

S. mirabilis is rarely found in Narragansett Bay. During the summer months which were spent in Newport, only two specimens of this jelly-fish were found. If one contrasts this rarity of the medusa south of Cape Cod with its abundance at times in the waters of Massachusetts Bay, the conclusion seems evident that the specimens which were captured in the former locality were stragglers, and do not strictly belong to the fauna of Narragansett Bay. A portion of the base of the tentacle of *S. mirabilis* is specialized into a spherical body, which projects downwards as the jelly-fish swims in the water, hanging below the margin of the bell.

The walls of this spherical enlargement at the base of the tentacle are formed of two layers, and enclose a number of cellular bodies, which resemble indistinctly lasso cells. They appear to have some special function, and are not found in other genera of our coast closely related to *Sarsia*. Covering the surface of the walls in which they are contained, there are many small, bright red pigment dots. The true eye-spot (ocellus) is black, and is mounted on a papilla, which rises on the upper and external side of the base of the tentacle. The spherical enlargement previously mentioned is on the under and opposite side of the base of the tentacle. A figure to illustrate the general appearance of the tentacular bulb, with the two structures, ocellus and problematical sense organ (*spherical body with contained cells*), is given, with an enlarged view of part of the latter structure, in Plate III. figs. 11, 12.

* I am indebted to Mr. Agassiz for facilities to carry on this work in his private laboratory, at Newport, R. I.

Lizzia grata, A. Ag.

Plate I. Figs. 1, 2, 3, 4, 5, 6, 7.

Sars * described, many years ago, a jelly-fish closely allied to *L. grata*, which he named *Cytæis octopunctata.* Forbes † refers to this jelly-fish of Sars a form from the coast of England, which he called *Lizzia octopunctata. Lizzia grata*, first described from our waters by Mr. Agassiz, is closely allied to *L. octopunctata.* While in the figures which Forbes gives of *L. octopunctata* there are but two tentacles in each of the clusters midway on the bell rim between the radial tubes, in the jelly-fish which I had there were three, as is represented (Plate I. fig. 1). Forbes, however, in his descriptions, speaks of specimens in which there were three members in the cluster as well as two, mentioning it, however, as if rather after the nature of an abnormality. Three is the normal number found in well-developed animals, and none were taken in which it was exceeded, however far advanced the medusa had grown. The number of tentacles, however, from the ocellus of the radial tubes, as Mr. Agassiz figures is, in large specimens, five or six. Forbes, on the other hand, says that in *L. octopunctata* only three tentacles arise from the radial ocellus. (See Naked-eyed Medusæ, Plate XII. figs. $3 - 3_2$.)

The adult and several of the younger stages of *L. grata* have been described in the "North American Acalephæ," by Mr. Agassiz. The process of budding from the proboscis is mentioned by him in a paper before the Boston Society of Natural History, in 1862 (p. 100, Figs. 28, 29).

Haeckel ‡ has formed a new genus called *Margellium* for the reception of the *Lizzia octopunctata* of Forbes and *L. grata* of A. Agassiz, and looks upon each as a separate species. In his diagnosis of Forbes's species, Haeckel makes no mention of the fact spoken of by Forbes, that the number of tentacles in the intermediate cluster is sometimes three. This is rather astonishing, as Haeckel considers the supposed inequality in the number of tentacles in different clusters a generic characteristic. Haeckel also suggests the genus *Rathkea* for Lizzia-like jelly-fishes, in which the number of tentacles in radial and intermediate clusters is equal. The young *Lizzia* resembles so closely the proposed genus that at least new characters must be pointed out to distinguish the two.

The *Oceania Blumenbachii* described by Rathke, and which suggested the new genus *Rathkea*, which Haeckel proposes, has eight clusters of tentacles with generally two members in each cluster. Rathke gives in his figure of *O. Blumenbachii* eight chymiferous tubes, an interesting condition, of which I shall speak in considering a new genus which I have called *Mabella.* Four of these tubes in Rathke's medusa are regarded by Haeckel as foldings, the result of muscular action in the bell walls.

* Wiegm. Arch. 1837, Part V. p. 406, and Fauna Littoralis Norwegiæ.

† Naked-eyed Medusæ.

‡ Das System der Medusen, Erster Band, p. 95.

Sars gives a good account of the process of germination in *L. octopunctata.* This description applies also to *L. grata*, but he was not able to trace the medusa up to what I believe is its adult. The oldest *Lizzia* which Forbes figures is also immature. My account of the sequence in the development of the tentacles is different from that which Mr Agassiz gives (Proc. Bost. Soc., 1862).

L. grata was found in abundance at Newport during all the summer months. Its small size and transparent bell would render it inconspicuous, if not invisible, were it not for the eight black pigmented ocelli on the bell margin at the bases of the tentacles. Four of these ocelli are situated near the point where the radial tubes join the margin of the bell, and four on the bell rim midway between the radial vessels.

The bell is deep, campanulate, and in older specimens has a pointed apex. The surface is smooth in the adult, and destitute of papillæ. The relative size of all the organs can be seen by a study of Plate I. fig. 1. The line at the left of the figure indicates its size. The proboscis is never, except when the bell is abnormally reversed, extended outside of the bell opening, but it generally reaches down about half of the whole height of the bell cavity. The stomach is mounted upon a peduncle, which resembles the substance of the bell walls in its transparency. The chymiferous tubes are small, simple, and without lateral glands or appendages. They are four in number, and, extending along the sides of the pedunculated proboscis, open into the stomach. Near this termination the peduncle bears a cluster of peculiar cells.

The stomach is four-sided, with oral tentacles which impart to it a cruciform shape when seen from below. The extremity of each oral tentacle is bifid, and the end of each bifurcation is thickly covered with many small cells or pedunculated knobs. Near the bifurcation of the oral tentacles from the axis of the proboscis are also similar clusters of knob-like organs of smaller size than those mentioned. The tentacles are short, very flexible, hollow, uniform in size, and with smooth surfaces. They are arranged in eight clusters, which in most stages of growth have an inequality in the number of component tentacles. The junction of each cluster with the bell margin forms a triangular bulb or ocellus, which in the adult is dark brown and black.

There are no otocysts on the bell margin. Claparede was unable to find the male of the *Lizzia* which he studied. Forbes mentions the male *Lizzia* as larger than a female, with the attached buds. Mr. Agassiz figures a male of *L. grata*, and calls the sexual structure near the base of the proboscis "sexual sacs." I have observed large *Lizzia* which were females, in which the power of germination seemed to have ceased, or to have become dormant, although from the proboscis of the same medusa young had previously formed by budding. A *Lizzia* in this condition may have been called a male by Forbes and Agassiz. The essential elements of the male were not detected in *L. grata.* It would be a very interesting fact to determine whether *Lizzia* lives for any length of time after the process of germination from the proboscis has ceased, and, if such is the case, whether true ova and spermatozoa are then developed as final products of the same process. From the observations which were made bearing on this question, it seems probable that the egg in *Lizzia* is always produced after the budding of the young has ceased. As a preliminary to the whole question, it must first be determined whether *Lizzia* has a fixed hydroid or not.

The observation of the egg of *Lizzia* by Claparede,* who described it as passing through a direct development, should not be dismissed as an error, in the summary way it has been by many naturalists. The egg enclosed in a capsule, which he figures, and which he says develops directly into a medusa, was probably the last product of this process of budding, which opened with the production of a jelly-fish by a sexual gemmation.

The growth of the bud of a young *Lizzia* from the proboscis of the parent is as follows.

Plate I. fig. 1 represents a moderately large *Lizzia*, which, however, is not an adult, where the number of tentacles in radial and intermediate clusters is the same. In this figure, on the left-hand side of the upper part of the proboscis an attached medusa bud, considerably developed, can be seen. The shape of the bud is about spherical, and it is united to the proboscis by a short, thick peduncle, through which passes a tube forming a free communication between the stomach cavity of the parent and the half-formed proboscis of the young. The surface of the bell, as that of all the other younger buds which are figured, is covered with minute papillæ. The contractions and expansions of the budding bell, even while still attached, are quite rapid and violent, causing the animal to sway back and forth as the water emerging from the opening of the bell strikes against the inner walls of the bell cavity of the parent. The cavity of the bell of the young is relatively much larger than that of the adult. The whole of its apex is taken up by a short pedicle, by which, as has been already pointed out, the bud is fastened to the parent.

The number of tentacles appended to the bud in this stage of growth is sixteen. The same number is also found in the youngest of the free forms, which had voluntarily separated from the parent, and were fished up with a drag-net. These tentacles are distributed as follows. At the end of each tube there is a cluster of three tentacles, composed of a medial member, usually the longest, and two lateral. A single short tentacle is placed in a position midway on the bell rim between each of these clusters. The tentacular bulbs in the bud as compared to the bell are larger in the bud than in the adult. The proboscis has a yellow color, and is, like that of the adult, already four-parted, and when seen from below is cruciform. The extremities of the oral tentacles are undivided, but bear many small knobs mounted on short thread-like styles. The proboscis has as yet no peduncle. The stomach and oral tentacles resemble closely the same organs of *Dysmorphosa*. Three buds on the proboscis of this bud belong to a second generation, grandchildren of the original *Lizzia* with which our account opened. The second generation of buds has not been found

* Zeit. f. Wiss. Zoöl., Bd. X. p. 403.

by me very completely developed, as long as the union of their parent to the first *Lizzia* remained unbroken. In addition to a well-developed bud, which, as Sars pointed out, seems in its growth far in advance of the remainder, we find other buds, now to be described, in various stages of development, from a simple hernia-like protuberance of the walls of the proboscis to a sphere united at one pole to the parent. Each seems in its early stages to be enclosed in a separate capsule, which is ruptured at the time when the bell opening is formed, long before the final separation of the bud from its parent. The remains of the capsule after the rupture are then absorbed by the parent. In the youngest buds from the proboscis of a *Lizzia,* four of the tentacular bulbs are very large and conspicuous. These bulbs are situated at the junction of radial tubes, with a circular vessel. From each of them arises a single club-shaped and hollow tentacle, which, with the three other primary tentacles, is nicely folded over the future opening of the bell cavity above the future veil. In this stage, before the capsule in which the young medusa is contained is ruptured, the four tentacular bulbs, which become the ocelli, are large, and form the most conspicuous structure in the bud. In the same stage the proboscis is a club-shaped body, almost filling the whole upper part of the bell cavity, and has the free end bifid, thus prophesying the future oral tentacles. Each of the bifurcations is thickly set with lasso-cells, but is destitute of knob-like bodies mounted on pedicles. The mouth is as yet closed. The next oldest stage to that last described in the growth of the bud is one in which there are four radial tentacles, and the beginnings of four others intermediate between them on the bell margin. This stage resembles in many particulars a jelly-fish called *Dysmorphosa fulgurans,* A. Ag. We have here eight tentacles, of unequal size to be sure, and buds beginning to form on the proboscis, both true characteristics of *Dysmorphosa.* A little later the surrounding capsule breaks, and the bell opening, with its veil, is speedily formed, so that there protrudes a well-developed medusa, only a little less mature than that shown in Plate I. fig. 1.

The order of appearance of new tentacles in the intermediate clusters is different from that given by Mr. Agassiz,* and copied from him by Haeckel.† The method of growth, more especially the addition of the new tentacles, is as follows.

The tentacles in the intermediate clusters appear *singly,* each one of its cluster being well developed before the beginning of the next following. Good figures of *Lizzia,* while in a stage with two tentacles in each intermediate cluster, and at the same time with three in the radial clusters, are given by Forbes. In fact a medusa with tentacles in this condition is the oldest which he has figured. It is probably, as has been pointed out, a younger stage, for in subsequent growth a third tentacle is added to each interradial cluster, and thus we have a medusa in which the number of tentacles is three in all clusters,

* North American Acalephæ, p. 161.

† Das System der Medusen, p. 95.

both intermediate and primary, although the tentacular bulbs at the ends of the radial tubes are larger than the remainder. This predominance in size they always retain. Fig. 1, Plate I., represents a young *Lizzia*, intermediate in form between that figured by Forbes and the adult *L. grata* as given by Mr. Agassiz. The addition of two more tentacles to the primary clusters completes the number five and gives for the adult, as far as followed by any observer, thirty-two tentacles in all. There appears, however, no satisfactory evidence that this is the maximum number possessed by the adult, and possibly the intermediate clusters likewise increase to five tentacles instead of three, which would give it a resemblance to the genus *Rathkea* of Haeckel.

Lizzia passes through a *Dysmorphosa* and *Margellium* stage, and has the power of germination throughout them both. It seems, therefore, hardly proper as yet to form new genera, as Haeckel has done, on what are surely embryonic features. The genus *Rathkea* of Haeckel, or *Oceania Blumenbachii* of Rathke, in the description and figures of the latter, has eight chymiferous tubes. I do not feel justified in considering with Haeckel that four of these tubes are folds of the bell or muscular fibres. There is one feature found only in more advanced stages, which seems to be wanting in all the immature conditions of the *Lizzia*. Four small bundles of oral knobs are formed on the under side of the lips near the bifurcation of the oral tentacles. These make their appearance at the same time that the second tentacle in the intermediate clusters develops. Mr. Agassiz has given a good figure of them in the adult proboscis (N. Amer. Acal., p. 162).

The specimens of *Lizzia*, with buds in all sizes, which I have studied, were taken abundantly in tide eddies in Laboratory Cove, at Newport, R. I. The development of the egg is unknown. At the junction of each of the radial tubes with the stomach, in older specimens, clusters of small ovarian-like cells were observed, which resembled undeveloped ova, but I was unable to definitely form an opinion as to their exact character.

Mabella gracilis, n. g. & s.

Plate VI. Figs. 2, 3.

A single specimen of a very interesting jelly-fish was taken near the close of the month of July. This medusa is of a genus as yet undescribed, and resembles *Dysmorphosa* very closely, with the exception (?) that it has *eight* radial chymiferous tubes. Gemmation from the proboscis similar to that which has been described in *Lizzia*, combined with the last-mentioned characteristic, makes it a most interesting and exceptionable jelly-fish. The bell has the shape of a very convex watch-crystal, the height of which is about one half its radius. It is transparent, colorless, and the surface is covered sparsely with small papillæ. The chymiferous tubes are narrow, without side appendages, simple, and *eight* in number. Proboscis without a peduncle, quadrate, with four undivided and non-bifurcated oral tentacles, which have their club-shaped tips covered with knobs not unlike those in *Lizzia.* The mouth is never protruded beyond the bell opening. There were three half-formed buds on the walls of the upper part of the proboscis, but none were far enough developed to exhibit movements of themselves, and appeared to be enclosed in a capsule. Tentacles hollow, flexible, transparent, sometimes carried upright as in Fig. 3, are about equal length, and with smooth surfaces. Number of tentacles eight. The tentacular bulbs are divided into two parts, an external portion so called, since more distant from the centre of the disk than the other, is carried external to the bell cavity as the jelly-fish swims, and is of dark brown color. A smaller, internal part of crimson color may be likened to a true ocellus. Sexual organs not known. Hydroid unknown. This genus is the only one described in which budding takes place from the proboscis of a hydroid medusa with *eight*, or more than four, chymiferous tubes. It resembles closely *Dysmorphosa fulgurans*, A. Ag.

I feel sure from repeated examination that *Mabella* has eight tubes in the bell, but cannot definitely say that it is not the same as *D. fulgurans*, A. Ag. Brandt * represents in *Rathkea Blumenbachii* a jelly-fish with eight tubes, but the tentacles in it are not single, and no reference is made by him to gemmation from its proboscis as a method of reproduction. The shape of the bells of *Rathkea Blumenbachii* and *M. gracilis* is very different, which leads me to think that these two medusæ, although alike in the number of chyniferous tubes radially arranged in the bell, are not the same.

Turris episcopalis, Fewkes.

Oceania episcopalis, Forbes.

Plate III. Figs. 1, 2, 3, 4, 5, 6.

Several specimens of a jelly-fish, which seems to be identical with the *O. episcopalis* of Forbes, were taken by me last summer. These medusæ were all found in the same week in July, and at no other time. In former seasons it has not been seen. The whole number of specimens taken was ten. This medusa is one of the largest of the Tubularians of our waters, and is inferior to none in beauty. The positions which it assumes while swimming are very characteristic and full of grace. The bell is shaped like an inverted teacup, with a conical prolongation above. This projection may be retracted into a spherical shape, or greatly elongated into a slender cone. In some specimens the cone is capped on the apex by a small button. The prolongation is gelatinous and solid, with smooth surface. The walls of the bell itself are thin, transparent, pale milky white. The radial tubes are very broad with lateral glands (?) or muscular attachments to the bell walls, imparting to their outline a jagged appearance. Number of radial tubes four. Circular tube broad,

* Brandt, Beschreibung der Oceania Blumenbachii einer bei Sevastopol gefundenen leuchtenden Medusa von H. Rathke, 4 Oct., 1833.

with a jagged upper edge, as seen in profile. All the tubes infested with parasitic *Distoma*. The proboscis is large, hanging from a pyramidal elevation in the bell cavity left by four recesses, which are prolongations of the bell cavity itself, extending into the base of the apical extension of the bell walls. The broad tubes which extend along the proboscis hang from this projection as in a sling, one from each angle. The prolongations of the bell cavity upward into the gelatinous substance of the conical apex of the bell leave four thick partitions, which separate the upper bell cavity into four chambers. These chambers can best be understood by a study of the figures (Plate III. figs. 1, 2, 3, 4). The sexual organs were fully developed, and in all the individuals which I captured were female. The ovaries in larger specimens were swollen with ova, and are formed of vertically placed tubes flanked with lateral branches, which, when the ovaries are mature, fill almost the whole upper part of the bell cavity below its division into the four chambers already mentioned. The stomach is quadrate in shape, with mouth simple, and destitute of oral tentacles. The proboscis terminates near the veil, and rarely, except in distorted specimens, extends outside the bell opening.

There are two kinds of tentacles, the smaller of which probably develop into the larger. The length of these two kinds of tentacles is very disproportionate. The ocelli placed upon their respective bases seem to be arranged in two series, those on the bulbs of the longer tentacles are situated higher up on the bell than those on the smaller. The long tentacles in the oldest specimen, which I have studied, are very flexible, and when retracted are closely coiled together, each one around its respective tentacular bulb. The number of long tentacles is sixteen. In the young specimen of *O. episcopalis*, Forb., which Forbes figures, there are but eight long tentacles. Four arise from the point of junction of radial and marginal tubes, and three on the bell rim between each pair of the primary tentacles. All sixteen long tentacles have triangular enlargements at their bases, and are joined by one angle of the enlargement to the bell margin, while the adjacent angle is continued into a pointed projection, extending upward for a short distance along the side of the bell, as shown in Plate III. fig. 5. At the very tip of this extension there is a bright crimson pigment spot. There are sixteen of these pigment spots, and together they make the upper series. They are true ocelli, corresponding with the black eyespots on the tentacular bulbs of *S. mirabilis*, Ag.

Between every pair of these larger tentacles, there are three short, finger-like processes, each with a single pigment spot at its base, the color of which is the same as that of the pigment spots of the upper series. The centrally placed of these three short tentacles is the most developed, and the pigment spot which it bears is of about the same size, and has the same appearance, as those of the upper series. None of the smaller tentacles send a pointed projection from the tentacular bulb up the side of the bell, as is the case with all the long tentacles. There are forty-eight smaller tentacles. The pigment spots which they carry form the second and inferior series of these organs. The tentacles, both large and small, are hollow, flexible, and with smooth surfaces. Their color is pale yellow. In the youngest stages each pigment spot is double, formed of two clusters of pigment grains of unequal size.

Plate II. fig. 2, in Forbes's work, illustrates a young specimen of this species. Figs. 3 *b*, 3 *c*, of the same plate, exhibit very well the arrangement of the pigment spots of the tentacles in two series. In Plate III. fig. 2, I have given for comparison a younger stage of this genus, with eight long tentacles. The bell is not relatively as high as in Forbes's figure of the same, and the four prolongations of the bell cavity into the apical projection of the bell are more pointed and deeper than he has represented.

Development from the egg is unknown.

Locality, Newport, R. I.

Turris episcopalis seldom comes to the surface of the water, in the glass vessel in which it is confined, and may be a deep-sea medusa. It seems to be very near the medusa which Claus described as *Oceania pileata* (Zeit. f. Wiss. Zool., Bd. XIV., Stud. über Polypen und Quallen der Adria. Taf. XIII. figs. 46, 47).

Modeeria multitentacula, n. s.

Plate III. Figs. 7, 8, 9.

A jelly-fish found by Mr. Agassiz, in 1865, resembles closely the genus *Modeeria*, Forbes, as he has pointed out in manuscript notes from which this description was made. It differs from *M. formosa* in the following particulars. Its bell is of uniform thickness, while in *M. formosa* the apex is much thicker than the walls. The chymiferous tubes of *M. multitentacula* are broad and well defined, while in *M. formosa* they are fine and thread-like. The peduncle upon which the stomach and ovaries are borne is much more developed than in *M. formosa*. The tentacles are more numerous in *M. multitentacula* than in *M. formosa*, and the pigment spots of the tentacular bulbs are found on their under surfaces at a short distance from the union of tentacles and bell margin. The medusa resembles the genus *Callitiara*, Haeck. *M. formosa* has undeveloped ovaries, and may be the young of a form more like *M. multitentacula*.

The bell of *M. multitentacula* is high, almost a prolate spheroid in form, with one pole truncated to form the bell opening. The diameter near the bell margin is slightly greater than that just above this point. It decreases very gradually towards the apex, where it is only a trifle less than at the bell margin. The bell walls are thin throughout, and without apical prolongation or thickening. Chymiferous tubes simple, with smooth profile, and of medium width. They enlarge slightly before their junction with their tentacles, and are four in number. In the upper part of their course they arch over on to the peduncle, and extend down the sides of the proboscis to their opening into the stomach. Bell transparent, and with smooth surface.

The proboscis is large, with a peduncle, which fills a large part of the upper portion of the bell cavity, and extends downward almost to the bell opening.

The mouth rarely reaches outside the entrance into the bell cavity. The peduncle in the figure has a cellular appearance. This resemblance to cells may be due simply to superficial folding of its walls, and the peduncle itself may be transparent and gelatinous, like the remainder of the bell from which it hangs.

The sexual organs are formed of four globular bodies, of orange brown color in which darker colored patches are distinguishable. The specimen figured is a female. The male is unknown. The oral tentacles are simple, short, four in number, and clothed at their tips with many knobs.

The tentacles are numerous, uniform in size, flexible, hollow, carried like those of *Trachynema* or *Turritopsis* closely coiled about their bases. Their color is greenish, with deeper coloration in the bulbs. Tip of the tentacle pink. Number of tentacles, thirty-two.

A bright crimson pigment spot is borne on the under side of the enlarged base of the tentacle, a short distance from its union with the rim of the bell. This position of the pigment spot is very characteristic.

Development from the egg unknown. Male unknown.

Locality, Naushon, Buzzard's Bay. A. Agassiz.

This jelly-fish I have never seen, and the description is made from a sketch, with notes loaned me for that purpose, by Mr. Agassiz.

Gemmaria gemmosa, McCrady.

Plate I. Figs. 10, 11, 12.

McCrady first described a new jelly-fish from Charleston Harbor allied to *Zanclea* of Gegenbaur, to which he gave the name of *Z. gemmosa*, suggesting at the same time that its characteristics may be important enough to place it in a new genus for which he presents the name *Gemmaria*. Mr. Agassiz adopts the name *Gemmaria gemmosa*, and gives additional drawings of what seems to have been the same jelly-fish. The form which is here described as the adult of *G. gemmosa* was discovered by Mr. Agassiz, from whose drawings and notes this description is made.

The bell is teacup-shaped, with an apical hemispherical protuberance, which rises slightly above the apex. The bell walls are thin. Surface, except in four meridional lines yet to be mentioned, smooth. The radial tubes simple, narrow, smooth in profile, and four in number. Proboscis without peduncle, and extending normally to the opening into the bell cavity, and sometimes capable of great protrusion outside the bell. Oral tentacles wanting. The mouth opening is circular. The lips are studded sparsely with large lasso-cells. The lower part of the proboscis is slender, the upper very much swollen with the ovarian glands. Ovaries in four spherical lobes, through the walls of which eggs with germinative dot and vesicle can be plainly seen.

The tentacles are primary, uniform in size and length, and four in number. The tentacular bulbs are large, and each tentacle is thickly crowded with tentacular knobs, which resemble stalked capsules, in each one of which is contained a number of lasso-cells (?). The knobs near the end of the tentacle are more scattered. The surface of the tentacle is rough. Four meridional lines or areas extend from the tentacular bulbs along the surface of the bell to its apex. To these structures, which are filled with bright cells, the species owes its name. I am in doubt whether they are continued the whole distance to the apex. Near the bulbs of the tentacle they form four areas, broader than the meridional lines, and otherwise differentiated from them.

The otocysts are wanting.

Locality, Newport, in September.

The genus *Gemmaria*, if this form with four tentacles is the adult, is closely allied to *Zanclea* of Gegenbaur.

Dinematella cavosa, n. g. & s.

Plate II. Figs. 2, 3, and Plate IV. Fig. 3.

Many specimens of a jelly-fish closely allied to *Stomatoca apicata* were taken in the summer of 1880. This medusa has generally been confounded with *S. apicata*, being looked upon as a variety, or as its male.

The most striking superficial difference between the two genera is in the color of the ovaries, and their peculiar shape. Mr. Agassiz mentions in "North American Acalephæ" examples of *S. apicata* where the sexual organs are cream-colored. He may have had the same medusa which is here described, and which is considered a wholly different genus from *Stomatoca*. The most important anatomical peculiarity of this new genus is the presence, in the apical prolongation of the bell, of a cavity, which almost fills the whole of this part. The bell has a conical apical projection which is not as high as a like protuberance in *Stomatoca*. The height of the projection is not more than one half that of the bell itself. In young specimens it is very small. The cavity within occupies all the lower part of the projection, and has a form which would contain the frustum of a cone. The contents of the cavity is a liquid identical with that which circulates in the marginal and radial tubes. A similar cavity in the apical prolongation of the bell in *Ctenaria* is said by Haeckel to contain planulæ. It is hardly possible in alcoholic specimens to distinguish the planulæ of *Dinematella* from particles of chymiferous fluid. The cavity in the apical projection of this genus is not a brood sac, and has not been observed with young medusæ within. The extremity of the prolongation on the apex of the bell is *solid*, forming a gelatinous hemisphere without external opening, which caps the top of the cavity. In a younger specimen, the walls of this cap were penetrated by a tube, through which, when attached to the hydroid, their cavities probably communicated. *Dinematella* probably buds from a hydroid, and this cavity never serves as a brood sac, at least for stages more developed than the planula. In older specimens there is no communication between the cavity and the surrounding medium, as in *Ctenaria*. The color of the bell is light green.

The radial tubes are unbranched, broad, with jagged profile, and four in number. The proboscis is shorter than that of *Stomatoca*, and extends two thirds the distance down the bell cavity. There is no peduncle. The ovaries are large, and crescentic shaped, filling a large part of the upper portion of the bell cavity. They are of a cream color, with a greenish tinge. Oral tentacles not folded, and undivided, without knobs, and four in number. At times the oral tentacles by a contraction of the bell walls are extended beyond the bell opening, as is also the case in *S. apicata.* Veil thick, muscular, and when at rest re-entering the bell cavity. It plays a great part in the motion of the animal. Tentacles two, very long and flexible, and at times coiled into a shapeless snarl around the tentacular bulb. Their color is light green, with extremities white. Tentacular bulbs large, pale green, and cream-colored, in the motion of the medusa carried sidewise like those of *Stomatoca.* Their color, as that of the whole tentacle, is often tinged with pink. Between the two long tentacles in either semicircle of the bell margin there are three slight projections, each one of which has a bright pigment spot of crimson color. The pigment spots are not borne on small tentacles, as in *Stomatoca,* but on simple protuberances.

Otocysts wanting.

Development unknown. Eggs small, white, cast in great numbers in the glass dish in which the jelly-fish is confined.

Locality, tide eddies in Laboratory Cove, Newport, R. I. Many specimens were taken each summer.

Stomatoca apicata, Agassiz.

Plate II. Figs. 1, 4, 9.

This beautiful jelly-fish was first described by McCrady, under the name of *Saphenia apicata.* It differs very greatly from *S. dinema* of Eschscholtz and Forbes in the shape of the bell, as compared with the figure given by the latter. Eschscholtz gives no figure of *S. dinema*, and, until a comparison of specimens can be made, it is best to retain the specific name of *apicata* for our representative of the genus.

The only published figure of *S. apicata* is a poor one by McCrady. A similar jelly-fish was mentioned by Mr. Agassiz, from New England waters, but he has given no figures of it, and added nothing to McCrady's account.

The bell has an irregular, triangular profile, and the upper angle is formed by a conical projection, apically placed, the height of which is oftentimes double that of the bell itself. This prolongation varies in size in different specimens, now very slender, and then short and blunt. It may also be at times, as McCrady says, jauntily carried on one side. The substance of the apical projection is solid throughout. The bell walls are thin and with smooth surface. The diameter of the bell is slightly larger near the margin than a little above. The chymiferous tubes are broad, with jagged outline, and are four in number. Near their junction with the two tentacles they enlarge into small triangular cavities. The stomach is capacious, and without peduncle. It is very extensile, the lips normally falling outside the bell opening, but also at times retracted into the cavity of the bell. The upper part of the bell cavity is almost wholly taken up by large ovaries, which cover and conceal the whole base of the proboscis. The ovarian glands are formed by four spherical lobes of claret color, the surface of which resembles closely the convolutions of the brain. The eggs are cast in abundance by the larger females, and were raised into planulæ. They are white in color, and undergo a total, regular segmentation. I have not traced them into a hydroid, but have no doubt that they ultimately develop into that condition.

The lower part of the proboscis is slender, and enlarges into a trumpet-shaped mouth. The walls which separate the lobes of the ovaries are continued into the lips as four elevated ridges, which give to the stomach, when seen from below, a cruciform shape. The lips of the trumpet-shaped mouth are very much folded, and are destitute of lasso-cells or knobs. The medial line of the lower and slender portion of the proboscis is of a claret color, which fades gradually in the raised ridges into brown and pale red. There are two tentacles, both of which are very long and flexible, and of equal size. At rest they are generally coiled up into a snarl about the tentacular knobs. Their color is white. Between the long tentacles in either hemisphere of the bell margin there are seven tentacula-like bodies, each one with a claret-colored pigment spot, resembling in size and color an ocellus. McCrady speaks of three of these pigment structures, or ocelli, but does not figure them in his plate. The tentacula-like structures which arise from the margin of the bell near the radial tube, intermediate between the longer tentacles, are larger than the others. The size of all, as compared with the two long tentacles, is very small.

S. apicata is common at Newport, and, like many other jelly-fishes, it seems to prefer the bottom of the aquarium in which it is confined, and only rarely comes to the surface of the water.

Turritopsis nutricola, McCrady.

Plate IV. Figs. 4, 7, 8, 9, 10.

The genus *Turritopsis*, first suggested by McCrady, is well known on account of the peculiar life of the young *Cunina octonaria*, McCr. in its bell cavity. The only description which we have of the adult is by McCrady, but the distinguishing points in its structure were not sufficiently emphasized by him, and especially in the account of the base of the proboscis his description is quite faulty. The commensalist in the bell cavity of the jelly-fish from Charleston Harbor I have never seen. *Cunina octonaria*, its adult, is not found in Narragansett Bay. *Cunina discoides*, s. n. is, however, often taken, and its young may be a commensalist in some other medusa, but finds no protection in the bell of our *Turritopsis*. The bell of the adult *T. nutricola* has an almost spherical shape, with thin walls and a slight apical projection. McCrady's figures do not show this protuberance, for the reason that the specimens which he drew had the proboscis more or less protruded outside the bell cavity. The external surface of the bell in the adult is smooth, and in the young is crossed by eight meridional lines of cells, two of which arise from each tentacle and extend to the pole of the bell, where all have a common junction. The radial tubes are narrow, thread-like, and not "wide," as McCrady says. They are four in number. The proboscis is without peduncle. McCrady gives a long description of what he calls a cellular upper portion of the proboscis, which resembles a peduncle as found in some other medusæ. This cellular structure is in reality the inverted upper part of the bell cavity of a *Turritopsis* in which the proboscis has been extended outside the bell opening. The bell of this genus is often reversed, so that the whole of the proboscis with attached ovaries is pushed out exterior to the bell, just as takes place in other genera, as *Eucope* and *Obelia*. As a result of this protuberance of the proboscis, the upper part of the bell is infolded and pressed into a "cellular body," like a peduncle. In normal positions of the medusa the proboscis has no such peduncle.

The ovaries are large, and arranged in four lobes, which cover the whole upper part of the proboscis. Their color is orange. Of oral tentacles there are four, each one of which is subdivided into two parts at the extremity, and covered with very peculiar knobs, mounted on short retractile, thread-like pedicles. These knobs, as McCrady pointed out, give to the extremity of the oral tentacle a "frosted appearance." They are characteristic in their form of the genus *Turritopsis*. A few of the same kind of pedunculated cells are found near the first bifurcation of the oral tentacles, but the most of them are confined to their extremities. The tentacles are numerous, with a length twice the height of the bell, hollow, flexible, and clavate at their extremities. When at rest they are coiled around the base, not unlike the position assumed by the tentacles of *Trachynema digitale*, A. Ag. The number of tentacles in the oldest specimen is thirty. The tentacular bulbs are so closely crowded together that intermediate sections of the margin of the bell cannot be seen, or are so very small that the tentacular bulbs appear to touch each other.

Otocysts wanting.

Locality, Newport, R. I.

I have not noticed in the jelly-fish the zigzag motion which is mentioned by McCrady, but the movement was always direct, consisting of several successive rapid contractions of the bell and veil, and then a pause followed at a short interval by similar exertions. McCrady says *Turritopsis* is gregarious. It is found accompanied by large numbers of the same kind, but cannot be said to be more gregarious than many other jelly-fishes. Accumulations of many in one place are due to tide eddies.

The younger stages in the growth of the medusa have been well figured by Mr. Agassiz. A few intermediate stages are given by me to fill up the gaps in the developmental history (Plate IV. figs. 4, 6, 7, 9, 10). Fig. 6 is a magnified view of one of the peculiar knobs found principally on the extremities of the oral tentacles, and characteristic of the genus.

The development of the egg of *Turritopsis* is unknown. Eggs were observed to be dropped in August. The younger stages of the medusa are characterized by the tenuity of the bell walls, and the short tentacles, which are sometimes carried stiffly thrown back along the side of the bell or tightly coiled round the tentacular bulbs.

Dipurena strangulata, McCrady.

Plate IV. Fig. 5.

Two species of *Dipurena*, *D. strangulata* and *D. cervicata*, were described from Charleston Harbor by McCrady, who founded the genus. A third species, *D. conica*, is described from Naushon, Vineyard Sound, by Mr. Agassiz.

A single specimen of *D. strangulata* was captured by the author at Newport, in September. The bell is half-egg-shaped, with the minor axis greater than the height. It is very transparent, colorless, and has a smooth surface. Radial tubes four, resembling fine lines on the bell, and simple in profile. Proboscis long, slender, extending when protruded far outside the bell opening, and with ovaries so distended with eggs that it can with great difficulty be withdrawn into the bell cavity. At the point on the inner surface of the bell from which it is suspended, there is an enlargement in the neck of the proboscis into a kind of bulb, which has bright red contents. The function of this bulb is not known. A similar structure, reduced in size, is found in many other medusæ, as in *Sarsia mirabilis*, *Ectopleura ochracea*, and some others. The sexual organs are divided into two parts, or arranged in two packets on the proboscis, separated by an interval from each other. The upper of these is placed about midway between the bulb already mentioned and the mouth or the distal end of the proboscis. This division of the sexual organ is a simple oblong body of uniform size throughout. Through the external walls the motion of the chymiferous fluid within the proboscis can be well seen. The enlargement around the cavity of the proboscis is filled with ova. The upper portion of the surface is covered with minute warts, the lower bears patches of bright crimson color. The whole has a greenish color throughout. The lower of the two divisions into which the sexual glands are divided is larger than the former, and has a slight constriction midway in its length. In it also, as in the former, the walls of the stomach may be easily seen, surrounded by the peripherally placed eggs. Like the lobe already mentioned, it too has patches of crimson color in its lower half, and the surface is set with lasso-cells (?). The mouth is simple, and destitute of tentacles or knob-like appendages. The tentacles are short, stiff, solid, or with a very small central cavity, and are generally carried at an angle to the bell. They are four in number. The tentacular bulb is large, spherical, with green pigment, and a single small black ocellus externally placed on a slight projection from the bulb. The distal end of the tentacle is a dumb-bell shaped organ, which is separated from it by a neck, the diameter of which is slightly smaller than the constriction in the dumb-bell shaped organ itself. The whole interior of the end of the tentacle is filled with patches of crimson pigment, which are enclosed in a layer formed of elongated cells placed side by side. Extending over this cell-layer is a second and thicker stratum, composed of smaller, less regularly arranged cells. All these histological structures taken together impart to this portion of the tentacle the resemblance to a specialized sense organ of some kind. The tentacle itself is composed of large central cells and a thin layer of ectoderm. Its interior resembles that of a *Cunina* tentacle.

Otocysts wanting.

Development unknown. Single specimen was a female.

Locality, Newport, R. I.

Zygodactyla groenlandica, Agassiz.

Plate V. Figs. 5, 6, 11, 12.

These jelly-fishes are sometimes two or three inches more in diameter than measurements which others have given. When fully extended, they are oftentimes eighteen inches in diameter. They are very abundant at Newport in the last of August. To the description which has been given of the adult can be added, that, extending in radial rows from centre to circumference, between each pair of radial tubes on the under side of the umbrella, there are rows of small tubercles or simple knobs, prolongations of the substance of the disk. There are about twenty such tubercles in each row. In the young *Zygodactyla* with eight tubes, these tubercles were present, but limited to a circle with a radius half that of the disk of the jelly-fish itself. I have not found similar tubercles placed on the inner surface of the umbrella described in any other medusa. In some cases, as often happens in a *Zygodactyla*, two of the tubes divide in their course half-way between stomach and bell margin. The lines of tubercles also bifurcate, and follow the tubes between which they lie. On each side of the base of a single tentacle of *Zygodactyla*, there is a green body, the function of which is not known. If the openings at the base of the tentacle are, as has been suggested, depuratory orifices, these structures may play some important part in this function. Plate V. fig. 11, taken from a young *Zygodactyla*, where the tentacle is but slightly developed, shows both the depuratory opening and the pair of green bodies adjacent to it. The very young tentacle has at its tip lasso-cells, which disappear with age. The relative size of the green bodies also becomes reduced as the *Zygodactyla* grows older.

The jelly-fish represented in Fig. 156 of the "North American Acalephæ" is probably not the young of this animal. It is too small, and has four genital organs, one on each of but four chymiferous tubes. The development of other tubes takes place before any sign of the genitals appears; and when sexual organs do develop, they do not begin as round bodies limited to one point on the tube, but as narrow folds along the whole length of the vessel. The stomach of a young *Zygodactyla* has a rectangular outline. Intermediate tubes really begin to form while there are but four tentacles, while the figure referred to (N. Amer. Acal., Fig. 156) has four chymiferous tubes and *twenty-four* tentacles.

The youngest *Zygodactyla* taken by me was captured with the drag-net in the last of June. It was a little more than an eighth of an inch in diameter, and is figured on Plate V. figs. 5, 6. The color of the bell on a black ground is pale green; that of the tentacles, cream-white. The radial tubes broad, four in number, each one arising from an angle of the rectangular stomach, and extending the whole distance to the bell margin. There are also rudiments of four other tubes, each of which arises from the side of the stomach midway between the pairs of primary tubes, and extends half the radius of the bell, and there ends abruptly in a slight enlargement. There are four tentacles corresponding with the tubes which are fully developed, and beginnings of four more, one midway between each pair of primary. The tentacles, as soon as developed to any extent, are coiled up when the animal is at rest, just as is the case in the tentacles of the adult. The outer surface of the bell is crossed by four meridionally placed rows of lasso-cells. These diminish in size with the growth of the *Zygodactyla*, and in the oldest medusæ are almost completely lost. No tubercles exist on the under side of the umbrella of a *Zygodactyla* as small as the example which I figure. Vertical outline of the stomach rectangular. Development unknown. Although the ovaries were crowded with eggs, I was unable to raise any of them, and cannot tell whether it has a hydroid or not, except on the grounds of comparative embryology of other and similar medusæ. Variations in the course of the tubes, their union, bifurcations, and number, are very numerous. In such cases of abnormal growths the ovaries which accompany the tubes follow the same variations.

Tima formosa A. Ag.

Plate VI. Figs. 1, 4, 5, 6.

A *Tima* was very abundant at Newport, in May of the past year, which later in the season disappeared altogether. In former years, I have begun my work there in June, and have never had a specimen of *Tima*. These facts lead to the conclusion that the medusa is a spring jelly-fish in Narragansett Bay.

Tima formosa, A. Ag. is closely related to *T. Bairdii* of Forbes. Of the former species, the only representative of the genus on our coast, Mr. Agassiz has given a good account. Larger specimens, with more tentacles than he mentions, were found, but in the main I have little to add to his description of the adult. He says that the otocysts have from four to five otoliths. This number is too small. In many otocysts of young jelly-fishes ten to fifteen otoliths were counted by me. The otocysts often form new ones by a process of self-division. Equatorially in a large otocyst a constriction takes place, which later deepens until the inner wall touches the floor opposite the point where the first sign of constriction appeared. The double otocyst, one of the component parts of which is usually smaller than the other, is now separated into two distinct otocysts by the growth of the intervening margin of the bell. Besides the production of otocysts by fission in this way, new otocysts also appear by a growth from the ectoderm of the bell rim.

The young of *T. formosa* is said by Mr. Agassiz to be without otocysts. A specimen of *Tima* still younger than that represented in Fig. 169 of the North American Acalephæ has two otocysts with otoliths, between each pair of the sixteen tentacles. The number of otoliths in each of these otocysts is seven.

Many specimens of this genus were without stomachs on the end of the proboscis. From many specimens taken in the last of May, a single example only was not mutilated in this way. A new stomach, however, grows quickly from the peduncle of a *Tima*. It forms by a process of budding in four or five days, so that all the oral tentacles are fully formed at the end of that time. The formation of the new stomach begins simultaneously in four points, which are near the terminations of the chymiferous tubes, at the end of the peduncle. As they increase in size they join at their sides, at last forming the stomach as it has been described in the adult.

Eutima gracilis, n. s.

Plate V. Figs. 1, 2, 3, 4.

A single specimen of a *Eutima*, which differs somewhat from either of the two species, *E. mira* and *E. variabilis*, described by McCrady, was taken in the tow-net. It differs from these, and also from *E. limpida* of Mr. Agassiz, in that each of the rudimentary tentacles, as well as those fully developed, bears a pair of lateral "spurs," or thread-like appendages. It may be the adult of any one of the three forms of *Eutima* which have been described from American waters, but the descriptions which have been given of them do not warrant a reference of it to any one of the known species.

The bell is shallow, rounded at the apex, and has very transparent walls. The surface is smooth. The radial tubes are thread-like, and from them hang small transparent sexual organs, which extend their whole length in the bell, but not on the proboscis. Their undeveloped condition indicates an immature individual. From the centre of the bell cavity hangs down a long, flexible, transparent peduncle, along which extend the four chymiferous tubes, after arching over from their radial course on the bell. The peduncle protrudes outside the bell opening, and carries on its end a globular stomach, which has a mouth with four oral tentacles. The latter structures have smooth lips, are undivided at the tips, and are destitute of knobs.

The tentacles arise from the margin of the bell at the junction of the radial tubes, and are four in number. They are long, flexible, hollow, and with apple-green colored tentacular bulbs. From the base of each tentacle arises a pair (one from each side) of thread-like "spurs," which are generally tightly coiled up, even when the tentacles themselves are extended. These tentacular appendages have a cream color. (For their relative position see Plate, V. fig. 1.) Intermediate between each pair of tentacles are four rudimentary structures, simple elevations of the bell margin, each of which has thread-like "spurs" similar to those found at the base of the four long tentacles. There are eight otocysts, two between each pair of long tentacles. Each otocyst contains numerous otoliths.

A single specimen of unknown sex was taken at Newport in the middle of August.

I have proposed the new name *E. gracilis,* although one of the forms already named may be its young.

Eucheilota ventricularis, McCrady.

Plate V. Figs. 7, 8, 9, 10.

This species of *Eucheilota* is not as abundant in Narragansett Bay as *E. duodecimalis.* The adult has been well described by McCrady, and two young stages are figured by Alexander Agassiz. My figures are of stages intermediate between those given by McCrady and the latter. McCrady's figure of the bell margin of the adult is in some particulars faulty. He figures (Plate XII. fig. 1, *b*) a tentacle on the bell rim, which has no lateral cirri. All the tentacles have in the adult these characteristic structures.

The first stage of *E. ventricularis* which I represent (Plate V. figs. 7, 8) is a little older than one figured by Mr. Agassiz, and has a flat bell with four simple, radial tubes, and eight tentacles, each with a pair of lateral cirri. There are eight otocysts, which alternate in position on the bell margin with the tentacles. The stomach is square in vertical outline, and hangs down about one third the whole depth of the bell cavity. No oral tentacles with knobs, or lasso-cells.

A second and following stage is also figured by me (Plate V. figs. 9, 10). This stage is a little younger than the adult as represented by McCrady. The whole number of tentacles has now increased to sixteen, and the new structures have appeared in such a position on the bell margin that between a primary tentacle and an otocyst there is now placed a single tentacle, so that each otocyst is separated from the adjacent by three tentacles on one side (the medially placed of which is a primary tentacle), and by one tentacle, the intermediate, on the other. This order in appearance of the tentacles is different from other hydroid medusæ.

The sexual organs are developed on the radial tubes, and are situated midway in their course between the stomach and the bell margin.

The figure which McCrady gives of the adult does not show the true form of the bell, nor the position and shape of the ovaries and proboscis. He omits also the lateral cirri found on intermediate tentacles.

Development unknown.

Locality, Newport, R. I.

This medusa was discovered in Narragansett Bay by Mr. Agassiz, who has kindly loaned me his drawings of it for study. Two specimens were taken by the author in 1880.

TRACHYNEMIDÆ.

Sphærula formosa, n. g. & s.

Plate I. Fig. 13.

A single small jelly-fish, closely allied to Gegenbaur's genus *Eurybiopsis*, was taken in August of last summer.

The bell is spherical, smooth, transparent, and with very thick walls. The depth of the bell cavity is about a half of the height of the bell itself. The radial tubes are simple, unbranched, and four in number. Their profile is not jagged. The veil is thick, muscular, and generally reversed, or turned into the bell cavity when the animal is at rest. In that respect it closely resembles *Trachynema digitale*, A. Ag. The motion of the animal in the water is accomplished in part by muscular action of the veil.

The proboscis is without peduncle, the stomach with open cruciform mouth There are no oral tentacles nor knobs. The mouth resembles closely the mouth of *Trachynema digitale*. Along the edges of the lips are rows of lasso-cells. The color of the whole proboscis is brownish and yellow.

There are four very flexible, hollow, smooth tentacles, with large tentacular bulbs carried at an angle to the bell. Around them the tentacles are often tightly coiled.

There are twelve otocysts, each composed of an *ectodermic* and *endodermic* layer. Ovaries wanting. Development unknown.

A single specimen of this jelly-fish was taken in the evening in August. I think from its want of ovaries that it is an immature form. The endodermic otolith leads one to place it with *Liriope* and *Cunina*, and not with Campanularians and Tubularians, where the whole otocyst with its enclosed otolith is ectodermic.

Trachynema digitale, A. Ag.

Plate II. Figs. 5, 6, 7.

Trachynema digitale is closely related to *T. ciliatum*, Gegenbaur. In the last part of May, this jelly-fish was very common in the bay, in every excursion filling the dip-nets with their numbers. I have been unsuccessful in a search for the very young forms, and have looked in vain in the stomachs of *Tima* and *Zygodactyla*, which were very common at the same time, in hopes of finding a case of commensalism, such as has been described in closely related medusæ.

A stage in the development of *T. digitale* younger than any yet mentioned is described below.

The bell of the youngest *Trachynema* is flat, without apical projection, and covered with small papillæ. The surface is destitute of cilia. The chymiferous tubes are broad, with smooth profile, and eight in number. Tentacles solid, stiff, with bright crimson pigment spots in their distal extremities, and with the surface ciliated. The crimson pigment spots at the end of the tentacles are in irregular patches of color, and perhaps correspond with similar structures in the tentacles of *Dipurena*. There are, however no such dumb-bell-like structures as are found in the latter genus. The number of tentacles is eight. The proboscis is short, destitute of a peduncle which is so completely developed in the adult. The mouth is cruciform, without oral tentacles, or knobs, and the lips are covered with lasso-cells. Color of the stomach, greenish, with brown shades. Otocysts four, each with a single centrally placed otolith which is endodermic.

In the past summer, all the intermediate stages between that described and the adult were found. My drawings add nothing to the figures and account which Mr. Agassiz has published. The tentacles of the adult are covered with cilia. The male of *T. digitale* was not found. The sexual organs were always extended with ova, which resembled the eggs of other medusæ in their transparency, and the possession of germinative dot and vesicle, both of which latter structures were plainly to be seen.

Cunina discoides, n. s.

Plate II. Fig. 8, and Plate IV. Figs. 1, 2.

The bell of *C. discoides* is flat, lens-shaped, transparent with smooth external surface. Radial tubes and extensions of the stomach wanting. No proboscis. The tentacles are solid, stiff, and borne at right angles to the vertical line of the bell. Number of tentacles fourteen. Below the bell is a gelatinous structure, collar-shaped, which hangs from the bell-margin as a circular ring, the width of which is about one half the height of the bell. This collar is crossed vertically by ribs (*peroniæ*), of which there are fourteen, each one arising from the base of the tentacle on the margin of the bell. These structures appear to give support to the tentacles, and have often been mistaken for vertical tubes. On the lower rim of the collar, which is called a sub-umbrella, are placed the otocysts. They contain each a single bright garnet-colored otolith, which is endodermic in its origin. Each otocyst is mounted on a short stalk. As the sub-umbrella hangs from the rim of the bell, so from the lower margin of the sub-umbrella is suspended a veil of about the same width as the sub-umbrella. It extends, however, at about right angles to the vertical axis, and forms a lower "floor" of the *Cunina*. The medusa is propelled in the water principally by the movements of this structure. The lower wall of the stomach is formed by a "washer-like structure" extended from the rim of the bell inwards at right angles to the vertical axis. The mouth is a simple circular opening in the centre of the washer last mentioned. The upper walls of the stomach are formed by the concavity in the lower surface of the umbrella. The stomach cavity appears full of granular particles, which are probably globules of chymiferous fluid. Sexual organs had not begun to develop. Development of egg unknown. The jelly-fish studied is probably an immature one, as the size and absence of sexual glands indicates. Whether it is identical with the Mediterranean species, which reaches a much larger size, is yet to be made out. It is not a frequent visitor in Narragansett Bay, and is undoubtedly brought there by the warmer waters of the Gulf Stream. Its anatomy shows that it is very different from Prof. McCrady's *Cunina octonaria.*

This description was made up from figures by Mr. Agassiz and a few rough sketches made by the author.

Liriope scutigera, McCrady.*

Plate VI. Figs. 7, 10, 11.

A single specimen of *L. scutigera,* McCr. was found at Newport in the summer of 1878.

Its bell is hemispherical, very transparent, with thick walls and smooth external surface. Radial tubes thread-like, unbranched, and four in number. Proboscis elongated, slender, with a long peduncle, which extends very far outside the bell opening. This peduncle is highly flexible. The lips of the mouth are simple, not elongated into oral tentacles, and cruciform when seen from below (Plate VI. fig. 10). Upon the lips are placed many lasso cells. The color of the lips is purple. A short gastrostyle hangs down as a continuation of the peduncle inside the stomach. No commensalists attached to it.

The tentacles are long, hollow, very flexible, and four in number. Lasso-cells are arranged in rings, alternating with smooth surfaces along each tentacle to its very tip.

Otocysts four, each one containing a single endodermic otolith. Each otocyst is sessile on the margin of the bell, and is accompanied by a club-shaped structure mounted on a short peduncle (Plate VI. fig. 11). The ovaries are situated on the radial tubes. They are heart-shaped, and so inflated with ova that their edges closely approach, where their width is the greatest.

The development of the egg is unknown.

* McCrady has published a partial description of this jelly-fish in his "Gymnophthalmata of Charleston Harbor," p. 106. A figure of the same is given in the North American Acalephæ, p. 60. The author of the latter does not represent the heart-shaped ovaries, but in his description says of them that they are more heart-shaped than McCrady describes. *L. scutigera*, McCrady, and *L. Catherinensis*, Fritz Müller, may be the same medusa.

SIPHONOPHORA.

Agalma elegans, Fewkes.

A. elegans is generally found once or twice each summer in Narragansett Bay. It appears with striking regularity about the end of the month of August.

In order to illustrate the general form of the adult there is given a life-size figure of one of the largest of these animals which was taken (Plate X.). Figures of the more important members of the colony and of younger stages can be found with explanations on Plate IX. The youngest *Agalma* figured in the latter plate (Fig. 2) resembles in some respects the genus *Athorybia*, and on that account is called the Athorybia stage. It is characterized by embryonic covering scales, which have serrated edges, and by peculiar tentacular knobs (Figs. 9, 9ª). Nectocalyces are not formed in this stage, and the float is surrounded by a crown of covering scales *fastened to an embryonic stem*, which is later absorbed. The covering scales of the adult *Agalma* (Figs. 3, 4) are not serrated along their margins, although their edges are crossed by rows of lasso cells (Figs. 11, 18), the tips of which, when seen in profile, impart the appearance of a serration to the border of the scale. The embryonic tentacles of the Athorybia larva never develop into those of the adult. These two structures, or at least the knobs which they bear, are so different in form in larva and adult that there is little doubt that they have different functions (compare Figs. 9, 9ª, with Figs. 20, 21).

The embryonic knobs do not resemble the tentacular knobs of the genus *Athorybia*, but are not unlike those of *Nanomia cara*, A. Ag. They bear on their distal ends long stiff hairs (cnidofils) which seem to arise from peculiar cells in the substance of the knob. They are non-retractile, and can be made to separate from or approach each other. All together generally when separated at their tips assume a fanlike shape. The mass of the knob itself is made up of large lasso-cells of two kinds. Of these the majority form a pavement of cells laid side by side, making a cup-shaped body, which is seen in the upper basal part of Fig. 9. The second kind of cells lie between these and those terminal cells out of which seem to issue the "cnidofils." The embryonic knobs have a darker crimson color than that possessed by the adult tentacular pendants.

The embryonic tentacle of the *Athorybia* larva arises from an embryonic polypite (Plate IX. fig. 14, *f*). This polypite is formed out of the modified yolk sac, and differs from the other polypites, which are formed later by the presence on the side towards the attachment of the tentacle, of a network of bright red pigment spots. The meshes of this latticework of pigment are clearly differentiated and well marked. This peculiar pigmentation distinguishes the embryonic polypite. All the others, which arise as simple buds from the stem, are destitute of the latticework of pigment found at the base or on the sides of the embryonic polypite. A larva of *Agalma* in a stage following the Athorybia stage bears a remote likeness to the genus *Physophora*. Although the resemblance is somewhat distant, for want of a better name I have called it the Physophora stage (Plate IX. fig. 1).

In this stage the tasters are arranged in a circle on an enlargement of the axis of the larva opposite the end which bears the float. This is a true characteristic of *Physophora*. Although nectocalyces are well formed, there is a section of stem between this terminal enlargement of the axis and the lowest nectocalyx which bears covering scales. This last feature separates the young *Agalma* from the genus *Physophora*. On the same enlargement which bears the circle of tasters there are two polypites, an embryonic, which is the modified yolk sac with the tentacle from which embryonic knobs are pendent, and a polypite with the characteristic tentacle and knobs of the adult. Both of these arise from the axial enlargement at the end of the stem. From a point on the axis just below the lowest nectocalyx hangs a single taster with tentacle, and small buds which later grow into polypites.

Tentacular knobs of both kinds coexist in this stage, but they are never found together in *Agalmata* in which there are more than four pairs of nectocalyces. No provisional or embryonic organs appear in stages between the Physophora stage and the adult *Agalma*. As far as the anatomy of the adult *Agalma* is concerned, I have little to add to what has already been given by others. In the arrangement of different individuals on the stem there is always a definite sequence, and the different individuals are never displaced from their proper order. Nectocalyces are always found on the nectostem, while feeding polyps, tasters, and sexual bells follow in an order which is exactly reproduced in different sections of the polyp stem. If we take a single such section the order is found to be as follows. Beginning with the upper end, there is found at first a polypite, just below which is the grapelike cluster of female bells. Removed by a considerable space on the stem from these, there is a cluster of tasters surrounded by male bells, and then, after another interval of about the same length of stem, another polypite with female bells and the beginning of a new section, which if followed out would be found an exact repetition of the preceding. This sequence is normally followed, whatever the length of the stem may be. New members of the polyp stem arise in the region just below the lowest nectocalyces. New nectocalyces always form on the nectostem just below the float.

In the *Agalma* which is figured in Plate X. there are seventeen pairs of nectocalyces, and seventeen sections bearing polypites and female sexual bells. This numerical identity is not a coincidence, but seems to occur normally in all stages of growth after that called the Physophora larva.

The development of the adult feeding polyp or polypite of *Agalma* seems to be quite peculiar. The feeding polyp originates as a simple two-layered bud from the stem, and assumes at first a globular shape. From this it elongates into a flask-like body, the proximal portion of which retains a spherical form, as shown in Plate IX. fig. 5. This spherical basal part is formed almost entirely out of a thickened middle layer, which lies between those which first formed the bud. On the distal portion of the walls of the spherical base of the polypites in this condition of growth many large lasso-cells arranged irregularly, as shown in the figure, make their appearance. At the base of the polypite where it joins the peduncle by which the feeding polyp hangs on the axis of the *Agalma*, there is a ferule-like structure, which has been called the "Wimperwulst." From this body in older stages the tentacular knobs, and after them the tentacles, later arise, Plate IX. fig. 7 *x*. As in its growth the polypite becomes older, Fig. 6, it takes on a more flask-shaped form, and the thickened median layer becomes reduced in size, while the lasso-cells in this region of the polypite increase in number. The Wimperwulst retains about the same size as in the former figure. In the next stage in the growth of the polypite, a part of which is figured in Fig. 8, the enlargement of the proximal end of this structure is still more diminished in size, and in the adult feeding polyp the reduction has gone so far that the swelling has completely disappeared, leaving between the Wimperwulst and the body of the polypite a kind of constriction richly covered with lasso-cells. This adult form is figured in Fig. 7. With the exception of the constriction between Wimperwulst and polypite the feeding polyps have already been well described by Leuckart, Gegenbaur, and others.

Closely connected with the growth of the polypite is the development of the tentacular knobs from the collar or Wimperwulst at its base. These bodies begin as simple buds, which elongate into hollow club-shaped structures of regular outline, Plate IX. fig. 22. In a somewhat later stage (Fig. 22^a) the distal end of the cavity of this organ slightly enlarges in diameter. Lasso-cells are present in the walls of the proximal part of the immature knob. These figures show that from the very first this "adult knob" is wholly different from that which has been called the "embryonic knob," Figs. 9, 9^a. The enlargement at the distal extremity increases in diameter (Fig. 22^c), differentiating three lobes from the extremity of the growing knob. The two lateral of these lobes by subsequent extension form those filament-like structures which I have represented in the adult knob, Figs. 20, 21, *b*. The medially placed lobe, which is the extremity of the knob placed in the angle between the two lateral prolongations, becomes the terminal sac (*a*, Figs. 20, 21) in the adult knob. The remainder of the half-formed knob coils itself together, passing into the future sacculus, while in its walls form those characteristic lasso-cells which distinguish this organ in the adult. Pigment also darkens its walls, and from its proximal part a circular rim is pushed out, which grows down around the sacculus enclosing it, in a sac which is shown in the figure of the adult knob as covering the whole sacculus, with the exception of the distal appendages, Fig. 21, *e*. In Fig. 20, *e*, this structure, which is called the involucrum, is drawn back to expose organs within, which otherwise could not be well shown. The last parts of the knob to be formed are two muscular threads, differentiated from the coiled sacculus, which connect the distal and proximal ends of the body of the knob, within the involucrum. These muscles have for a function the retraction within the involucrum of the extremity of the knob. They are shown in Fig. 20, *d.*

Eudoxia Lessonii, Huxley.

Plate VI. Figs. 8, 9.

In my paper on the Siphonophoræ (Bull. M. C. Z., Vol. VI. No. 7) a specimen of *E. Lessonii* is mentioned as taken near Newport. That mention is here supplemented by two figures of the medusa.

Diplophysa inermis, Gegenbaur.

Plate VI. Fig. 12.

In the figure given of this medusa, organs corresponding to those in *E. Lessonii* have the same lettering.

DISCOPHORA.

Cyanea arctica, Eschscholtz.

C. arctica is one of the more abundant jelly-fishes in Narragansett Bay. Three species of *Cyanea* called *C. arctica*, Per. & Les., *C. fulva*, Ag., and *C. versicolor*, Ag., have been described from the eastern coasts of the United States, by Prof. Agassiz. The main points of difference between *C. arctica* and the other species, *C. fulva* and *C. versicolor*, do not seem of sufficient importance to call for their separation. Differences in color in this as in many other *Discophoræ* may be the results of individual, seasonal, or sexual variations.

The Ephyra of C. arctica.

Very little is known of the ephyra of *C. arctica.* It has not been figured by Prof. Agassiz, and the representations by others are imperfect and few in number. It differs very greatly from the ephyra of our other common Discophore, *Aurelia*, and on that account I have introduced figures of it here. The genus *Cyaneopsis* of Brandt is an ephyra of *Cyanea*, as a comparison of the figures which I have given with his will, I think, make evident. The latest figures which have been published of the ephyræ of discophorous medusæ are those in an excellent paper by Claus,* of the genera *Aurelia*, *Chrysaora*, and *Pelagia.* In Agassiz's "Contributions" are excellent figures of the ephyra of *Aurelia.* No representations are found in either of these works of the ephyra of *Cyanea.* Agassiz gives a short description of the young of this genus, but of a stage considerably older than that which I discovered.

The youngest ephyra of *C. arctica* which was captured was caught with

* Studien über Polypen und Quallen der Adria.

the dip-net, in the month of May. I have given a figure, Plate VII. fig. 9, of an octant of this immature *Cyanea* seen from the oral side. This octant, as the other seven which compose the disk, bears an otocyst, and hence I shall in my description designate it as the sense octant. The lappets, one or the radius in which the otocyst lies, are called in my description pets, or lappets of the sense organs.

The movements of the umbrella of the ephyra are very rapid, and when at rest its lobes are thrown backward and upward, as in Plate VII. fig. 4[a], expanding the oral folds and causing them to project in the manner shown in that figure. The diameter is between an eighth and a quarter of an inch. It has a light brown color, and at a superficial glance resembles an ephyra of *Aurelia.* The likeness of the ephyra of *Cyanea* to that of *Pelagia cyanella* as figured by Prof. Agassiz, or of *Chrysaora* as represented by Claus, is so close, that it might easily be mistaken for that of either of these genera.

There are eight sense lobes in the ephyra, as in the adult *Cyanea.* The incisions in the margin separating the lobes are very deep, and so wide that these bodies are removed from each other by an interval equal to the width of the lobe itself. The whole aboral surface of the disk is covered with very minute papillæ, which a little later in the growth of the ephyra elongate into prominent filaments, of which I shall speak later. To anticipate, let me say that the developed filaments are figured in Plate VII. fig. 1. The whole disk of the ephyra, especially the margin of the disk, has very thin walls.

The structure of the "lower floor" of the umbrella in the ephyra is very complicated. In the centre of the disk on this side there is found a mouth, which is a simple opening surrounded by a slightly raised, quadrate-shaped ridge, forming the lips. The elevation of this ridge above the lower floor of the ephyra is very slight, and the lips are as yet without folds. There are, however, four re-entering angles, one on each side of the rectangular ridge, which impart to the mouth as seen from below a cross-shaped outline. Plate VII. figs. 9, 10. The points of this cruciform figure later elongate, and, hanging down like curtains, form the complicated folds of the oral appendages to the mouth.

From the under surface of the "lower floor" of the ephyra in the interval left by the re-entering angles in the ridge about the mouth there is formed a tentacle (S), differing in no respect from the first tentacles found on the umbrella margin. As there are four of these re-entering angles about the mouth, there are at first only four of these tentacles, one for each angle. Each one originates as a simple bud, and as they become more developed smaller buds form near and upon the base of that first developed. Plate VII. fig. 9[a]. The position in which this tentacle is found refers it to the sexual organs. In the adult *Cyanea* these tentacles are very numerous, and are found in rows above the sexual glands. In my figure, Plate VII. fig. 13, the natural position has been reversed, and the row of sexual filaments is found below the ovaries. In the genus *Cyanea* the sexual filaments of the adult are very minute; in *Polybostricha dubia*, Br. they reach a much greater development.

Internal changes, in addition to those already mentioned, accompany the development of the ephyra into this stage of the young *Cyanea*. The stomach cavity is prolonged into extension between the umbrella and the lower floor of the medusa, as in the youngest ephyra, but these extensions have become broader, as the lobes in which they lie have become widened. The lateral branches, which in the ephyra were almost tubelike, are now much broader, yet still without bifurcations at their extremities. The circular muscular folds have become more clearly differentiated, and on the under side of the walls of the young medusa triangular-shaped muscles connected with these circular folds have begun to push out into the sense octants. In each sense octant there is a pair of these muscles, which at this stage are very minute, but are later greatly developed in the " under floor " of the adult. The otocyst of younger stages, as well as of the ephyra, is simpler than that of the adult. The "hood," which in the adult (*d*, Plate VII. fig.12^{a}) covers and protects the sense organ, is not developed in any of the ephyra-like stages. The same is true of the oral curtains, Plate VII. fig. 12, *c*, which hang down on either side of the otocyst in the adult.

One half of an octant of a young *Cyanea* still older than that represented in Plate VII. fig. 8 is shown in Fig. 7. The more important internal changes which have taken place are the results of the enlargement and filling out of the margin of the umbrella to a more regular and unbroken outline, and the addition of new tentacles in the marginal clusters. There is also a multiplication of sexual filaments, many of which have been removed from the figure to avoid complication. The function of these sexual filaments in the adult is somewhat doubtful. They are said to have a motion by which the water in proximity to the sexual organs is removed, and pure water continually made to replace the impure. This motion I have never observed, nor am I able to distinguish the male *Cyanea* from the female. The figures which are given in Agassiz's " Contributions " of the immature ovaries and spermaries, resemble each other very closely, the spermaries possessing folds in the mesentery-like membrane (*o. s.*). Are not like folds also sometimes found in the ovarian organs ? I figure, Plate VII. fig. 13, the ovaries of a *Cyanea*, of which the ova were not mature. Plate VIII. fig. 13, illustrates the microscopical structure of the egg and its envelope in the ovary of the same age.

Outside the four tentacles formed in the re-entering angles of the lips of the ephyra of *Cyanea*, there is a ring in the lower floor which is less transparent than the remainder of the floor, and thickly striated. This ring is the origin of the muscular folds in the lower floor of the adult *Cyanea*. The lower floor is joined to the umbrella itself by perpendicular partitions, eight in number, each situated on the lines where the sense octants join each other.

In the angle of the incisions in the margin of the umbrella separating the lobes which bear the otocysts, there arises from the oral side of the ephyra, at the same time with the sexual tentacle, another of about the same size. As there are eight of these incisions, there are at first eight of these tentacles. They originate as simple buds, and elongate to a length equal to the diameter of the ephyra. One of these is always in advance of the others in time of appearance, and is the longest. This predominance of one of these marginal appendages is another expression of bilateral symmetry, which, as has been pointed out by others, is well marked in the tentacles in the younger scyphistoma stage of *Cyanea* and *Aurelia*.

In the ephyra in which there are eight tentacles on the margin of the umbrella, octants of which I have represented, Plate VII. figs. 9, 10, the resemblance to the members of the family of *Pelagidæ* is very striking. Not only in the outward form is this likeness apparent, but in the internal anatomy the resemblances are very close. One of the most striking of these anatomical likenesses is to be seen in the course of the chymiferous tubes in the sense octants of these two forms. If one will compare Fig. 9 with a sense sector of *Pelagia cyanella*, he will find the tubes almost identical in their course. The addition of new tentacles on the margin of the umbrella of the ephyra takes place by the growth of new tentacles on either side of that first formed, and in pairs, one on each side at the same time. These grow along two sides of a V-shaped figure, in which the first formed tentacle is situated at the angle of the V, and is directed towards the centre of the ephyra. The subsequently formed tentacles to the primary always arise external to those already developed. Marginal tentacles in all stages of growth, from a bud to a well-developed filament, arranged along the figure of which I have spoken, are shown in Plate VII. fig. 8. The same figure shows also the changes which have taken place in the contour of the rim of the sense octant, and the greater development of the bundle of sexual tentacles. The specimen from which the drawing was made was not raised from the larval ephyra, but was taken free swimming in the dip-net.

In some of the older forms following the ephyra stage, the upper surface of the umbrella is covered with peculiar undescribed filaments. These are well shown in a young *Cyanea* somewhat older than that, an octant of which is figured, Plate VII. fig. 7. This stage with the filamentous appendages is shown, Plate VII. fig. 1. The whole upper surface of the umbrella is covered with peculiar tentacles of unknown function. They are most developed in younger stages, but are not wholly wanting in the adult. The filaments to which I refer were first noticed in these young *Cyaneæ* by Dr. Walter Faxon. Of the anatomy of these filaments there is very little to be said. They are very flexible, transparent, of brownish color, tapering uniformly from base to extremity, and seem to be simple prolongations of the substance of the bell, covered by a layer resembling that which is stretched over the whole of the aboral surface of the umbrella. They are also solid, and destitute of lasso-cells. Their superficial layer is penetrated by those same nerve cells which are found all over the surface of the umbrella, the histology of which has been so elaborately investigated by Dr. Eimer. These cells are undoubtedly connected with sensation of some special kind, and we may consider with great probability that the aboral filaments are specialized sense organs. I suggest for them, whatever their function may be, the name of "aboral papillæ." In some genera of *Discophoræ* the same appendages also exist, but they are nowhere as prominent as in the young of *Cyanea.* In *Aurelia*, Plate VII. fig. 6, they are represented by wart-like excrescences of small size, covering the whole upper surface of the bell, even to the marginal lobules.

On the Sense Organs found on the Bell Margin of Cyanea arctica.

The structure of the sense organs found in the rim of the bell of *Pelagia*, *Aurelia*, and *Cyanea* has been carefully studied by Dr. Eimer. His observations of *Cyanea* are less complete than of the other genera, and as the differences are in some respects so radical, I have here described the more important details of their anatomy again. The "marginal sense bodies" of *C. arctica* are eight in number, and are situated at equal distances on the rim of the umbrella in incised angles, slightly removed from the margin. Morphologically, each of these structures is a modified tentacle, as pointed out by Agassiz.

The eight extensions of the stomach in the interval between the lower surface of the umbrella and the lower floor are separated from each other by vertical partitions connecting these structures. The early condition of these vertical partitions has been already mentioned in speaking of the ephyra. It remains to be noticed that they lie in radial lines, separating the octants which bear the sense bulb from those from which the bundles of marginal tentacles hang. The chymiferous tubes or extensions from the stomach into the periphery of the disk divide as they approach the margin of the umbrella into a single small central, and two large lateral branches. The central of these, which is medially placed, extends directly into the otocyst, while the lateral divisions are subdivided into many dendritic branches, becoming more and more subdivided as they approach the margin of the lobes on either side of the sense bulb or otocyst. It will be seen, however, by a consultation of the figures, Plate VII. figs. 7, 12, that only a part of the lobes adjacent to the sense bulb is penetrated by branches from the optical extension of the stomach, part of which passes into the otocyst. By far the greater number of dendritic branches arise from chymiferous tubes, which lie in the same sector as the bunch of marginal tentacles. The dendritic branches of the main divisions of the ocular tube are of two kinds, one of which spreads itself out in the margin of the umbrella, while the other, arising from the sides of these tubes, extends into curtain-like folds (Plate VII. fig. 12 *c*) on the under surface of the umbrella. These curtains are placed as follows. On the aboral side of the adult *Cyanea* the otocyst is covered and protected by a roof-like prolongation of the upper surface of the umbrella into what is known as the hood (Plate VII. fig. 12*, *d*). On the oral side, this hood does not exist in the same form. It is, however, represented in the oral curtains. When one carefully examines the otocysts from below, or from the oral side, they are found to be protected by raised walls or curtains, which do not join each other, but arise from the edges of the adjacent lobes and extend parallel with each other from the base of the otocyst to a distance far beyond its distal end. They are so placed in reference to each other that their free edges, which are crescent-shaped, slightly overlap (Plate VII. fig. 12, *c*). It is as if we had a hood on the oral side of the sense organ only split along the medial line.

Into these curtains extend the dendritic branches from the sides of the main branches of the extensions from the stomach into the sense octants of the umbrella. What the "hood" accomplishes on the aboral side, these lappets partially perform on the oral aspect of the disk. Both structures serve for the protection of the delicate parts which they surround.

Upon the base of the style which bears the otocyst in the genus *Cyanea*, and on its oral surface, there rises an elevation, Plate VII. fig. 14, covered with papillæ, which I think are connected with the function of sensation. This structure takes the place of an organ found on the aboral surface of the disk of *Aurelia*, and called by Eimer the "Sinnespolster." The "Sinnespolster" of *Aurelia*, as he says, is wanting in the aboral surface of *Cyanea*. It is represented in part by this wart-like protuberance covered with papillæ (Plate VII. figs. 5, 14), on the under surface of the otocyst style. Whatever the function of this organ may be, it has escaped the notice of all those who have studied the nervous and sensatory systems of this genus. In *Aurelia* this protuberance on the style in *Cyanea* is wholly wanting, and is perhaps represented by that structure wanting in *Cyanea*, and called the "Sinnespolster."

There remains yet to be noticed in my description of the general form of the sense organ of *Cyanea* certain hollows or angles in the neighborhood of the otocysts formed in the rim of the umbrella. I refer to organs which Eimer has called the inner "Reichgrübschen." As the style of the otocyst rises from the margin of the umbrella, it leaves on either side, between it and the lateral folds, two small recesses. One of these cavities is shown on Plate VII. fig. 12, just above the point where the curtains, *c*, begin to rise from the oral surface of the sense lappets, and on a level marked by a line drawn through the papillæ perpendicular to the radius of the medusa. On the aboral side the "hood," and on the lower, which is for the most part open, a part of the ends of oral curtains (*c*), Fig. 12, enclose the recesses thus left, so that they resemble imperfectly closed furrows in the edge of the disk walls. These cavities are said to be sensitive, their walls are so thickly set with nerve cells. The cavity of the adult otocyst is filled with hexagonal calcareous otoliths of prismatic shape, terminated by six-sided pyramids. The centre of each prism is filled with a small cube which resists the action of caustic potash. In addition to an elongated prismatic form with terminal pyramids, many of these otoliths are hexagonal lozenge-shaped, with flat terminal facets. The color of the otoliths is bright orange, and when enclosed in the otocyst renders it very prominent in the midst of the transparent walls of the umbrella. A cluster of small otoliths is found on the under side of the otocyst near its junction with the style, which may be the same as the ocellus described by Claus in *Aurelia*, while the larger otoliths belong more to a different organ of sensation. If that is true, in the otocyst of the *Cyanea* is an organ of sense representing the ocellus and the true otocyst of certain hydroid medusæ.

The walls of the otocyst are made up of three layers, of which the external alone stretches over the terminal end of this organ. In this layer are epithelian cells, modified into nervous elements. The otocyst is fastened to the style, which bears it on the lower side, so that, instead of being continued directly into it, the cavity opens from the upper sides of the otocyst through the under side of the style.

Exceptions to the regular number of otocysts in *Cyanea* and *Aurelia* are common.

Aurelia flavidula Per. & Les.

A few specimens of this medusa were taken each summer. They were as a general thing fewer in number and smaller than those found in Massachusetts Bay. An *Aurelia* as large as a water-bucket, which is not a rare sight north of Cape Cod, I have not seen in the southern bays. A side view of a small *Aurelia* is beautifully figured in the well-known "Contributions to the Natural History of the United States." The figure is taken from a medusa with contracted bell, and oral lobes, and consequently there is no representation in it of the otocysts. I have given a figure of *Aurelia* with disk expanded and oral appendages extended, in order to show, more plainly than one in which these parts are drawn together can, the position of the sense organs to which I wish to call special attention. (Plate VII. fig. 2.)

The otocysts of *Aurelia* differ very greatly from those of *Cyanea*, yet still we can in both recognize homologous parts. The oral curtains hanging down one on each side of the otocyst of *Cyanea* are wanting as such in *Aurelia*. They are represented in part by two lappets, one on each side of the sense bulb, *a*, Plate VII. fig. 3. Corresponding morphologically with the dendritic divisions found in the oral curtains and adjoining sense lobes of *Cyanea*, there are in *Aurelia*, arising as branches from the prolongation of the stomach into the sense octant, two blindly ending horn-shaped tubes, which, as seen from above (Plate VII. fig. 3, *b*), appear to embrace the style of the otocyst, and extend a short distance into the base of the lappets, *a*, Plate VII. fig. 3. The prolongation of the stomach into the sense octant, in *Aurelia*, takes the form of a straight tube, the diameter of which is quite small. This tube, after arising from the stomach, passes directly towards the margin of the disk, and when near the otocyst opens into a circular-shaped enlargement. Into the same cavity pass also two other pairs of chymiferous tubes, one on each side, which are branches from another system of vessels likewise extensions of the stomach. From the under floor of this cavity, which is shown in Plate VII. fig. 3[a], near its peripheral part, there arise three small vessels besides those which have been already mentioned. One of these, the median, is continued directly into the cavity of the otocyst, passing through the style of the same, while the others, the two lateral branches, are the horn-shaped tubes which seem to embrace the style of the otocyst, and enter for a short distance the lappets of the sense bulb. Their extremities never become dendritic, but end blindly in the substance of the lappet. As has been hinted at above, these sense lappets in *Aurelia* are represented in part by the oral curtains hanging down, one on each side of the otocyst of *Cyanea*, Plate VII. fig. 12, *c*. The lateral tubes which enter their bases are strictly homologous to the early conditions of the lateral branches in the ephyra of *Cyanea*, Figs. 9, 10. That there is this resemblance between the marginal sense bodies of the young *Cyanea* and the adult *Aurelia* is still another fact added to many others, that *Cyanea* stands higher in the scale of life than *Aurelia*, or that *Aurelia* is an arrested stage of development similar to the young of *Cyanea*.

Dactylometra quinquecirra, A. Ag.

Plate VIII. Fig. 14.

D. quinquecirra is a rare medusa in Narragansett Bay. One or two specimens are taken each summer. The adult, one half natural size, is shown in Plate VIII. fig. 14. The genus is characterized by the presence of five tentacles between each pair of otocysts. In other respects it resembles *Pelagia*, to which genus it was referred by Desor.

The umbrella is thickly pigmented with brown and red spots, which are very large in the middle of the upper surface of the umbrella. The color of the bell is pale blue and brown. The same color with pigmentation is likewise found on the tentacles.

There are oral appendages of two kinds, four of which are quite long, floating gracefully along after the medusa as it swims in the water. The remaining oral appendages are shorter, more ruffled, confined to the immediate vicinity of the mouth, and extending only a short distance outside of the bell below the lower floor. The stomach lobes are united at their bases, yet not by a solid circular ring such as exists in *Cyanea*. Ovaries yellow, hanging in baglike masses between the pillars by which the oral appendages are suspended. In alcoholic specimens there are no circular muscular folds such as exist on the lower floor of *Cyanea*. The whole umbrella is very flexible. Size six to ten inches in diameter. There are generally five tentacles between each pair of marginal sense bulbs. These tentacles vary in size, and oftentimes there are but three or four between each pair of otocysts. The chymiferous tubes resemble closely those of the genus *Pelagia*. They are not dendritic at their distal ends, as is the case with *Cyanea*, nor branched as in *Aurelia*, but pass directly to the vicinity of the otocysts, where they divide, sending a branch into the cavity of this structure, and lateral forks which are continued into a tube which runs along the margin of the disk.

CTENOPHORA.

Mnemiopsis Leidyi, A. Ag.

M. Leidyi is one of the most common Ctenophores in Narragansett Bay. In the latter part of the summer and early autumn these jelly-fishes fill the water in Laboratory Cove, Newport, and can be found in almost all stages of development. *M. Leidyi* resembles very closely *Bolina alata*, Ag. What is very much needed is a critical examination and comparison of both genera. Mr. Agassiz says the latter genus is limited to north of Cape Cod.

Mnemiopsis is distinguished from the other Ctenophores, except *Bolina*, by the great development of the lappets or lobes on each side of the mouth, and their irregular triangular profile (Plate VIII. figs. 1, 2). The rudimentary tentacles lie in a groove, covered by a "hood" resembling a structure of the same name in *Cyanea* covering the otocysts.

The young *M. Leidyi* recalls a *Pleurobrachia* in possessing long, flexible tentacles with secondary appendages (Plate VIII. figs. 3, 4). These tentacles become more and more reduced in size with the growth of the young *Mnemiopsis*, until in the adult they reach the rudimentary condition figured in Plate VIII. fig. 9. The presence of well-developed tentacles in the young *Bolina* was first pointed out by Prof. McCrady.

Another likeness between the young *Mnemiopsis* and the tentaculated Ctenophores, like *Pleurobrachia* is the development on its aboral pole of a special "sense area" of peculiar shape (Plate VIII. figs. 5, 5^a). The outline of this area as that of the same in the adult *Pleurobrachia*, is dumb-bell shaped, and the otoliths are enclosed in an otocyst, midway between the two extremities. On either side of the centrally placed cluster of otoliths, yet within the same sac or otocyst, is a single otolith not yet united to the cluster. As the *Mnemiopsis* grows older, the dumb-bell like area of the larva is reduced in size by drawing in the two extremities, until, in the adult, it has almost wholly disappeared. It seems to be an embryonic sense organ, which is confined to larval stages of higher Ctenophores, and to the adult of such lower forms as *Pleurobrachia*. The adult of *M. Leidyi* (Plate VIII. figs. 1, 2) is very transparent, when contracted (Fig. 2) ovoid, and when expanded roughly triangular in profile. In each lateral hemisphere the walls of the body are continued into lappets of great size hanging down on either side of the animal. These lappets are very movable, and when the jelly-fish is alarmed they close together below the mouth. Their inner walls are crossed by a network of muscular lines (Plate VIII. fig. 11) composed of small cells placed side by side. The external surface of the body is thickly dotted with small papillæ. The oral lappets are separated from each other by deep longitudinal furrows along the sides of the body. The diameter of the jelly-fish from the floor of one furrow to that of the opposite is much less than that from one surface of the oral lappets to the other. In the former of these planes lies the longitudinal axis of the mouth and the rudimentary tentacles. The length of the Ctenophore from mouth to sense bulb is about one half the whole length of body and oral lappets taken together.

In the longitudinal furrows and on each side of the medial line of the same lies a single auricular appendage (Plate VIII. fig. 2, *h*), which arises from the walls of the body just above the line, passing through the mouth at right angles to the axis of the jelly-fish. These structures extend a short distance below the level of the mouth. Their general form is seen in Fig. 2. They are lined with a vibratile plate. There is a pair of auricular appendages in each furrow, making four on both sides.

The rudimentary tentacles are placed in a medial position in the furrow at the extremities of a diameter passing through the longitudinal axis of the mouth. They are club-shaped (Plate VIII. figs. 7, 8, 9), and bear in their reduced condition small filaments or secondary appendages. These filaments are also found on the adjacent ridges of the body, extending in two rows, one on each side of the tentacle to the angle where the tubes from the "oral lappets" and "auricular appendages" join (Fig. 10). The recess in which the rudimentary tentacles lie is closed on one side by a "hood," *d*, Plate VIII. fig. 8. The tentacle springs from the body walls, and is affixed by one end and by a part of the lateral walls. In the adult the tentacle rarely projects beyond its socket. Its secondary appendages, however, are often extruded beyond the rim of the hood which shields the club-shaped tentacle to which they are affixed. The socket in which the tentacle lies, and one wall of which is made by the "hood," is the diminutive representative of the tentacular socket of *Pleurobrachia*. Scattered pigment cells of crimson color in the base of the tentacle may represent a former ocellus. On either side of the base of the tentacle, Plate VIII. fig. 7, 8, *a*, the socket is continued into recesses not unlike the sense organs called "Riechgrübschen" in the bell margin of *Cyanea*.

The course of the lines of comblike swimming plates differs but little from that of the same structures found on the surface of the body in other *Ctenophoræ*. There are eight rows of combs, four of which are much longer than the remainder. The modifications in their length are due to the abnormal development of the oral lappets. The rows of vibratile combs, which are situated on the same hemispheres from which the lappets are suspended, are much longer than those which lie in the furrows between these lobes. Isolated single combs from front and side are shown in Plate VIII. figs. 12, 12[a]. These combs retain their power of motion even when separated from the jelly-fish, and are often found rolled into a spherical ball, which is kept in rotation for a considerable length of time by their combined motion.

With the exception of eight small vessels passing along the upper surface of the bell to the locomotive flappers, there are in *Mnemiopsis* no tubes which take origin from the upper end of the "funnel" near the otocyst. All the tubes arise from the lower extremity of the "funnel" just at its union with the upper end of the stomach, and not from the other extremity, upon which the otocyst is situated. The "funnel" itself is very short, but is well marked. From the lower end of the funnel arise six tubes, four of which by subsequent subdivision form the tubes, which lie under the locomotive flappers, while the remaining pair extend to the region of the mouth, each of the latter passing into a tentacle, *b*, Figs. 7, 8. The appearance of these tubes in the young *Mnemiopsis*, when they closely resemble each other, is shown in Fig. 8.

The edge of the "auricular appendages" has fastened to it a vibratile plate, which extends, without break, from the base on the side turned to the medial line, to the angle which the rim of the oral lappets makes with the body of the animal. This vibratile plate is homologous with the vibratile combs, of which it is the exact continuance. The bright crimson pigment spots found in a row at its base and along the auricles are probably functional, but, whether sensory or not, has not been determined.

From the origin of the tentacle to the angle formed by the oral lappets and a ridge from the auricular appendages, Plate VIII. fig. 10, there passes a row of small tentacula-like bodies, which closely resemble the filaments or secondary appendages to the rudimentary tentacle. They resemble closely the tentacles foung along the bell margin in *Aurelia* (Plate VII. fig. 6). Folds in the walls of the intestine near the upper end of its course are well marked. These structures are figured in *Bolina* by Mr. Agassiz.

The upper part of the funnel and the otocyst of *M. Leidyi* is figured in Plate VIII. fig. 6. The bundles of nerves which pass from the ganglion beneath the otocyst distribute nerves to all the important organs of the body. Their course can be traced very well, even to the margin of the oral lappets. They are unbranched, and of a white, almost silvery color. Their course in a small portion of the inner surface of the oral lappets has the appearance shown in Plate VIII. fig. 11. There is in the adult no circumscribed aborally placed sense organ of dumb-bell shape similar to what has been mentioned in the young, Plate VIII. fig. 5^a. A part of the body walls around the otocyst has a granulated appearance, which may represent this structure in a reduced form.

The otocyst is a two-layered sac containing otoliths arranged in a cluster. This sac is without apical opening. The connection of the otoliths with the ganglion is through the walls of the floor upon which the cluster rests, and not by suspension from the upper walls of the capsule. Four bundles of nerves arise in a symmetrical manner from the ganglion, two of which are well marked, and extend into the oral lappets, *d*, Fig. 6.

The network of lines on the inner walls and surface of the oral lappets is arranged with great regularity, and does not form those characteristic spots, four in number, which exist in *Ocyroë maculata*, Rang. Each line in the network is made up of small cells, laid side by side. Nerve fibres are especially rich in the oral lappets, which, as a result, are highly sensitive, quickly responding by retraction when the surface is touched.

CAMBRIDGE, February, 1881.

EXPLANATION OF THE PLATES.

The size of the medusa is indicated by a line at one side of the bell. A line of this kind refers to the bell exclusive of appendages.

PLATE I.

Fig. 1. *Lizzia grata.* This specimen is not fully developed, but has attached young, one of which is almost ready to separate from the attachment, and can be seen through the bell walls.

Fig. 2. Young bud of the proboscis of *L. grata.* The capsule in which it is confined, when attached, has been removed, and the tentacles drawn apart.

Fig. 3. The bell margin of *L. grata* as it breaks away from attachment to the parent's proboscis.

Fig. 4. Bud on the proboscis of *L. grata* inside the capsule.

Fig. 5. Tentacles around the mouth of adult *L. grata,* which has one bud from the proboscis.

Fig. 6. Young *L. grata* just before the rupture of the connection with the parent.

Fig. 7. Very young *L. grata* with infolded tentacles.

Fig. 8. *Gemmaria gemmosa* (adult). Only one tentacle is represented.

Fig. 9. *G. gemmosa* (natural size).

Fig. 10. Tentacular bulb of *G. gemmosa.*

Fig. 11. Tentacular knobs of *G. gemmosa.*

Fig. 12. Aboral view of *G. gemmosa.*

Fig. 13. *Sphærula formosa* (young ?).

PLATE II.

Fig. 1. *Stomatoca apicata* (adult). Only a single tentacle is represented.

Fig. 2. Young of *Dinematella cavosa.*

Fig. 3. Apex of the bell of *D. cavosa.*

Fig. 4. Base of the proboscis of *S. apicata* (male ?).

Fig. 5. Young of *Trachynema digitale.*

Fig. 6. View of the same from oral side. One tentacle represented.

Fig. 7. Part of the bell rim of *T. digitale* (adult) showing parts of two chymiferous tubes and of the tentacles.

Fig. 8. Tentacular bulb of *Cunina discoides.*

Fig. 9. Four stages in the development of the egg of *S. apicata.* The lowest figure is the ciliated planula. Size of planula $\frac{1}{32}$ inch.

PLATE III.

Fig. 1. *Turris episcopalis* (adult). One tentacle figured.

Fig. 2. Young of *T. episcopalis.*

Fig. 3. Upper part of the bell of *T. episcopalis*. This figure shows one of the four continuations of the bell cavity into the apical prolongation of the walls of the bell.

Fig. 4. Optical section of the ovaries and bell margin of *T. episcopalis*. The origin of two long tentacles and the three intermediate papillæ is shown on the lower side.

Fig. 5. The tentacular bulb of *T. episcopalis*. The figure shows the relative position of the ocellus.

Fig. 6. Undeveloped tentacular papilla of *T. episcopalis*.

Fig. 7. Tentacular bulb and ocellus of *Modeeria multitentacula* (lower side).

Fig. 8. *Modeeria multitentacula*.

Fig. 9. Optical section (from aboral side) of the same.

Fig. 10. Tentacular bulb of *M. multitentacula* (right side).

Fig. 11. Ocellus and base of a tentacle of *Sarsia mirabilis*.

Fig. 12. Cells and pigment spots of the spherical base of the tentacle of *S. mirabilis*.

PLATE IV.

Fig. 1. *Cunina discoides*.

a. Sub-umbrella.

b. Otocyst.

v. Veil.

Fig. 2. View of *C. discoides* from oral side. One tentacle and one otocyst represented.

Fig. 3. *Dinematella carosum* (adult).

c. Cavity in the apical prolongation of the bell.

Fig. 4. Young *Turritopsis nutricola* (oral view).

Fig. 5. *Dipurena strangulata* (adult).

Fig. 6. Pedunculated structure found on the adult oral lappets of *T. nutricola*.

Fig. 7. Young *T. nutricola* (side view of Fig. 4).

Fig. 8. Oral appendages of *T. nutricola*.

Fig. 9. Stage in development of *T. nutricola* between Figs. 7 and 10.

Fig. 10. *Turritopsis nutricola* (adult).

PLATE V.

Fig. 1. *Eutima gracilis* (adult).

Fig. 2. Two rudimentary tentacles (?) with cirri, and a single ocellus, of *E. gracilis*.

Fig. 3. Tentacular knob of *E. gracilis* (adult).

Fig. 4. Mouth of *E. gracilis* (adult).

Fig. 5. Young of *Zygodactyla groenlandica*.

Fig. 6. Side view of the same.

Fig. 7. *Eucheilota ventricularis* (young).

Fig. 8. *E. ventricularis* (oral view).

Fig. 9. Half of *E. ventricularis* (adult).

Fig. 10. Quadrant of *E. ventricularis* (oral view).

Fig. 11. Single undeveloped tentacle of *Zygodactyla groenlandica*.

e, e. Green bodies.

Fig. 12. Sextant of adult *Z. groenlandica* (oral view.)
c. One of four meridional lines of lasso-cells (?) on the bell.
d. Tubercles arranged in rows between the radial tubes, and situated on the under side of the bell.
v. Velum.

PLATE VI.

Fig. 1. *Tima formosa* (young).
Fig. 2. *Mabella gracilis.*
Fig. 3. *M. gracilis* (side view).
Fig. 4. Otocyst of *T. formosa* (from young figured in Fig. 1).
Figs. 5, 6. These two figures show how by fission two otocysts of *T. formosa* are formed from one.
h. Point of constriction of walls.
Fig. 7. *Liriope scutigera* (adult female).
Fig. 8. *Eudoxia Lessonii* (side view).
a. Primitive covering scale.
b. Oil globule. This oil bubble is *not* the same as the float of *Agalma.*
c. Somatocyst.
d. Tentacle.
e. Nectocalyx.
f. Tentacular knob.
g. Chymiferous tubes of the nectocalyx.
i. Oil globule in somatocyst.
p. Polypite.
s. Female sexual bells.
The lettering in Figs. 8, 9, and 12 corresponds.
Fig. 9. *Eudoxia Lessonii* (dorsal view).
Fig. 10. Mouth of *Liriope scutigera.*
Fig. 11. Otocyst of *L. scutigera.*
Fig. 12. *Diplophysa inermis.*

PLATE VII.

Fig. 1. Young of *Cyanea arctica,* showing the filaments covering the upper surface of the bell.
Fig. 2. *Aurelia flavidula.*
Fig. 3. Marginal sense organ of *A. flavidula.* View from the dorsal surface.
a. Sense lappets.
b. Sinnespolster.
Fig. 3a. Same as above from oral surface.
Fig. 4. Ephyra of *C. arctica.* Margin of the disk contracted.
Fig. 4a. The same with disk margin expanded.
Fig. 5. Marginal sense body of *C. arctica* (young).
Fig. 6. Margin of the bell of *Aurelia flavidula* with lobules and tentacles.
Fig. 7. Portion of the disk of a young *Cyanea* in which the sense organ and bundle of tentacles are shown (oral view).

Fig. 8. An octant of the disk of *Cyanea* showing the early condition of the chymiferous tubes, the sexual filaments, and the bundles of marginal tentacles.

Fig. 9. Octant of the ephyra of *C. arctica* (oral view).

s. Single sexual filament.

Fig. 10. Still more developed ephyra of the same (oral view).

Fig. 11. Aboral view of the region of the bell margin in which the sense organ is situated (*Cyanea*).

Fig. 12. Marginal sense organ of *Cyanea*.

c. Single curtain hanging down on the left-hand side of the otocyst.

Fig. 12ª. Hood covering the otocyst on aboral side.

Fig. 13. Sexual organs and sexual filaments of *Cyanea* (female).

Fig. 14. Peculiar sense organ (?) on the under side of the peduncle of the marginal sense organ of *Cyanea*.

PLATE VIII.

Fig. 1. *Mnemiopsis Leidyi*, expanded, life size.

Fig. 2. The same, contracted and seen in a plane at right angles to Fig. 1.

a. Sense pockets of the tentacle.

h. Vibratile plate.

i. Intestine, with surrounding glands.

j. Rudimentary tentacle.

l. Vibratile combs.

Fig. 3. Young of Fig. 1 (*Mnemiopsis Leidyi*) with embryonic tentacles extended.

Fig. 4. Side view of the same.

Fig. 5. Aboral view of the young of *M. Leidyi* a little younger than those figured in Figs. 3, 4.

Fig. 5ª. Sense area of young *Mnemiopsis*.

Fig. 6. Sense organ, with nerves (*d*) of adult *Mnemiopsis*.

Fig. 7. Rudimentary tentacle of a young *Mnemiopsis*.

Fig. 8. Rudimentary tentacle of the adult of the same.

a. Sense pockets.

b. Chymiferous tube.

d. H od covering the rudimentary tentacles.

Fig. 9. Side view of the tentacle raised from the socket in which it lies.

Fig. 10. Place of junction of tubes in the angle made by the oral lappets and the body of the Ctenophore (*Mnemiopsis*).

e. Tube from the ambulacral combs.

f. Row of pigment spots extending to the tentacle, and bearing small thread-like tentacles.

Fig. 11. Cells found forming a network on the inner surface of the oral lappets of *Mnemiopsis*.

Fig. 14. *Dactylometra quinquecirra*, A. Ag.

PLATE IX.

Fig. 1. Young of *Agalma elegans*.

Fig. 2. Athorybia stage of *A. elegans*.

Fig. 3. Covering scale of *A. elegans* (adult).
e′. Central tube.
Fig. 4. Side view of the same.
Figs. 5, 6, 7, 8. Development of the feeding polyp of *A. elegans*.
x. Structure at the base of the polypite from which arise the tentacles. The region between this and the body of the polypite is homologous to the spherical enlargement with lasso cells shown in Fig. 8.
Fig. 9. Provisional tentacular knob found on the first tentacle formed in the early stages (*Athorybia* and *Physophora* stages of *A. elegans*).
Fig. 9ᵃ. View of this knob from below.
Fig. 10. Taster of *A. elegans*.
Fig. 11. Young covering scale of *A. elegans*).
Fig. 12. Adult nectocalyx of the same.
Fig. 13. Young nectocalyx.
Fig. 14. Primitive polypite and tentacle of *Athorybia* stage.
Figs. 15, 16, 17. Stages in the growth of the covering scale.
Fig. 18. Side view of a young nectocalyx older than Fig. 13, turned a little to one end.
a e. Mantel tube.
Fig. 19. Side view of adult nectocalyx.
Fig. 20. Extruded sacculus of a tentacular knob of adult.
a. Terminal vesicle.
b. Terminal filaments.
c. Sacculus.
d. Small muscles connecting two extremities of the sacculus.
e. Retracted involucrum.
Fig. 21. Tentacular knob of the adult *Agalma* with sacculus withdrawn into the involucrum.
Figs. 22, 22^a, 22^b, 22^c 22^d, 22^e. Development of the adult tentacular knob up to the trifid terminal division.
Fig. 23. Very young covering scale.
Fig. 24. Termination (distal) of the taster.
Fig. 25. Optical section of the undeveloped covering scale of *A. elegans*.

PLATE X. *Agalma elegans* (life size).

a. Float.
b. Nectocalyces. *b′*. Undeveloped nectocalyces.
c. Stem.
d. Covering scale.
e. Tentacle. *e′*. Tentacular knob. *j*. Retracted knobs in a bundle.
f. Male bells. *g*. Female bells.
h. Taster.
i. Tentacle of the taster.

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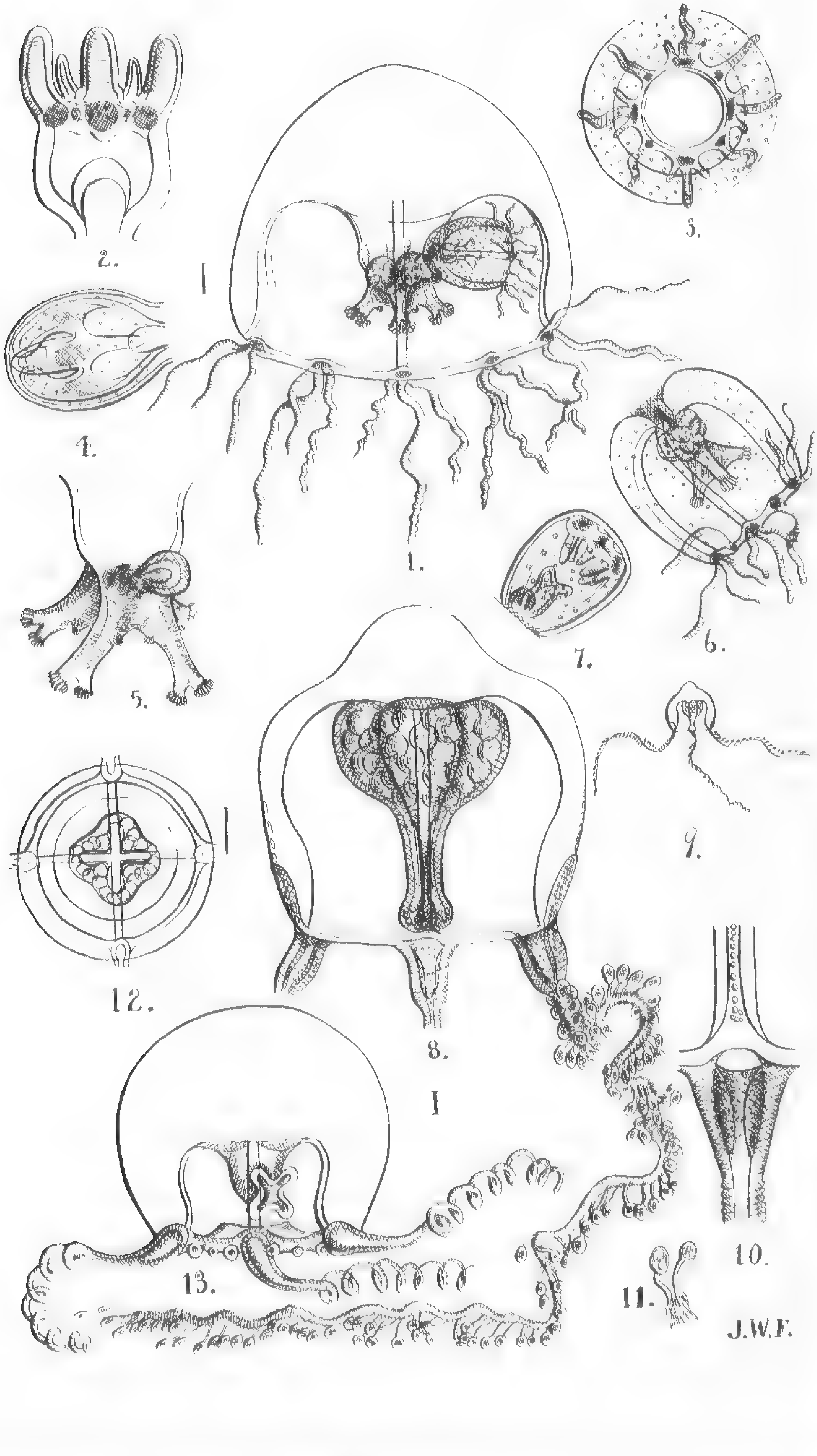

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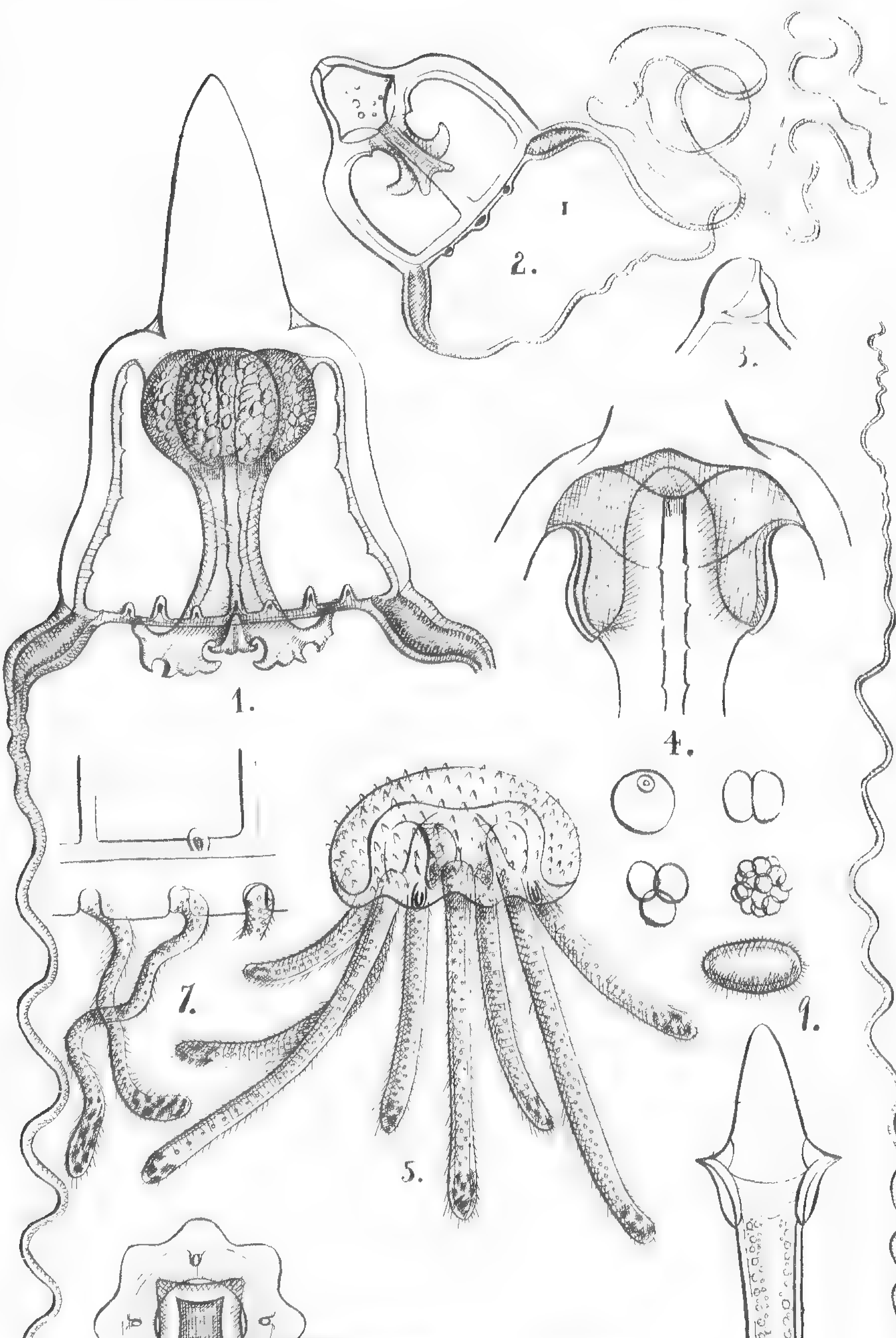
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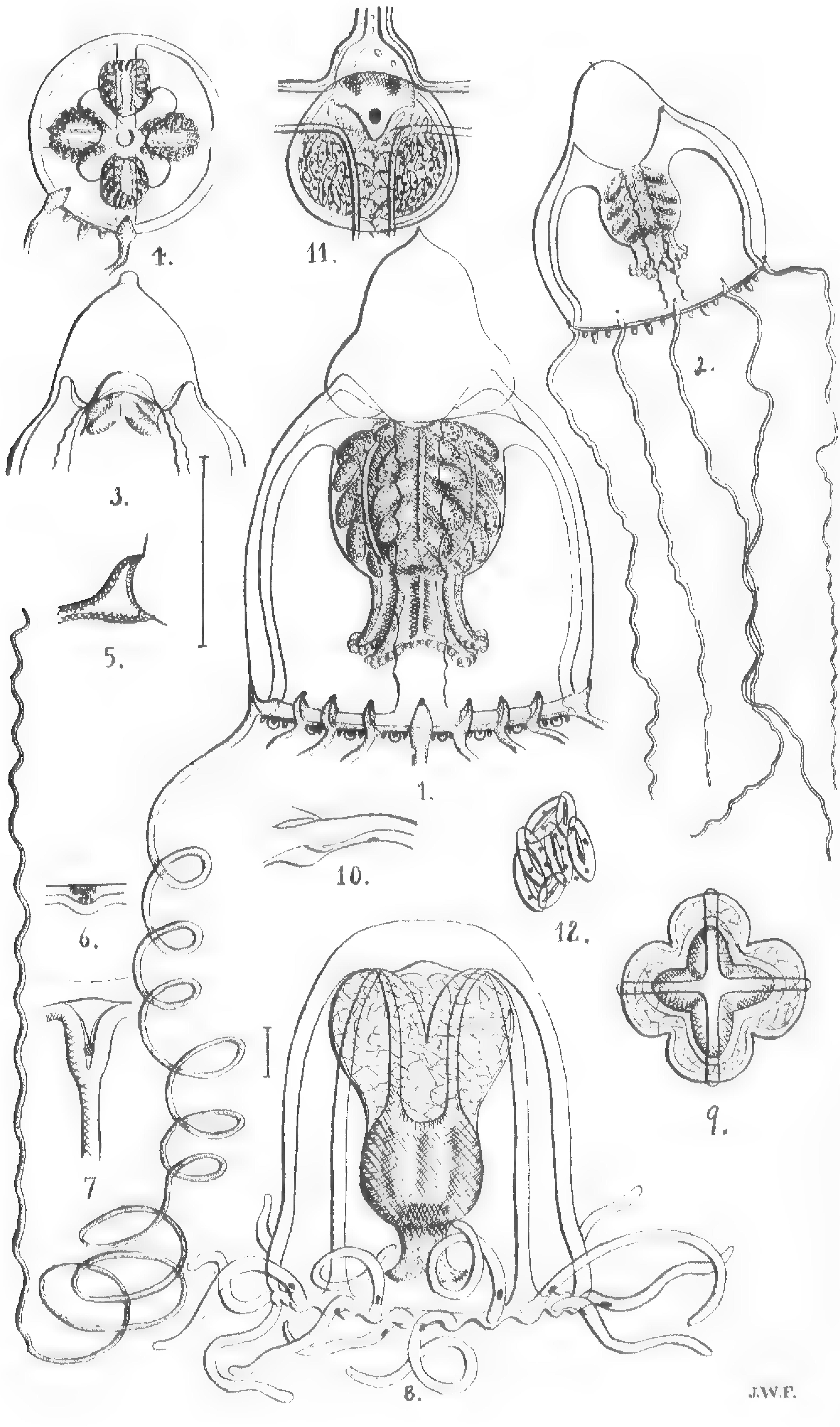

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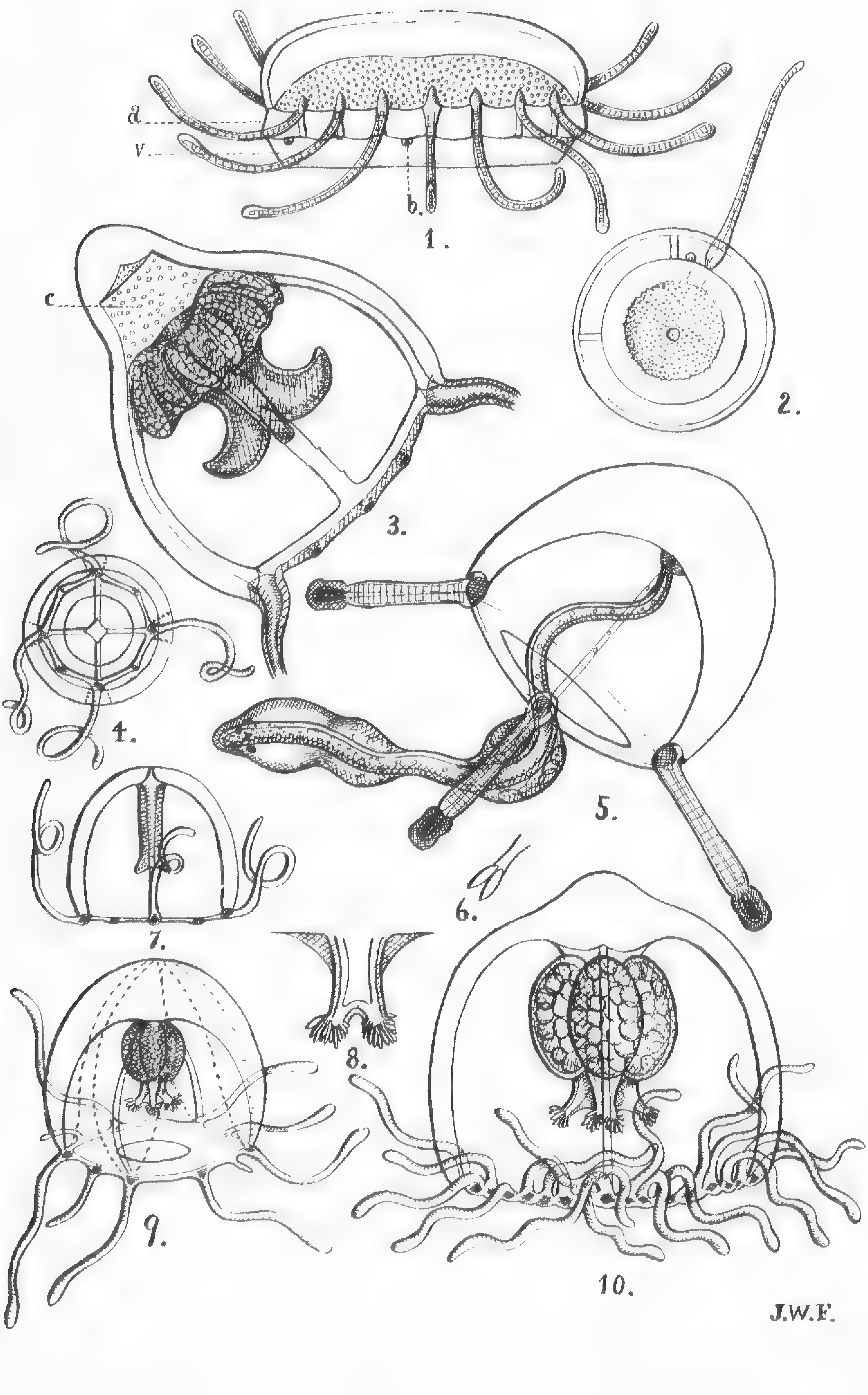
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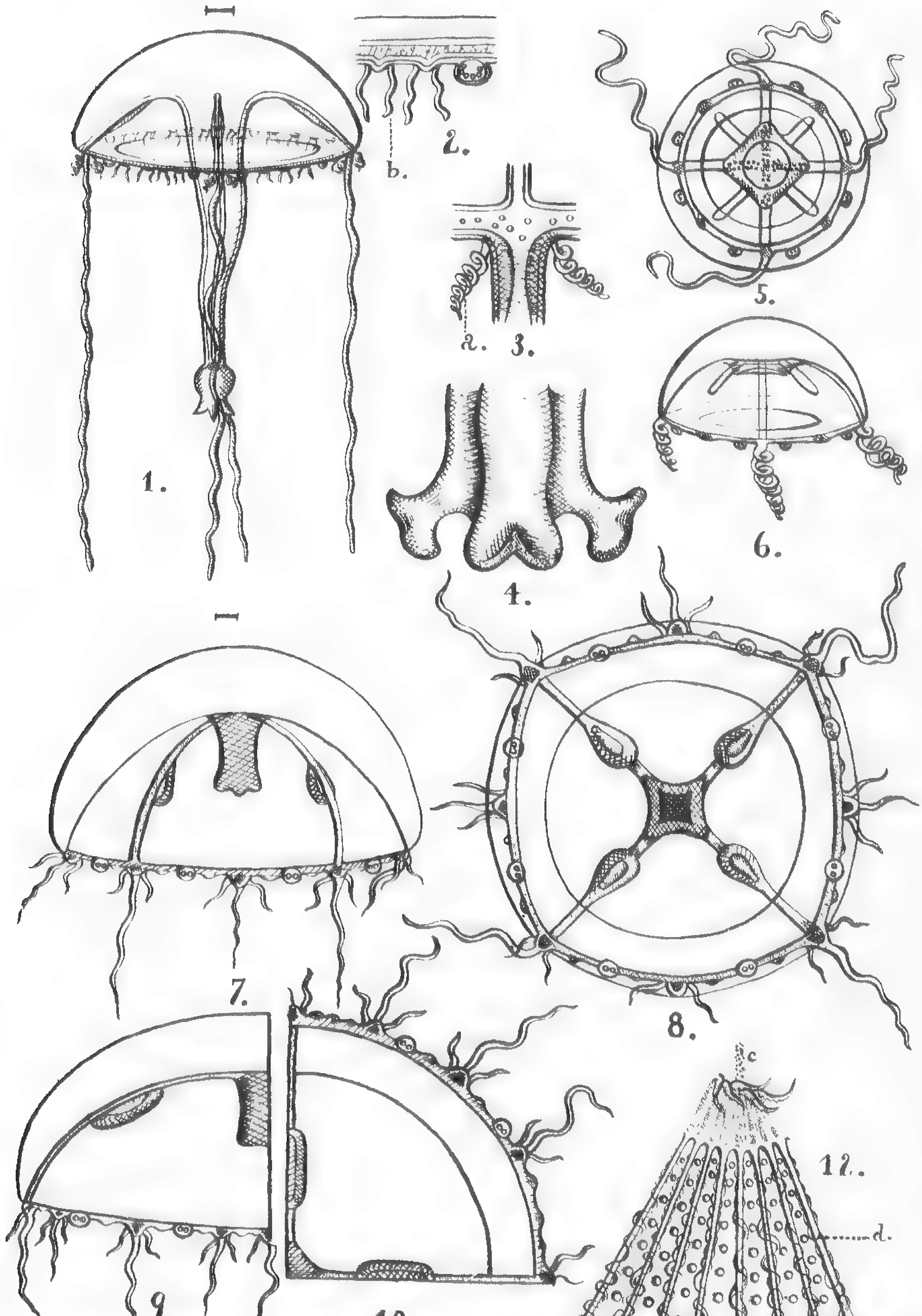
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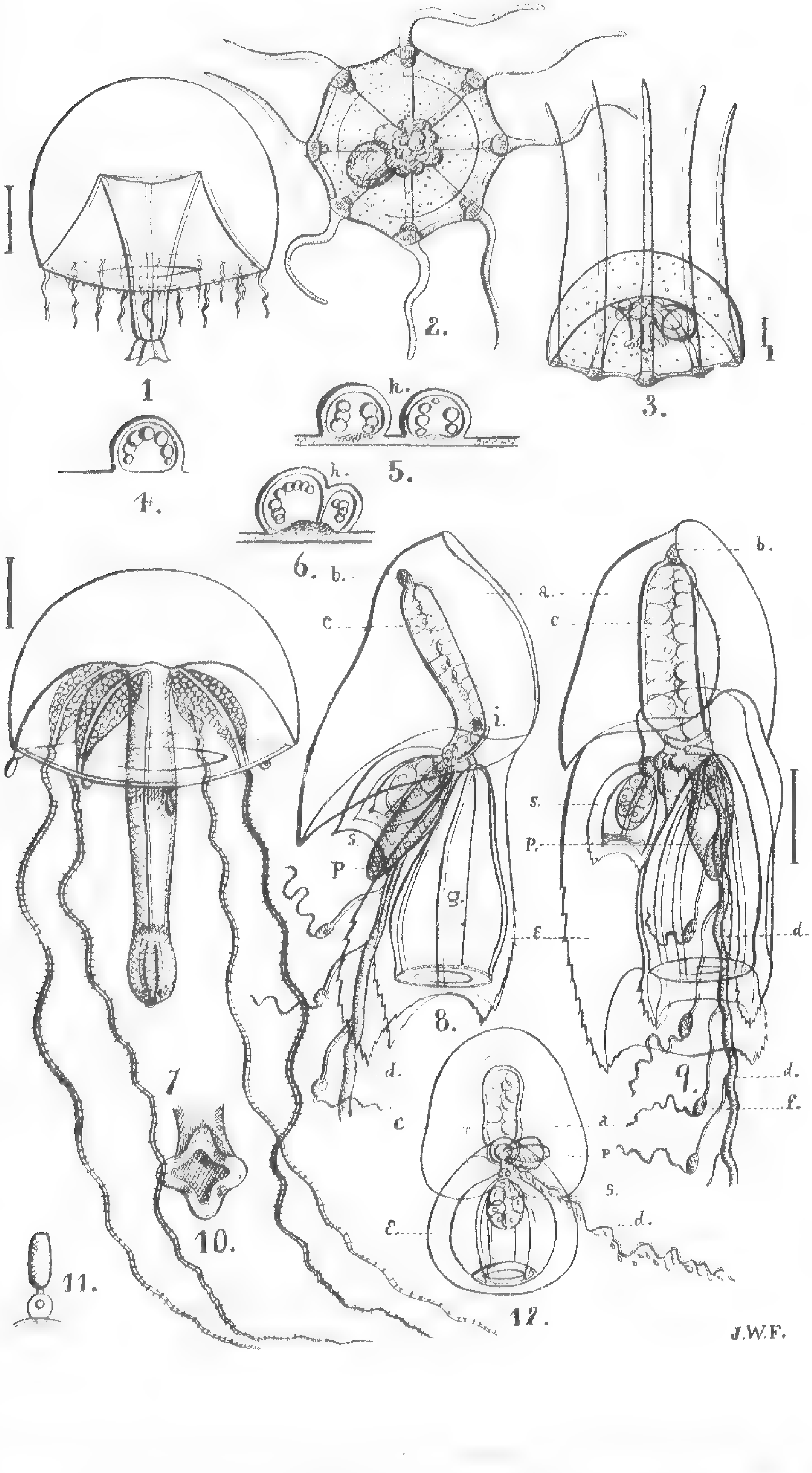

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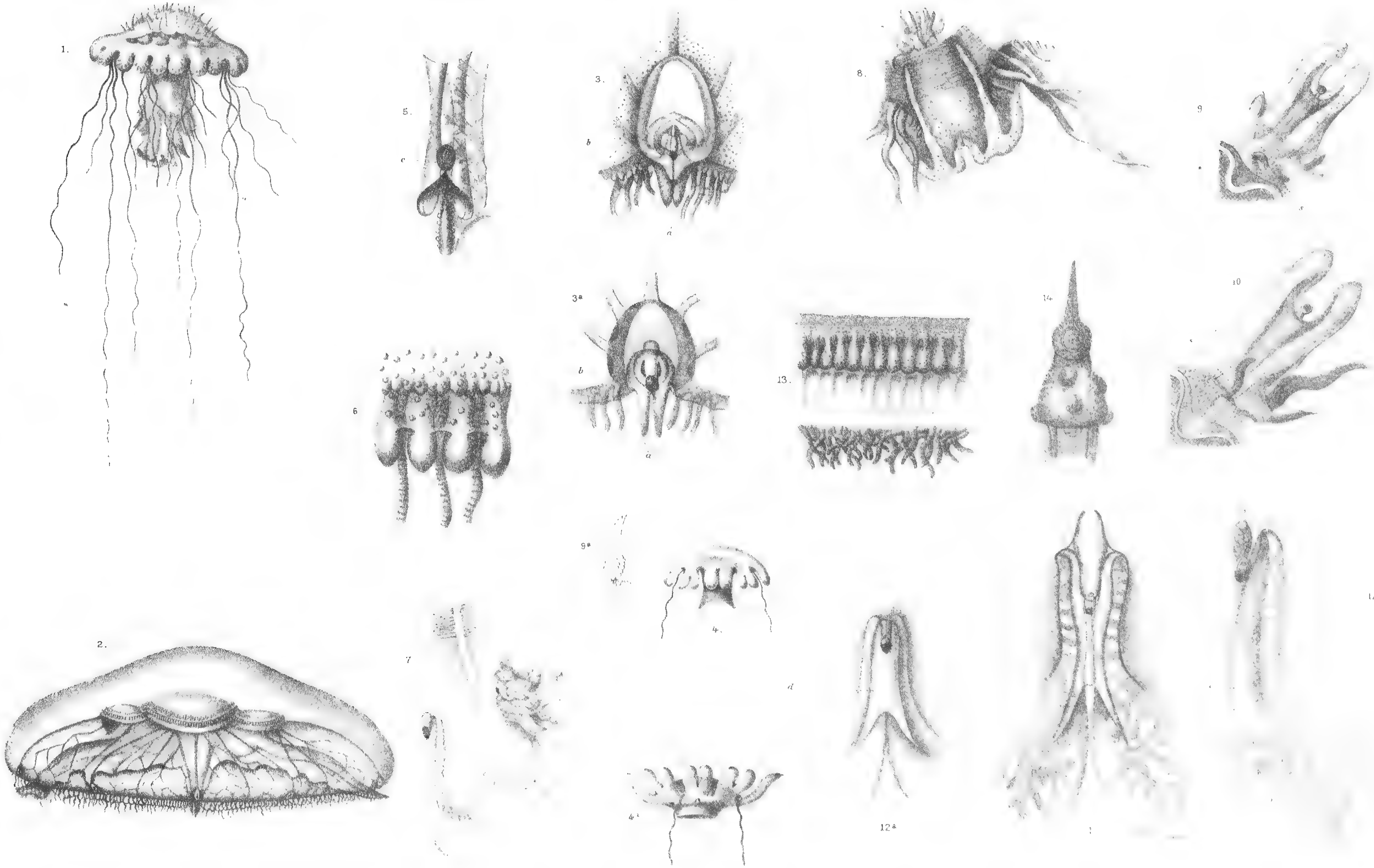

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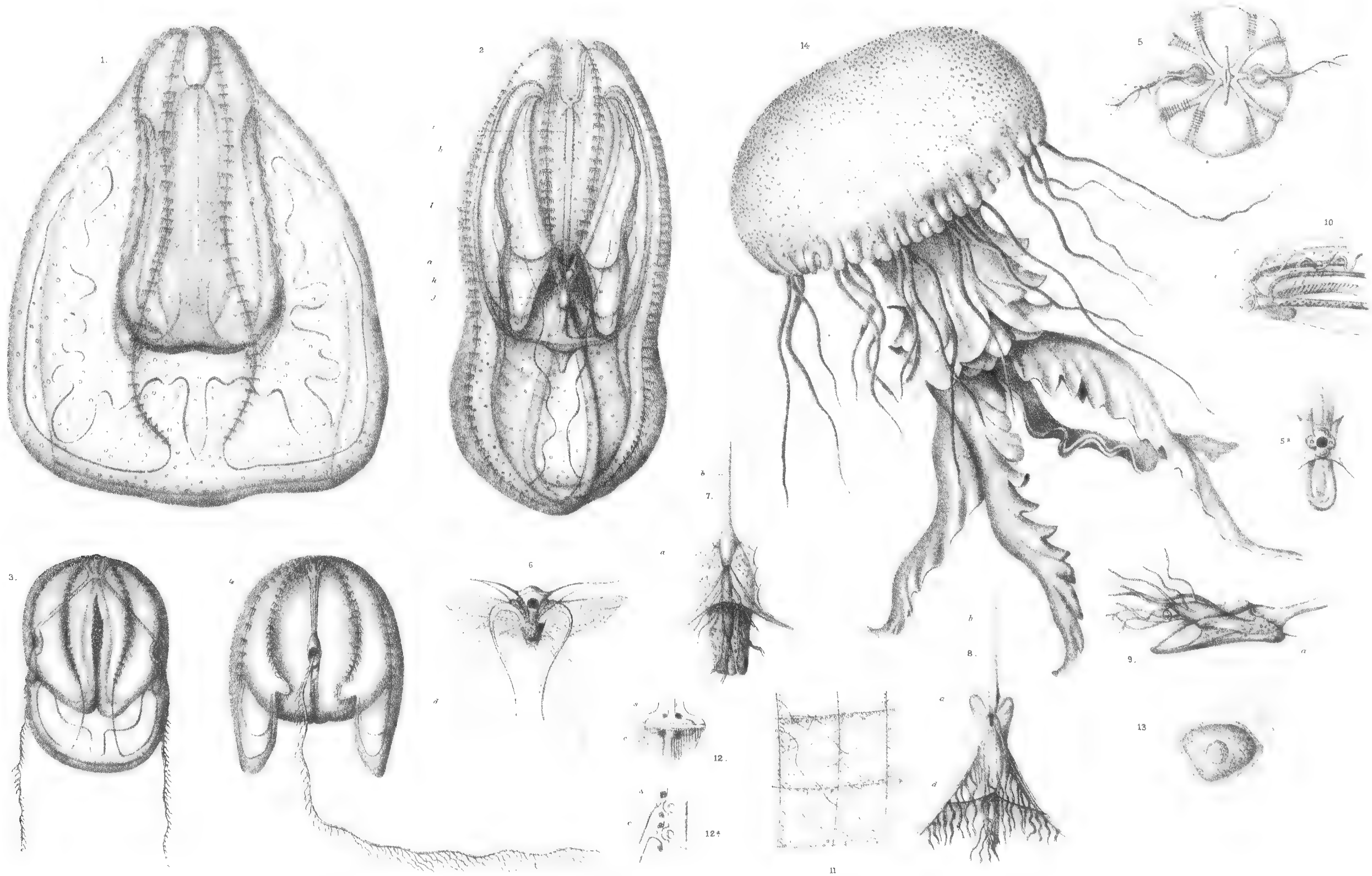

No. 9.—*List of Mammals collected by Dr. Edward Palmer in North-eastern Mexico, with Field-Notes by the Collector.* By J. A. Allen.

The region traversed by Dr. Palmer includes the eastern portion of the State of Coahuila, the southern parts of Nuevo Leon and Tamaulipas, and a large part of the State of San Luis Potosi. The specimens were collected chiefly in the vicinity of the city of San Luis Potosi, but include a number from Monclova, Parras, Saltillo, Rio Verde, and the neighborhood of Tampico. The remarks respecting the distribution and abundance of the species, when of a general character, may be taken as relating to the general region traversed. The collection throws much light on the range of Mexican mammals, and in a few cases extends their range much beyond their previously known limits. The detection of a species of *Heteromys* so far northward is perhaps the most important single fact of the list. The notes on the relative abundance and distribution of the species, written from Dr. Palmer's dictation, are distinguished by being enclosed in marks of quotation.

1. **Canis latrans**, Say. Prairie Wolf; Coyote.

"Generally dispersed but not common, having been to a large extent destroyed by poisoning and shooting." Dr. Palmer reports their occurrence in small numbers in all the parts of Eastern Mexico visited by him. One specimen was sent from San Luis Potosi.

2. **Urocyon cinereo-argentatus** (Schreb.), Coues. Gray Fox.

"Generally dispersed and very common. Often domesticated."

3. **Putorius brasiliensis frenatus** (Licht.), Coues. Bridled Weasel.

Mountains near Saltillo, August 11, 1880. The species is represented in the collection by a skin and skull. "Apparently not common."

4. **Taxidea americana berlandieri** (Baird), Allen. Mexican Badger.

The localities represented are San Luis Potosi, San Pedro (Chihuahua), and Saltillo. Not common.

5. **Bassaris astuta**, Licht. Civet Cat.

One specimen, San Luis Potosi, March 29, 1879. "Not very common, but occurs in small numbers nearly everywhere. Often tamed as pets."

[**Bison americanus** (Gmelin), Smith. AMERICAN BISON.

Of this species no specimens were of course observed, but it is here introduced for the purpose of recording some traditional evidence of its former presence at points outside of its hitherto definitely recorded range. "According to the testimony of old people," says Dr. Palmer, "the Bison was very abundant about Monclova and Parras when the first settlers reached these points, probably half a century after the conquest. For some years they killed large numbers for food, but soon they ceased to appear. There seems to be no reason why, so far as the nature of the country is concerned, the Bison may not have ranged also to Saltillo. Careful observation failed to detect any of their remains, nor could I learn that such have been met with. Little attention, however, is paid to such things by the inhabitants, which might easily pass unnoticed, even if existing."]

6. **Cariacus virginianus mexicanus** (Gmelin), Allen. COMMON DEER.

The collection contains the head of a male, obtained at Savinito, Tierre Caliente. "Common everywhere in the wooded mountains, to which they are restricted. Very common about Tampico, and are frequently exposed for sale in the markets of the town."

[Dr. Palmer informs me that he found no indication of the presence of the Prong-horn (*Antilocapra americana*) in any portion of the region he traversed. This is an important negative fact, as tending to fix the southern limit of this species, as it is known to occur further westward in the northern parts of the States of Chihuahua and Sonora.] Berlandier is cited (Alston, Biol. Cent. Amer., Mam., p. 113) as authority for the statement that its range extends "southwards at least throughout the State of Tamaulipas."

7. **Nyctinomus brasiliensis**, Is. Geoffroy.

Four specimens, San Luis Potosi. "Common, infesting the houses. This is the common Bat of this region."

8. **Plecotus auritus**, LeConte. BIG-EARED BAT.

One specimen, San Luis Potosi. This appears to be the first record of this species from any part of Mexico.

9. **Spermophilus grammurus** (Say), Bachman. LINED-TAILED SPERMOPHILE.

One specimen, taken at Angostura, Rio Verde, one hundred and sixty miles south of San Luis Potosi. "Occurs here and elsewhere abundantly about old walls and rocky places. Very destructive to the crops, and a great pest. From the nature of their haunts they are hard to capture."

10. **Spermophilus mexicanus** (Licht.), Wagner. MEXICAN SPERMOPHILE.

One specimen, Monclova. "Widely distributed at favorable localities, but not nearly so abundant as the smaller species" (*S. spilosomus*).

11. **Spermophilus spilosomus**, Bennett. SONORAN SPERMOPHILE.

Eleven specimens, representing both the young and the adult, are in the collection from San Luis Potosi, and one each from San Pedro (Coahuila) and Parras. There is very little variation in color with age or individually.

"Abundant. Lives on the open plains and about the edges of fields, where it is a troublesome pest. Hibernates. Many are tamed."

12. **Cynomys ludovicianus** (Ord), Baird. EASTERN PRAIRIE DOG.

Five specimens, from the vicinity of Saltillo. "Only a single small colony was met with, in a little valley surrounded by mountains, not far from Saltillo, confined to an area of some thirty or forty acres."

This discovery extends the range of the species considerably to the southward and eastward of any point from which it has hitherto been reported. In "Monographs of North American Rodentia," p. 896, I inferentially gave its southern limit as the Staked Plains of Western Texas, overlooking the fact that it had been recorded by Dr. Kennerly (Rep U. S. Mex. Bound. Surv., II. Mamm., p. 40) and by Dugés (La Naturaleza, I. p. 137) from the State of Chihuahua, the former observing it as far westward as the Sierra Madre.

13. **Mus decumanus**, Pallas. BROWN RAT.

"Abundant in the cities of the interior, as well as in those of the coast. It was common at San Luis, and extends as far north at least as Zacatecas."

14. **Mus alexandrinus**, Ét. Geoffroy.

Four specimens, from San Luis, where it is "common in the houses." In addition to these are two specimens which seem to be unquestionably hybrids between this species and *M. rattus*, with which it has been repeatedly stated to interbreed.

15. **Mus rattus**, Linné. BLACK RAT.

Two specimens, San Luis Potosi. "Lives in the houses and also in fields."

16. **Mus musculus**, Linné. HOUSE MOUSE.

"A numerous pest everywhere in the houses."

17. **Hesperomys melanophrys**, Coues.

One specimen, a full-grown male, San Luis Potosi, September 1, 1879. "Rather common in the fields."

As admitted by both Coues (North Amer. Rodent., p. 102) and Alston (Biol. Cent. Amer., Mam., p. 147), there is strong probability that *H. melanophrys*, Coues, and *H. mexicanus*, De Sauss., are identical. The specimen collected by Dr. Palmer agrees in size with Dr. Coues's largest examples from Tehuantepec ; the black eye-ring is also quite conspicuous, but the back posteriorly is apparently more strongly ferrugineous. I therefore provisionally adopt Coues's name in preference to De Saussure's.

18. **Neotoma floridana mexicana** (Baird), Allen. Mexican Bush Rat; "Rata del Campo."

Neotoma mexicana, Baird, Proc. Acad. Nat. Sci. Phila., VII., April, 1855, 333; Mam. N. Am., 1857, 490; U. S. & Mex. Bound. Surv., II. Pt. 2, 1859, Mam., p. 54, Pl. XXIV. fig. 1, skull.

Neotoma micropus, Baird, Proc. Acad. Nat. Sci. Phila., VII., April, 1855, 333; Mam. N. Am., 1857, 492; U. S. & Mex. Bound. Surv., II. Pt. 2, 1859, Mam., p. 44.

Neotoma floridana, Geoffroy, Zoöl. Voy. Venus, 1855, 154, Pl. XIII. — Coues, Mon. N. Am. Roden., 1877, 14 (partim). — Dugés, La Fraternidad, I., 1874, 82, Pl. (animal, details of external parts, skull, and dentition).

A series of eight specimens, two collected in October and the remainder in March, at San Luis Potosi, contrast so strongly in color and size with Florida examples of *Neotoma* that the Mexican form seems eminently worthy of varietal recognition. The Mexican specimens are fully one fourth smaller, the tails are much more thickly clothed, and the color is widely different, agreeing, however, in every respect with *N. mexicana*, Baird. The tail is sharply bicolor, and the feet and the lower surface of the body are snowy white, separated from the mouse-brown of the back by a well-marked band of yellowish-rufous or golden-rust, varying in intensity in different individuals. Two specimens have the dorsal surface strongly ferrugineous throughout, varied of course with black medially, passing into strong reddish brown on the sides, thus in general tint strongly resembling *N. ferruginea*, for which they were at first mistaken. One is a male, the other a female, and they were taken, respectively, March 10 and March 24. Another specimen, a female, taken March 20, presents the opposite extreme of paleness, being gray above, varied with black and faintly tinged on the sides with a pinkish hue. These examples indicate an exceedingly wide range of individual variation in color; the other specimens, however, are variously intermediate, and form altogether a closely intergrading series.

"These rats are sold in the markets as food for invalids whose stomachs are unable to retain other food; as a cure for chronic diarrhœa and dysentery is believed to have few equals. The animals are split open and applied as a poultice to parts affected with pain. The market of San Luis Potosi is never without these rats. They are said to be good eating aside from their ascribed medicinal virtue. They are very abundant, inhabiting the localities of the magueys or agaves, about the roots of which they live, probably because the thorny nature of the plant prevents rapacious animals from burrowing after the rats, or possibly in order to feast upon the roots. They live in the ground, and the daily supply seen in the market of San Luis Potosi is obtained by digging them out of their burrows. They are known under the name Rata del Campo."

Dr. Palmer has kindly called my attention to two papers on this species in "La Fraternidad" * by Don Alfredo Dugés and Dr. Gregorio Barrocta, the

* La Fraternidad — Periódico de la Sociedad Medica de San Luis Potosi, Tom. I., Entr. No. 6, Junio de 1874, pp. 82–87 y pl.

first accompanied by a plate giving a life-size figure of the animal, with numerous details, including the skull and dentition. Dr. Barrocta alludes especially to its supposed medicinal qualities, to the use of its flesh as food by the poorer classes, and to the daily sale of the animals in the market. Dugés states that they are readily domesticated and form agreeable pets.

19. **Dipodomys phillipsi**, Gray. Kangaroo-Rat.

Nine specimens, San Luis Potosi, September, October, March, and May, including adults of both sexes and half-grown young. In point of coloration they present great uniformity, the young exactly agreeing in this respect with the adult.

"Everywhere common. Very troublesome in the cornfields. Nocturnal. Obtained with difficulty and only by digging them out of their burrows."

20. **Heteromys longicaudatus?** Gray. Mexican Hispid Mouse.

Heteromys alleni, Coues, MS.

Dr. Palmer's collection contains a single specimen of *Heteromys*, an adult male, taken at the Hacienda Angostura, Rio Verde, February 26, 1878. Dr. Palmer states that it was discovered in a mound in digging for antiquities. Two were seen, but one of them escaped. He believes it to be rare, as it was not recognized by the natives. Appreciating its importance he offered a reward of a dollar apiece for other specimens, but was unable to obtain any more.

The genus *Heteromys* has hitherto been known only from Southern Mexico (Oaxaca) and thence southward to Northern South America. Numerous species have been described, but only four are recognized by Mr. Alston (Biol. Cent. Amer., Mam., pp. 166–168) as valid, and of these two only (*H. desmarestianus* and *H. longicaudatus*) are found north of the Isthmus of Panama. The present example differs apparently in important features from either of these and a detailed description of it is therefore appended.

"In size and general appearance it greatly resembles *Perognathus fasciatus*, but is a typical *Heteromys;* the upper incisors being smooth while the pelage is mixed with flat grooved spines. Tail vertebræ as long as head and body; with hairs, half an inch longer. Tail tufted at the end, the lengthened hairs forming a crest, as in *Perognathus pencillatus*. Soles hairy from the heel nearly to the bases of the toes ; but a slight strip along the heel is naked. A very prominent black tubercle at the base of the inner toe. Under surfaces of the toes naked and scaly. Palms naked from the wrist. Upper surfaces of hands and feet densely hairy. Ears large, orbicular, projecting beyond the fur ; notch bounded behind by a very large flap-like lobe, in front by a slight fold (much as in *Perognathus pencillatus*).

"Coloration not unlike that of *Perognathus fasciatus*, but darker. Under parts pure white. A conspicuous stripe of fawn-color extends the whole length of the head and body, separating the white under parts from the dark upper parts. Nearly the whole fore leg is colored like the upper parts ; this dark color also descending the hind leg and advancing a short distance on the tarsus. The dark color of the fore leg is separated from that of the upper parts by the fawn-colored stripe; that of the hind leg is continuous. Ears conspicuously bordered with white. The general color of the upper parts is blackish intimately grizzled with gray and sandy; the dark colors predominate and give the general effect on the back, the admixture of sandy increasing on the sides in approaching the fawn-colored stripe. The spines are colorless in all their grooved portion, the smooth sharp lips being blackish; these comprise one fifth to one fourth of the whole length. The very slender hairs intermixed with the spines are similarly colored. The spines are restricted to the upper parts; elsewhere the fur is soft, but coarse, and there appears to be no under fur. The hairs of the white under parts, and of the fawn-colored stripe, are uniformly colored from root to tip. The tail sharply bicolor, blackish above and white below, fully haired, the hair completely hiding the scales; the pencil at the end is entirely dark-colored and occupies the terminal inch of the vertebræ. Whiskers partly blackish and partly colorless. Claws nearly colorless. Incisors yellow.

"The length of the well-prepared skin (No. 5889, M. C. Z.) is 4.30 inches. Tail vertebræ the same. Tail with hairs, 4.75. Hind foot, 1.15. Ear, .55 above notch.

"As above stated, this example is of the size of *Perognathus fasciatus*, which it much resembles in general appearance, especially in the conspicuous fawn-colored stripe along the sides; in its long tufted tail it resembles *P. pencillatus*, but is of course generically different from either. The white rim of the ears is also a strong mark." — *Coues*, MS.

In 1868, Dr. J. E. Gray (Proc. Zoöl. Soc., 1868, pp. 204, 205) described three species of *Heteromys* from Mexico (*H. longicaudatus*, *irroratus*, and *albolimbatus*) and one from Honduras (*H. melanoleucus*), all of which Mr. Alston has referred to a single species, together with another (*H. adspersus*) from Panama described by Dr. Peters, in each case from an examination of the types. For this species he adopts the name *longicaudatus* as "the only one of Gray's names which is not absolutely misleading." In view of this large number of synonyms it seems presumptuous to take the risk of adding another, although the present example does not agree with the characters given by Mr. Alston for *H. longicaudatus*, nor with those of any of the species described by Gray, although recalling certain features of two of them. It has, for instance, the white-rimmed ears of *H. albolimbatus*, and "the yellow streak on the side," or "widish interrupted yellow line," of *H. irroratus* (which, however, Mr. Alston says, is merely "a slight tinge of pale fawn along the edge of the darker coloring"), except that in the present example it is not interrupted and forms a conspicuous feature of the coloration. There is no allusion in any of the descriptions, nor in Mr. Alston's diagnosis and remarks, to the conspicuous crest of long (.50 to .65 of an inch in length) blackish hairs along the terminal fifth of the tail-vertebræ, unless it be that the phrase, "short black hairs, which are more abundant on the upper part near and at the tip, forming a kind of pencil," in the description of *H. albolimbatus*, can be so construed. From Mr.

Alston's determinations it is evident that specimens he refers to *H. longicaudatus* present considerable variations in color, in the length and hairiness of the tail, etc., and may or may not have white-edged ears. In view of this fact a conservative course seems the only advisable one in the present instance.

I may here add that some months since (before the appearance of Mr. Alston's revision of the group) I submitted the specimen to Dr. Coues, who considered it as undescribed (an opinion I then fully shared), and returned it with the above-given description and MS. name.

21. **Thomomys talpoides umbrinus** (Rich.), Coues. SOUTHERN POCKET GOPHER.

Two specimens, San Luis Potosi. "Abundant. Very troublesome in the sugar fields."

The specimens collected by Dr. Palmer extend the known range of the species much to the southward (some 10° of latitude) and eastward of previously recorded localities (Espia and Santa Cruz, State of Sonora).

22. **Lepus sylvaticus**, Bachm. WOOD HARE; "GRAY RABBIT."

Six specimens, from the vicinity of San Luis Potosi. The series includes both young and adult.

"Everywhere abundant. Brought into the towns by the mule-load."

23. **Lepus callotis**, Wagler. MEXICAN HARE; "JACKASS RABBIT."

Eleven specimens, including a series of young examples, from San Luis Potosi.

"Abundant everywhere; more common even than the smaller species [*L. sylvaticus*] and forms an important source of food."

24. **Tatusia novemcincta** (Linné). ARMADILLO.

There is a single carapace in the collection from the Tierra Calienta of the State of San Luis Potosi, where, according to Dr. Palmer, the animal is not uncommon.

25. **Didelphys** ——

Parras, two specimens (skins and skulls in spirits), apparently about half-grown, of a species not yet determined. The ears are entirely white; there are three prominent black stripes on the face, and the long hairs of the dorsal surface are black, imparting this color to the whole dorsal aspect.

No. 10. — *The Trilobite: New and Old Evidence relating to its Organization.* *By* C. D. WALCOTT.

INTRODUCTION.

THIS publication terminates, for the present, an investigation that has occupied much time and attention during the past seven years.

In the month of October, 1873, the attention of Professor Louis Agassiz was called to certain markings on the inner side of the pleuræ of a specimen of *Asaphus platycephalus*, "Panderian Organs." He considered them as proving the existence of true crustacean legs. (*Amer. Nat.*, VII. 741, 1873.) With his characteristic liberality Prof. Agassiz offered facilities for study, and strongly urged that an attempt should be made to discover the ventral surface of the animal and the character of the attached appendages. It affords me pleasure to state here that whatever there may be of value in this contribution to our knowledge of the subject is owing largely to the spirit of investigation that he awoke and which has carried forward the work under many adverse circumstances long since his death.

The prosecution of the investigation during the year 1874 gave the material from which the notes on the inferior or ventral surface of the dorsal shell of *Ceraurus pleurexanthemus* were written. Judging from the dorsal shell alone the views of Burmeister were given as best explaining the facts then known.*

The succeeding year thin sections of Trilobites were cut from both Lower and Upper Silurian rocks. In the upper portion of the Trenton limestone at Trenton Falls, N. Y., a thin layer of dark, bluish-gray, fine-grained, partially impure limestone was found, that contained many very perfectly preserved trilobitic remains. On examination of these by cutting sections, it was ascertained that other parts of the animal besides the dorsal shell and hypostoma were present. Specimens from all other localities and formations failed to afford more than the strong dorsal shell and hypostoma. This fact once established led to the extended working of the prolific stratum. The soil and rock to a depth of nine feet was removed, over a large area, to obtain the fossils scattered through the thin layer of limestone. From this area

* Ann. Lyceum Nat. Hist. of New York, XI. pp. 155-162, 1875.

there were taken over 3,500 entire Trilobites; 2,200 were in a condition to warrant sections being made of them. Comparatively few had the appendages well preserved, and now there are but 270 sections,* affording more or less satisfactory evidence of their preservation. It was very difficult, after obtaining the material, to cut a section so as to show what might be preserved within the dorsal shell. With a knowledge of the character and position of the appendages, as they were buried in the rock, sections might have been cut at once revealing all that was desired to prove this knowledge to others. But the true conditions were more in this wise. An Arthropod of which little was known as to the structure of its appendages was buried originally in a soft, calcareous mud or ooze. It was subjected to maceration and disintegration by the action of the water, and also to the attacks of the small scavengers of the time (*Leperditiæ*), antecedent to its burial in, and the consolidation of, its muddy bed. In the process of mineralization calcite replaced the viscera and contents of the appendages, destroying most of the details of structure. Taking a specimen that a fortunate blow of the hammer has exposed unbroken, the section is cut down through a mingled mass of what was formerly the viscera and appendages, if they chance to be present at all: that but one specimen in twenty gave an instructive section is not at all surprising. As the work extended over several years, what is now known of the structure of the appendages is the result of an accumulation of material and facts from time to time and not of a fortunate discovery of one or more instructive specimens.

In the latter part of the year 1876 a preliminary notice was published of the results then obtained by section cutting.† Conclusions were drawn to be abandoned six months later on the discovery of evidence that negatived them. The following year a further notice of the progress of the work was published.‡

The conclusions then arrived at are not all sustained, although the main features of the structure of the Trilobite were well recognized. This is especially true of the cephalic appendages, showing the affinity of the Trilobite with *Limulus* and *Eurypterus*.

Many fine and instructive sections have been cut since 1877 that give information in relation to minor points of structure.

* 205 are from *Ceraurus pleurexanthemus*, 49 from *Calymene senaria*, 11 from *Asaphus platycephalus*, and 5 from *Acidaspis Trentonensis*.

† Pamphlet issued in advance of the 28th Report of New York State Museum of Natural History.

‡ See 31st Report of New York State Museum of Natural History, p. 61.

The sections of the Trilobite retained in the slices of rock are translucent, and in nearly all cases when used for illustration were photographed by transmitted light. The photographs were used to obtain the outlines of the dorsal shell and appendages, thus insuring a greater degree of accuracy than enlargement by measuring.

In referring to what has been done in the past, in the study of the organization of the Trilobite, it is unnecessary to present the many strange views that have been advanced to show that it was related to fish, mollusk, insect, or some crustacean to which it has but a superficial resemblance. These are given in the introduction to the study of the "Organization of Trilobites," by H. Burmeister, where the student can find the most complete review of the subject up to the date of the English edition (1846) that has been published. M. Barrande, in the Supplement to his Volume I., 1872, presents an historical review to that time.

The following historical notes are given as showing that many naturalists have considered the Trilobite related to *Limulus* and also to the *Phyllopoda* as represented by *Apus* and *Branchipus*.

1750. Ch. Mortimer, in the Philosophical Transactions (XLVI. p. 600), expressed the opinion that *Scolopendræ aquaticæ scutatæ affine animal petrificatum* (the Trilobite) appeared to correspond with *Monoculus apus*, Linn.

1753. Linnæus designated all the species belonging to the Trilobite as modifications of his *Entomolithus paradoxus*, deciding himself in favor of their near affinity to *Monoculus apus*. This view is expressed in all the editions of the "Systema Naturæ."

1768. Ch. Fr. Wilkens sustained the views of Linnæus, and gave the name *Entomolithus brachiopodus cancriformis marinus*, thus removing the Trilobite from the domain of conchology, to which it had frequently been referred.

1771. J. Imm. Walch adopted Wilkens's views, and, convinced of the unsuitableness of the name heretofore used, gave the name Trilobite, a designation that was generally received, and has since been used by authors with the exception of Dalman.

1821. H. Burmeister says that "the year 1821 is a crisis in the literary history of the Trilobite, for a new epoch then commences," V. Audouin and George Wahlenberg both arriving at very important results in their studies. Audouin summarizes his results in the following four conclusions, viz.: —

1st. That Trilobites differ only from the other Articulata in points of secondary importance, and that, beyond a doubt, they belong to this group of the animal kingdom.

2d. That they exhibit the greatest analogies with the *Isopodes,* particularly with *Cymothoa* and *Ligia.*

3d. That the want of feet seems to be a necessary characteristic of their skeleton formation, although this point still remains problematical.

4th. That these feet, if they existed at all, were most probably connected with the branchial apparatus.

These conclusions are introduced here as they evidently had much to do with the direction of future research, especially the 1st and 4th.

Wahlenberg followed closely in the steps of Linnæus. He believed that the Trilobite was most nearly allied to *Limulus,* and was inclined to transfer this similarity to the structure of the feet. The feet in the Trilobite, being smaller, were not observed in the fossils. He noted the corresponding solidity of the head-plate of the Trilobite and *Limulus,* and adds, that, from the various considerations given, we may assume that it, the *Limulus,* is now amongst living crustaceans the last remaining member of the voracious family which was formerly represented by the Trilobites.

1822. "Brongniart," Burmeister observes, "expresses the correct view with reference to the zoölogical relations, namely, that the Trilobites are most nearly related to the *Branchiopodes* among the Crustacea, and that the want of visible feet, as well as of visible antennæ, accords very well with this."

1826. Dalman came to nearly the same conclusions as Wahlenberg, seeing a connection of affinity between the Trilobites and *Limulus, Apus* and *Branchipus,* and one of analogy only between them and *Sphæroma, Cymothoa,* and *Idotea*; or, generally, of affinity between the *Palæades* (Trilobites) and *Monoculi,* and of analogy between the *Palæades* (Trilobites) and *Onisci.*

1836. Dr. Buckland considered *Serolis, Limulus,* and *Branchipus* as the three living genera of crustacea to which the Trilobites were most nearly related.

1843. J. E. Portlock, "Geology of Londonderry," says: "We may assume a group, formed of *Asaphus, Isotelus, Ilænus, Nileus, Bumastis,* etc., would constitute a true connecting link in the chain of organization between these obscure fossil crustaceans and the recent genera *Limulus* and *Apus.*"

1843. The work of Burmeister, "Organization of Trilobites," marks an era in the history of the discussion of the zoölogical affinities and analogies of the Trilobites. He brought together the history of what had been done up to that time, and added the results of laborious and profound studies of his own. Summarized, the result of his investigation is best given in the following general conclusion: —

"*The* TRILOBITES *were a peculiar family of* CRUSTACEA, *nearly allied to the existing* PHYLLOPODA, *approaching the latter family most nearly in its genus* BRANCHIPUS, *and forming a link connecting the* PHYLLOPODA *with the* PŒCILOPODA."

1870. Mr. E. Billings's discovery of an individual of *Asaphus platycephalus* from the Trenton limestone, with traces of the appendages beneath the dorsal shell, affords the first evidence of the presence of articulated ambulatory appendages in the Trilobite. He homologized the Trilobite with *Limulus* and added materially to the knowledge of its structure by his discovery.

——. Mr. Henry Woodward strongly supported Mr. Billings's interpretation of the parts found in the Canadian *Asaphus*.

1872. Dr. A. S. Packard accepted Burmeister's classification of the Trilobite with the *Branchiopoda*, and, from the discovery of Mr. Billings and Mr. Henry Woodward, homologized it directly with *Limulus*, adopting the following arrangement under *Branchiopoda*: — 1st Order, *Cladocera*. 2d Order, *Merostomata;* Suborder, *Xiphosura;* Suborder, *Eurypterida*. 3d Order, *Trilobita*. 4th Order, *Phyllopoda*.*

1873. M. Alph. Milne Edwards states that, notwithstanding the small number of species of this group (*Limulus*, etc.), the zoölogist ought to consider them as constituting a particular class intermediate between the Crustacea and Arachnida.†

1877. C. D. Walcott illustrated sections of the manducatory apparatus, branchiæ, etc., and placed the *Trilobita*, *Xiphosura*, and *Eurypterida* as *orders* in the legion *Merostomata*, and under the subclass *Gnathopoda*.

1879. Dr. A. S. Packard formed the subclass *Palæocarida* to embrace the orders *Merostomata* and *Trilobita*, the former order including the *Xiphosura* and *Eurypterida* as suborders.

From the time of Ch. Mortimer to the date of Mr. Billings's discovery, the Trilobite was homologized with *Limulus* on the characters presented by the dorsal shell. That these were variously interpreted by naturalists is shown by the varying views of Linnæus, Burmeister,

* Boston Soc. Nat. Hist. † Ann. des Sci. Nat., Tome XVII. p. 56.

and Latreille. The facts brought together by Mr. Billings added to the homology with *Limulus*, and this was strengthened by the observations of Packard in his discussion of the classification of the *Branchiopoda*, and, later, by the writer in discovering the structure of the cephalic appendages.

The instances of the discovery of parts of the animal other than the dorsal shell and hypostoma are rare. M. Barrande, in reviewing the reported discoveries made of the appendages of the Trilobite to the date of the publication of his Volume I., 1852, says: "Unhappily all these researches have resulted in nothing more than the discovery of the pieces of the mouth named Hypostoma and Epistoma, and the intestinal canal." Again, in his Supplement to Volume I., 1872, he says: "The few scattered observations of parts found which might belong to the Trilobites have little value and were accepted as such by naturalists."

"Though disposed to regard these processes figured by Mr. Billings as feet, still the proof is unsatisfactory." *

"No traces of ambulatory or natatory limbs of branchiæ or antennæ have ever been discovered. . . . . Quite recently, however, a specimen of a Trilobite has been discovered in which it is said that the bases of the legs were distinctly recognizable." †

"No remains of legs are found with any Trilobites, which would not be the case if they had stout legs common to crustaceans of the same size." ‡

"Up to this time, no certain indications of the existence of appendages, nor even of any hard sternal body-wall, have been discovered, though a shield-shaped labrum, which lies in front of the mouth, has been preserved in some specimens." §

The following appear to be the only instances of the actual discovery of some portions of the appendages and structure beneath the dorsal shell.

1828. M. Goldfuss. As shown in the illustrations, the sections of *Phacops* figured on Plate II. (*Annales des Sci. Nat.*, Tome XV.) appear to indicate some remains of appendages. M. Barrande, however, thinks that M. Goldfuss failed to prove that the parts he considered as branchial feet were anything more than the result of a defect in the homogeneousness of the rock, or a section of some fragments gathered

* Development of *Limulus polyphemus*. Packard, 1872.

† Manual of Zoölogy. Nicholson, 1876.

‡ Manual of Geology. Dana, 2d ed., 1876.

§ Anat. Invert. Animals. Huxley, 1877.

by accident in the vacant carapace of the Trilobite before its petrifaction.

1846. Prof. Beyrich presented the account of the discovery of the intestinal canal of *Trinucleus*. This was fully corroborated by M. Barrande, and more recently by Dr. Volborth.

1863. Dr. Volborth discovered the intestinal canal of an *Illænus*. It was constricted, so as to appear to be an articulated organ.

1870. Mr. E. Billings. This discovery is mentioned on a preceding page.

——. Mr. Henry Woodward mentions the discovery of the jointed palpus and one of the maxillæ of an *Asaphus*, in position by the side of the hypostoma.

1876. Mr. C. D. Walcott announced the discovery of the natatory and branchial appendages of the Trilobites.

1877. Mr. C. D. Walcott. Additional evidence is given to show the presence of manducatory jaws, ambulatory legs, and branchiæ, in the genera *Calymene* and *Ceraurus*.

The discovery by M. Eichwald of an isolated crustacean (?) leg, illustrated on Plate VI. fig. 4 of this paper, is an instance of discoveries mentioned by M. Barrande as having little value. Mr. Billings first discovered evidence of the presence of ambulatory legs in the Trilobite, and this was so far from satisfactory that Messrs. Dana, Verrill, and Smith pronounced the so-called legs not to be such,* and the discovery has been entirely ignored by many recent authors in zoölogy, as not having any bearing on the question of the zoölogical position of the Trilobite. Others, however, have accepted it, as has been mentioned.

The discoveries of the writer have been received in about the same manner. So many times the discovery of the feet and other organs of the Trilobite had been announced, and subsequently proved to have been based on insufficient evidence, or no evidence at all, that naturalists were disinclined to accept any statement that such discoveries had been made, without absolute proof of their genuineness.

From the illustration given by Mr. Billings of the Canadian specimen of *Asaphus*, and an examination of a cast of the original, I cannot but think that the remains are what he considered them to be. Although the specimen does not reveal the structure of the Trilobite as we now know it, it is the first that gave any positive information of the presence of jointed legs beneath the thorax of the Trilobite.

* Amer. Journ. Scien. and Arts, 3d series, I. 320, 1871.

THE STRUCTURE OF THE TRILOBITE.

The Dorsal Shell. — The character and structure of the dorsal shell, and also of the hypostoma, have been so fully and thoroughly discussed and beautifully illustrated by M. Barrande,* that it is not necessary to review them here. One illustration is given of the interior or ventral surface of the dorsal shell of *Ceraurus pleurexanthemus*, as it has not been illustrated in any general work on the Trilobite, and it also has the added interest of having afforded more sections showing the presence of the remains of the animal inhabiting the dorsal shell than any other species. A careful inspection of Plate IV. fig. 5, will show why it is that in the sections, which are cut across at all angles to either axis, the outlines of the dorsal shell have such a variety and variation of form as shown on Plate III. figs. 4, 5 and 6, and Plate II. figs. 3, 6, and 8.†

A longitudinal section through the median lobe, Plate IV. fig. 6, gives an outline of the dorsal shell, the hypostoma, the cephalic cavity (*c.*), the restored outline of the ventral membrane (*v. m.*), and the line of the intestinal canal (*i.*).

The species *Calymene senaria* ‡ is a well-known form, and, with the closely allied form *Calymene Blumenbachii*, has been illustrated, as far as its dorsal shell and hypostoma are concerned, by various authors, as also *Asaphus platycephalus*, one section of which is illustrated on Plate II. fig. 9.

The following arrangement will be observed in describing the remains of the body and appendages exposed beneath the dorsal shell: —

1. The Ventral Membrane.
2. The Intestinal Canal.
3. The Appendages beneath the Head.
4. The Appendages of the Thorax and Pygidium.
5. The Respiratory Apparatus.

The details of each section, etc., used in illustration, are given at the end of the paper, where the reader is referred for a more detailed

* Sys. Sil. Boh., I. Trilobites, 1852.

† A detailed description of the interior as illustrated on Plate IV. will be found in the Annals of the New York Lyceum of Natural History, XI. pp. 159–169, 1875.

‡ Hereafter this species will be spoken of as *Calymene*, and *Ceraurus pleurexanthemus* as *Ceraurus*, as they are the only species of either genus used in cutting sections, and it is desirable to avoid repeating the specific name.

description of the material used, as the basis of the conclusions given in this and the succeeding chapter, than will be obtained from the present general descriptions.

The Ventral Membrane. — In those longitudinal sections in which the ventral membrane is most perfectly preserved, it is shown to have been a thin, delicate pellicle or membrane, strengthened in each segment by a transverse arch, to which the appendages were attached. These arches appear as flat bands separated by a thin connecting membrane, somewhat as the arches in the ventral surface of some of the Macrouran Decapods. The finest illustrations of this structure have been found in *Calymene,* but several sections of *Ceraurus* show it very well defined. The section represented in Plate V. fig. 2, gives a very fine view of the membrane and arches in a longitudinal section. These parts are also shown by the section crossing the Trilobite diagonally to the median lobe (Plate V. fig. 4), and also the variation of the form of the arch near the point of the attachment of the leg. This point is seen in Plate V. figs. 1, 2, and 3.

In by far the greater number of sections, both transverse and longitudinal, the evidence of the former presence of an exterior membrane, protecting the contents of the visceral cavity, rests on the fact that the sections show a definite boundary line between the white calcspar, filling the space formerly occupied by the viscera, and the dark limestone matrix. Even the thickened arches are rarely seen. This is almost universally the case with the legs and attached appendages, as their external membrane is not to be distinguished as such. It would appear that in the process of mineralization the calcspar that replaced the viscera and contents of the appendages also replaced the substance of the membrane, thus forming one continuous mass and effacing all traces of the delicate external test. The nature of this covering is also shown by the present imperfect condition of the appendages. Only in a few rare instances are they found in an approximately perfect state, and the many bizarre forms prove that it was semi-elastic, often undergoing maceration, and thus forced into many irregular forms, as shown in Plate II. figs. 6 and 8, and Plate III. figs. 3, 4, and 5.

On the same small block of limestone with the two jointed legs illustrated on Plate VI. fig. 5, occur the remains of the dorsal shell of both *Calymene senaria* and *Trinucleus concentricus.* The contrast in the test of the joints forming the legs and that of the dorsal shell is very striking. The latter is firm, thick, and of a yellow or opalescent color, while the former is of a bronze color, thin, indented with numerous imprints as though it had contracted or shrunk after the decomposition of the muscles forming the leg.

That such a delicate membrane as enclosed the appendages and ventral surface of the Trilobite may be preserved so as to be observed in the fossil state, there is little doubt. It may be an impression in fine, smooth shale, or by the replacement of the parts by a mineral differing in color from the matrix, so as to show them distinctly. In Eocene fresh-water strata on the Isle of Wight the gill feet of *Branchipus* have been found. They were in a fine argillaceo-calcareous rock and stained with iron so as to show as well as in a photograph.* It is difficult to conceive of a more delicate test of the preservation of the branchiæ, and other parts liable to destruction from their nature, than this.

The Intestinal Canal. — Attention was first called to the existence of the intestinal canal in the Trilobite by Prof. Beyrich, who discovered it in a specimen of *Trinucleus ornatus.*† M. Barrande subsequently gave numerous illustrations of its preservation in *Trinucleus Goldfussi*, where, he says, it extended from the middle of the glabella along the interior of the median lobe to the extremity of the pygidium. In some examples it is filled with very fine, soft clay. This substance has, perhaps, largely contributed to preserve the form of the canal, which, once filled and buried in incompressible sand, has undergone no other deformation. There must have been some peculiarity of conformation that preserved the intestinal canal in this species, as in other Trilobites from the same quartzites no traces of it are to be seen.‡ M. Barrande mentions that Dr. A. de Volborth discovered in an *Illænus* a lengthened and articulate organ which originated in the glabella and became attenuated towards the pygidium.§ A cast of the interior, as shown in Plate IV. fig. 7, might have such an appearance. This, however, is conjectural, as I have not seen an illustration of Dr. Volborth's specimen.

In cutting sections of Trilobites it was a very rare occurence to find traces of the intestinal canal. One specimen out of one hundred was a large proportion. The visceral cavity was usually filled with calcspar, and all vestiges of the canal or any other organ obliterated.

In a note taken while cutting sections in December, 1876, it is stated that when grinding down a section from the anterior towards

* Nature, p. 381, 1877.

† Ueb. Trilob., II. Stück., p. 30, Plate IV. fig. 1, *c*, 1846.

‡ Sys. Sil. Boh., I. p. 229, 1852.

§ Ibid., II. p. 182, 1872.

the posterior extremity of the head the cephalic cavity which was filled with calcspar, had a dark round spot midway between the hypostoma and median lobe of the head. A sketch taken after the grinding had carried the section a short distance back shows the dark spot with the same outline as the opening seen in Plate IV. fig. 1, that leads into the intestinal canal from the cephalic cavity as exposed in the specimen. That this was the normal form of the intestinal canal is doubtful, but the transverse section, Plate IV. fig. 2, shows the opening in Fig. 1 divided into two openings caused in all probability by the ventral membrane with its central ridge, having been pressed up against it. In several transverse sections a round dark spot is seen in the spar beneath the thoracic segments, as in Plate III. fig. 7. This was filled with the sediment or mud, and thus preserved distinct. In the section illustrated by Fig. 7, the canal is much larger than it is usually found, owing probably to distension. The specimen illustrated on Plate IV. fig. 7, shows a portion of the dorsal shell of the median lobe broken away so as to exhibit the openings in the ventral surface that gave passage to the muscles, etc. of the legs, the partitions separating the segments of the ventral surface, and the central ridge to which they are attached. This ridge, with the partitions and arches in the membrane beneath, would give the necessary strength and firmness to form the base of attachment of the numerous ambulatory legs. It would also influence the form of the intestinal canal, as has been mentioned, in case it was pressed up against it. The position of the opening of the canal in Plate IV. fig. 1, and in the section ground away, would indicate that it passed beneath the cephalic shield into the cephalic cavity, and then recurved to the opening of the mouth. Posteriorly it extended to the extremity of the pygidium, as described by M. Barrande.

The space occupied by the canal and other internal organs is not large, as it is contained mostly between the arched median lobe of the dorsal shell and the ventral membrane, as shown in the restoration of a cross section of the thorax, Plate VI. figs. 2 and 3. The membrane uniting the margins of the dorsal shell and the median lobe of the ventral surface curves upward close to the plural lobes of the dorsal shell, and leaves but a narrow space between it and the dorsal shell to be joined to the central cavity.

Appendages of the Head. — As previously stated, the hypostoma has been fully discussed and its various forms illustrated by M. Barrande, so that it only remains to mention it as it occurs in the two species of Trilobites from which the sections illustrated were obtained.

Plate IV. fig. 5, and Plate VI. fig. 1, show it in a normal position as attached to the frontal "doubling" of the head. The structural elements are essentially the same for each species. In the sections shown in Plate I. figs. 1–10, it is cut across at various points, and also at different angles to the longitudinal axis, which, combined with its concavo-convex form and recurved margin, causes the sections of it to vary greatly in outline. Longitudinal sections are shown in the sections illustrated on Plate V. figs. 1–4.

Careful search has been made for traces of an antennal system, but thus far without success. In one section a delicate jointed appendage occurs near the hypostoma. It has been frequently examined, but it is still unidentified, as from its structure it cannot be a fragment of an antenna.

The fifth conclusion, given in the "Notes on some Sections of Trilobites from the Trenton Limestone,"* is, that the mouth is posterior to the hypostoma, and consists of four pairs of manducatory jaws, formed by the basal joints of the four anterior pairs of appendages. With the exception of a slight modification of the first part, this conclusion may be permitted to stand as expressing our present knowledge of these parts. The mouth is not strictly posterior to the hypostoma, but is a little above and between it and the anterior end of the median lobe of the thoracic membrane, opening obliquely backward, instead of directly downward.

The four pairs of appendages have a general structure similar to the cephalic legs of *Limulus* and *Eurypterus.* The basal joints are larger than the others, and undoubtedly subserved the function of manducation. No one leg or appendage has been seen entire, but from several sections, Plate I. figs. 6–10, and others not illustrated, each leg is found to be formed of either six or seven joints. The basal joints of the three anterior pairs of legs are smaller than those of the fourth pair, and have their anterior or proximal end obliquely truncated as shown by the section represented in Plate I. fig. 6. The remaining joints are slender, and not unlike those of the thoracic legs. The basal joints of the fourth pair are more than twice as long as broad, and have the posterior inner angle cut away so that the anterior portions alone approximate to form a part of the manducatory apparatus. From the distal end a comparatively slender joint extends to unite with one or two succeeding joints, which support several more expanded joints that form what is considered a swimming leg. These are shown in

* 31st Rep. N. Y. State Museum, p. 63, 1879.

Plate I. figs. 8 and 9. If the section passed through these flattened joints obliquely, or transverse to their minor axis, a slender leg would be shown; if through the major axis, a broad swimming leg would be presented. No traces of spines or serrated margins on the inner margins of the basal joints have been observed.

Good longitudinal sections of the cephalic appendages, in a longitudinal section of the Trilobite, have not been obtained. Usually the appendages have the appearance shown in Plate II. figs. 5 and 7, and Plate V. figs. 1, 3, and 4.

Thus far our description of the cephalic appendages has been derived from sections of *Calymene*. In *Ceraurus*, however, we have illustrations of the same, but in a more fragmentary condition, Plate I. figs. 2, 3, and 4. These and many other sections go to show that the arrangement of the parts is about the same in each species, — the more shallow dorsal shell of *Ceraurus* necessarily giving a different appearance to the section from one cut at the same place and angle in *Calymene*. As yet no other appendages have been observed beneath the head that prove to have belonged there. Fragments of the thoracic legs and branchiæ are frequently seen in sections crossing the head, but they have been pushed forward and are of accidental occurrence.

Appendages of the Body. — The appendages of the body or the thoracico-abdominal legs and branchiæ are found to vary slightly in the genera *Calymene* and *Ceraurus*, as expressed by the species under consideration. The legs of the former are relatively shorter and more symmetrical as compared with the long and somewhat irregularly jointed legs of the latter.

The *Calymene* is frequently found enrolled, the head and pygidium fitting closely together, so that no opening is left at any point, the legs being all drawn within the shell and entirely protected from injury from without. With *Ceraurus*, i. e. in the species under consideration, a perfect closing of the shell by enrolment is impossible, and the space formed by the partial enclosure of the spinous extension of the pleuræ affords but an incomplete protection to the numerous legs and branchiæ.

The finest illustration of the legs of *Ceraurus*, and of the Trilobite as far as yet known, is given in Plate II. figs. 1, 2, and 3. In Fig. 3 the form of the transverse section of the basal joint and its mode of attachment to the ventral surface are shown. By Fig. 2 the joints of the leg are shown, and Fig. 1 adds to our knowledge of their shape and arrangement. Narrow at the base, each joint expands so as to be of a subtriangular outline in a cross section, with the exception of the basal joint which is broader at the base, narrowing towards the outer extremity. By a comparison of the longitudinal section of the basal joint in *Calymene*, Plate V. figs. 1 and 3, with the transverse section, Plate III. fig. 9, it is seen that this joint was transversely flattened. The means of such a comparison in *Ceraurus* are not as good, although the somewhat distorted basal joint, Plate II. fig. 6, may be placed with those of Fig. 8, and compared with the transverse section of the basal joint, right side, of Fig. 3. Fig. 3, Plate III., is a fine illustration of a section cutting across the basal joints of the thoracic legs at different points, as they are brought into the line of the section by the enrolment of the animal. The terminal joint of the leg has not been recognized as such in either species, which makes it difficult to say how many joints there are in the legs. Six is the usual number in the sections, but in one there is seven, if the evidence of Fig. 2, Plate II., is to be relied upon.

The character of the appendages beneath the pygidium is one of unusual interest, and for a long time was highly problematical, and at present the evidence is not all that could be desired. Four sections, two transverse and two longitudinal, show their presence in *Ceraurus*. That they are jointed is shown by Plate II. fig. 8, and also in a similar section not illustrated. The transverse section, Plate II. fig. 4, of the extreme posterior segment of the pygidium also shows the base of the leg and sections of the succeeding anterior legs. The position of the base is the same as that of the posterior leg, Plate II. fig. 8. That these legs were not foliaceous and branchial is evident, but what their terminal joints were like is yet an unsettled problem of the investigation.

With *Calymene* the success in cutting a section so as to show all the joints of the leg has not been as good as for *Ceraurus*. The knowledge of its structure is based on a number of fragmentary parts after the third joint from the base is passed. Plate V. figs. 1, 3, and 4, give a fine illustration of the first three joints. A transverse section obliquely crossing an enrolled specimen cuts across the legs as they diverge from the anterior extremity of the thorax. Each pair of legs is cut across farther from the base, so that we have an approximate outline of their form, which, from a comparison of the parts as seen in many sections, resemble those illustrated on Plate VI. fig. 5, while those of *Ceraurus* are more like those of Fig. 4 of the same plate.

The mode of attachment of the leg to the ventral surface is shown in the transverse section for *Calymene* in Plate III. fig. 9, and in *Ceraurus* in Plate II. fig. 3. The longitudinal section is given in Plate V. figs. 1 and 3, for *Calymene*, and in Plate II. fig. 6, for *Ceraurus*. These illustrations are considered as showing that the point of articulation was a small, round process projecting from the posterior surface of the large basal joint, and articulating in the ventral arch somewhat as the legs of some of the Isopods articulate with the arches in the ventral membrane. The arches of the ventral membrane in the Trilobite, and the parts shown in Plate IV. fig. 7, afford a correspondingly firm basis for the attachment of the legs. The general curvature of the legs is forward, as shown by all the sections, when they are attached to the ventral surface and in their normal position. This corresponds with the position of the cephalic appendages, and gives a uniformity to the entire series.

Our knowledge of the number of pairs of appendages is based on the evidence given by sections of *Calymene*, Plate V. figs. 1 – 4. The dorsal shell of this species has thirteen segments in the thorax, and nine coalesced in the pygidium. The section of the median lobe and ventral surface, Fig. 2, shows twenty arches, and Figs. 1 and 2, sections of the same individual, show twenty and twenty-two thoracico-abdominal appendages respectively. The fact that there is a space between the last arch or appendage and the posterior margin of the pygidium does not necessarily prove the existence of other appendages, as it is quite probable that in the process of disintegration of the visceral cavity the entire ventral membrane, with its attached legs, was drawn away from the pygidium by the pressure of the sediment imbedding it. This view is strengthened by Fig. 4, Plate V., as there are but eighteen or nineteen appendages, or their equivalent, the ventral arches, in the same space, and the break between the posterior margin of the pygidium and the appendages is less than in the preceding sections, but more than would be taken by the three or four missing appendages. From these facts it is considered that there is one pair of appendages to each segment, and it is so expressed in the restoration on Plate VI. fig. 1. In enumerating the number of arches or pairs of appendages the cephalic appendages have not been included, as there is still some uncertainty as to the number of appendages appertaining to the head. The four pairs described are probably all that existed, and from the marked similarity between the cephalic appendages of *Limulus*, *Eurypterus*, and the Trilobite we should naturally anticipate failure in searching for traces of antennæ. As known at present, the Trilobite *Calymene senaria* has twenty-six pairs of appendages.

The thoracico-abdominal appendages have been treated thus far as simple jointed ambulatory legs, without reference to the attached respiratory apparatus. On examining the basal joint of the leg as shown in several sections a short, jointed appendage is seen attached to it on the upper exterior side, as shown in Plate III. figs. 9 and 10, and in the restoration, Plate VI. fig. 2. The finest illustration of this appendage was unfortunately lost in 1875 before a sketch was taken of it.* Subsequently a number of sections were gradually ground away, commencing at the extremities of the pleuræ and working in towards the median lobe. First, the branchiæ and the extremities of the legs were seen, and then the jointed arm, which was followed up to the base of the leg. This manner of working enabled the observer to learn something of the position of the various parts, but it destroyed the evidence of what was observed.

Above the small jointed appendage, or epipodite, there is attached a branchia extending outward and downward beyond it.

Many perfectly preserved and beautiful specimens of *Asaphus platycephalus* have been cut into sections, but with little success in obtaining traces of the appendages, etc. Plate II. fig. 9, shows the basal joint of a leg and another section not illustrated gives evidence that the legs extended out beneath the pygidium, as shown by their basal joints. In *Acidaspis Trentonensis* the legs, both cephalic and thoracic, have been observed, as also the spiral branchiæ.

In review of our information concerning the thoracico-abdominal appendages, I think we are justified in stating that there is a series of jointed legs extending from the cephalic shield beneath the thorax and pygidium to the posterior segment of the latter; that, as far as known, they were ambulatory, and formed of six or seven joints; that to the basal joint there were attached an epipodite and branchia; and that, from the proof we now have, there is little doubt but that the appendages beneath the pygidium did not vary essentially from those of the thoracic region. They may have terminated in a slender filament, or filaments, as but three joints have been seen in any one appendage.

Illustrations are given of the supposed Trilobite's leg discovered by M. Eichwald, and also of the two crustacean legs from the Hudson

* Left on a writing-table, it was brushed to the floor, and from thence swept up and thrown into the fire by a careless domestic.

River group at Cincinnati, Ohio.* The former compares with the leg as found in *Ceraurus* and the latter with the leg as restored in *Calymene.*

Branchial Appendages. — The branchiæ have required more time and labor to determine their true structure than any of the appendages yet discovered. They were first regarded as small tubes arranged side by side, like the teeth in a rake; then as setiferous appendages, and finally as elongate ribbon-like spirals and bands attached to the side of the thoracic cavity, the epipodite being a so-called branchial arm. All of these parts are now known to belong to the respiratory system, but from their somewhat complex structure, and the various curious forms assumed by the parts when broken up and distorted, it was a long time before their relations were determined.

The respiratory system is formed of two series of appendages, as found beneath the thorax. The first is a series of branchiæ attached to the basal joints of the legs, and the second, the branchial arms, or epipodites.

The branchiæ, as found in *Calymene*, *Ceraurus*, and *Acidaspis*, have three forms. In the first they bifurcate a short distance from the attachment to the basal joint of the leg, and extend outward and downward as two simple, slender tubes, or ribbon-like filaments. In the second form they bifurcate in the same manner, but the two branches are spirals. These two forms occur in the same individual, but, as a rule, the more simple ribbon-like branchia is found in the smaller or younger specimens, and the spiral form in the adult. The exceptions to this, however, are such that it has little value for any comparison of structural features between the young and the adult. The first type of branchia is shown by Fig. 5, Plate I., Figs. 2 and 3, Plate II., and the second, by Figs. 4 – 10, Plate III. The latter are very interesting, and a number of illustrations are given. The spiral structure is finely shown by Fig. 5, Plate III., where, by the spiral being flattened, the plane of the section has passed through it so as to show the tube or ribbon as continuous and entire. Any of the sections, Figs. 4 – 10, clearly prove that spirals were cut across, although there is no connection between the segments except in Fig. 5. The bifid branchia is illustrated by Figs. 9 and 10, Plate III. The branchia on the left side of Fig. 3, and those of Fig. 8, Plate III., are formed of a finer, more slender tube or ribbon, and coiled in a larger spiral. The

* Received from Mr. S. A. Miller and Dr. C. A. Miller, of Cincinnati, Ohio.

spiral branchiæ of *Ceraurus*, Plate III., figs. 4–6, are usually larger and coarser than those of *Calymene*, and form the second variation of the spiral.

The third type of the branchiæ is shown in Plate III. fig. 2. As far as yet known, this is confined to the anterior segments of the thorax.

The epipodite or branchial arm was attached to the basal joints of the thoracic legs and formed of two or more joints. This has been called a branchial arm, not that it carrried a branchia, but on account of its relation to the respiratory system. It is regarded as an arm or paddle, that, kept in constant motion, produced a current of water circulating among the branchiæ gathered close beneath the dorsal shell. This would be necessitated by the character and position of the branchiæ and the evident habits of the Trilobite. The best illustration of this appendage, with the setiferous exterior joint, is shown in Plate III. fig. 9.

Of the modification the respiratory apparatus underwent beneath the pygidium, we have no evidence. If we estimate the branchiæ by the character of the dorsal shell, we would say that in some genera, *Remopleurides*, *Paradoxides*, etc., with very small pygidiæ, the branchiæ were doubtless aborted or mere rudiments, and that in those genera with larger pygidiæ, *Asaphus*, *Bronteus*, etc., the branchiæ were fully developed as beneath the thorax.

It is difficult to conceive how a thin pellicle or membrane that served the function of respiration could be preserved as the branchiæ, or spirals, as we call them, are found in the Trilobite. It is not certain but that these parts, as now found, were the supports of delicate branchiæ attached to them; this has objections, as the spirals and slender ribbons are comparable to the branchiæ of some species of *Cyamus*, as shown on Plate IV. figs. 9 and 10. In either case they are all that is left to show the respiratory apparatus of the Trilobite, and in that sense are called the branchiæ.

AFFINITIES OF THE TRILOBITE.

That the affinities of the Trilobite are with *Limulus* and its allies there is no longer any reasonable doubt. The observations of Billings, Packard, Dohrn, and other recent writers, have served to establish the views of previous authors on the subject, which have been confirmed by the discovery of the more important characters of the structure and arrangement of the cephalic appendages.

The classification of the group to which the Trilobite belongs is adopted in accordance with the advanced views of Milne-Edwards, Gegenbaur, Lankester, Van Beneden, Verrill, and other authors.

The more conservative zoölogists consider the group as an order or sub-class of the Crustacea, while others view it as a sub-class of the Arachnida.* Professors A. Milne-Edwards,† Gegenbaur,‡ and E. Verrill § consider the group as a class of the Arthropoda, placing it after the Crustacea and preceding the Arachnida in the scheme of classification. With this course we are in accord. ‖

The following arrangement is made to express the view of the relations of the different orders forming the group.

ARTHROPODA.

Class PŒCILOPODA.

Sub-class Merostomata.
 Order *Xiphosura.*
 Order *Eurypterida.*

Sub-class Palæadæ.
 Order *Trilobita.*

PŒCILOPODA. Arthropods with the cephalic appendages subserving the function of manducation.

Sub-class Merostomata. Pœcilopods with ocelli in addition to compound eyes, all the limbs serving as mouth organs, the mouth provided posteriorly with a metastoma.

Order *Xiphosura.* Mouth furnished with a small hypostoma and six pairs of appendages. Posterior segments of the body more or less free, and all bearing branchiæ or reproductive organs.

Order *Eurypterida.* Mouth furnished with five pairs of appendages. Two anterior free segments, bearing branchiæ or reproductive organs. Other free segments devoid of appendages.

Sub-class Palæadæ. Pœcilopods with numerous thoracico-abdominal appendages. Eyes compound (when developed). Ocelli unknown.

* Professors Ed. Van Beneden, E. Ray Lankester, Introduction to Gegenbaur's Elements Comp. Anat., English ed., 1878.

† Ann. des Sci., XVII., 1872.

‡ Elements Comp. Anat., English ed., p. 230, 1878.

§ Classification of Animals, Yale College, 1879.

‖ "It is by no means desirable that students should be taught to accept any one scheme of classification as finite. They should be taught to look upon these schemes as the condensed expression of an author's views, — as the epitome of his teaching, facilitating the recollection and comparison of conflicting solutions of the vast series of unsolved problems of morphology." Prof. E. Ray Lankester.

Order *Trilobita.* Mouth furnished with a large hypostoma and four pairs (as far as known) of appendages. Thoracic segments, 2 – 26, bearing jointed legs with attached branchiæ. Abdomen formed of anchylosed segments, 2 (?) – 28. bearing articulated appendages.

The following tabulation gives the characters presented by each order.

XIPHOSURA. Ex. *Limulus* (fossil and living).

1. Eyes sessile, compound.
2. Ocelli distinctly seen.
3. All the limbs serving as mouth organs.
4. All the thoracic segments bearing branchiæ or reproductive organs.
5. Other segments devoid of any appendages.
6. Thoracic segments *anchylosed.*
7. Abdominal segments *unanchylosed* and rudimentary.
8. Metastoma rudimentary.

EURYPTERIDA. Ex. *Pterogotus, Eurypterus* (fossil, extinct).

1. Eyes sessile, compound.
2. Ocelli distinctly seen.
3. All the limbs serving as mouth organs.
4. Anterior thoracic segments bearing branchiæ or reproductive organs.
5. Other segments devoid of any appendages.
6. Thoracic segments unanchylosed.
7. Abdominal segments free and well developed.
8. Metastoma large.

TRILOBITA. Ex. *Asaphus,* etc. (fossil, extinct).

1. Eyes sessile, compound.
2. Ocelli, unknown.
3. Cephalic limbs serving as mouth organs.
4. Thoracic segments bearing jointed legs and attached branchiæ.
5. All segments provided with appendages.
6. Thoracic segments unanchylosed.
7. Abdominal segments anchylosed and bearing jointed appendages.
8. Hypostoma large. (Metastoma unknown.)

The agreement in the structure of the cephalic appendages is taken as the basis of the union of the three groups under one head. The differences between the *Trilobita* and the two remaining groups are very marked, especially in the thoracico-abdominal regions. These, united with the great development of the *Trilobita* as expressed in its large number of families and genera, are considered as separating it from a sub-group formed of *Xiphosura* and *Eurypterida.* This is essentially the arrangement made by Woodward and other zoölogists, and one to which we subscribe, except that we would go farther, and place the two sub-orders of Woodward as orders,* the group formed by them will take the value of a sub-class, and with the *Trilobita* as a sub-class form a distinct class of the Arthopoda, as expressed in the foregoing classification.

Since the above was written the memoir of Dr. Packard † on *Limulus polyphemus* has been received. In addition to the descriptive portion of the investigation we find valuable comparisons made between the structure of *Limulus* and the Trilobites, and also an able discussion of the evidence for and against the removal of the group, of which *Limulus* is the type, from the Crustacea, and considering it a class intermediate between the Crustacea and the Arachnida.

Dr. Packard proposes "that the Merostomata and Trilobites should together form a sub-class of Crustacea (i. e. Branchiate Arthropods), standing parallel to, and as the equivalents of, all the other Crustacea, the two groups being parallel and equally important branches of the same genealogical tree."

While recognizing the force of Dr. Packard's arguments, we do not undertake to decide between the two conflicting views as to the zoological position of the Pœcilopoda. Our work has been that of the palæontologist, and to the zoölogist the discussion of differences that can only be determined by the study of the anatomy and embryology of living animals, is left.

Mode of Occurrence. — The two species of Trilobites, *Calymene senaria* and *Ceraurus pleurexanthemus,* from which nine tenths of the sections were obtained, are the two most abundant forms in the Trenton limestone of Central and Northern New York. Their remains occur, usually in a fragmentary condition, in nearly every layer of the limestone, and range, above, into the Hudson River group, and, below, into the Black River limestone. Their geographical distribution is also very extended, as they occur in the Canadas and at nearly all the exposures of the Trenton group in the Northern United States, as far west as the Mississippi River. The *Calymene* is much more abundant at the West, but at the locality from which the specimens of *Ceraurus* were obtained for section cutting the latter far exceeds it in numbers. The special interest attached to the occurrence of both species at

* The view given of the sub-order in 1877. Pamphlet published in advance of the 28th Report of the New York State Museum.

† The Anatomy, Histology, and Embryology of *Limulus polyphemus.* A. S. Packard, Jr., M. D. Anniversary Memoirs Boston Soc. Nat. History, 1880.

Trenton Falls, as well as of several other species, is their very perfect state of preservation in a thin bed of limestone outcropping in a small ravine half a mile east of the Trenton Falls cañon or gorge. An examination of the same horizon that this bed occupies, for several miles along the cañon, which is but half a mile away at one point, failed to give a single entire Trilobite, and the fragmentary remains are rare. Both above and below they are found, but not with any more of the animal preserved other than the dorsal shell and hypostoma. This shows that in the vicinity of the outcrop in the small ravine there is a limited area, which was surrounded by conditions that did not prevail elsewhere in that region, as the topography of the adjacent country permits of a close examination of the strata, and outcrops at the same horizon were examined in all directions in the vicinity for the purpose of finding other prolific localities.

The layer of limestone on which the prolific layer rests is thick, and formed of the comminuted remains of Crinoids, Trilobites, etc., indicating the action of shore waves and a distributing current. A change supervened, and this surface was depressed beneath deeper water, or a barrier reef was formed, affording a quiet habitat in which flourished Bryozoans, Echinoderms, Brachiopods, Pteropods, Entomostracans, and Trilobites. The remains of all these are now found, in a perfect state of preservation, attached to the lower surface of the superjacent layer of limestone. This appears to have been a deposit of fine calcareous mud or ooze, deposited on the surface of the subjacent stratum, so as to form when solidified a layer from one half to two inches in thickness. It did not destroy all the forms of life that existed on the surface beneath prior to its deposition, but many species are not known to occur again. The Trilobites, however, flourished on the new surface as the beautifully preserved interiors of the dorsal shell testify, an illustration of which is given on Plate IV.

Where the layer is over one inch in thickness, and there is no intermingled argillaceous shaly matter, as sometimes occurs, the best preserved specimens for cutting sections are found. They are usually with the dorsal surface downward, and partially enrolled. It was frequently noticed in polishing the sections that the imbedding rock showed dark laminations curving beneath the Trilobite, as though the soft mud had been compressed by its sinking down into it. Similar traces proved that the mud flowed over into the half enrolled shell, and buried the appendages, or such as were left of them, as often the laminations of the inflowing mud have not been disturbed since covering the fragments of the viscera, branchiæ, and legs.

In a former paper * it is stated that 1,110 Trilobites out of a total of 1,160 had been found resting on their backs, and it was argued from this that that was their normal position when living, as Burmeister had shown for *Branchipus* and theoretically for the Trilobite. In subsequent work the proportion was found to remain nearly the same, but with the discovery of ambulatory thoracic legs the view of their living in that position was necessarily abandoned. Mr. Henry Hicks writes that he had observed the same position in the Primordial Trilobites of Wales, the shell of the great *Paradoxides*, eighteen inches in length, occurring with its dorsal surface downward. He attributes it, and I think correctly, to the accumulation of gases in the viscera, which, with the boat-shaped shell, would cause the animal to turn over on the slightest motion in the water, and it would there remain to be buried beneath the next deposit of sediment.

A little dark argillaceous shale next succeeds, above the prolific Trilobite layer, and forms a parting between the latter and a layer of limestone six inches thick that is very much like the layer below in color and texture. From it several hundred very perfect *Asaphi* have been taken; but, with the exception of two small enrolled specimens, they have not shown the presence of the appendages sought for. Smooth, fine-grained, dark gray and bluish-gray limestones, in layers of from one to four inches in thickness, succeed in the next three feet above. Trilobites abound in nearly every layer, and upwards of fifty species of fossils, in a very perfect state of preservation, occur in the same beds. The conditions, however, do not appear to have been favorable for the preservation of the viscera and appendages, and the most perfect enrolled specimens of *Calymene* have nothing but the clear rock within the dorsal shell. On the lower surface of the prolific layer and in its interior many specimens of *Acidaspus Trentonensis* were found. Owing to their small size, five to ten mm. in length, they were not of much use, although some of their appendages were frequently found in a somewhat entire condition. The specimens of *Calymene* and *Ceraurus* averaged from thirty to forty mm. in length. A full series of the latter shows individuals from three up to fifty mm. None were ever seen showing any metamorphoses in the young, from this layer, although *Asaphus platycephalus* was found with but three segments in the thorax on a layer above.

As far as we now know, the occurrence of the Trilobites in the prolific layer is an exceptional one, as none have been reported from any

* Ann. Lyc. Nat. History, XI. p. 159, 1875.

other locality in the same condition of preservation. That most of them are not the exuviated shell, resulting from the moulting, is proven by the presence of more or less remains of the viscera and appendages associated with them, the viscera in the cephalic cavity nearly always being present. Some are probably the cast shells; but the greater proportion of the larger specimens are those in which the animal died. From observations made during several years collecting in various formations it appears that the exuviated shell is usually broken up. In some species, as the *Calymene senaria* at Cincinnati, Ohio, many of the entire cast shells were undoubtedly buried in the soft mud as soon as left by the animal, and thus preserved entire.

Manner of Life. — Burmeister gives us, as his view of the manner of life the Trilobites led, "that they most probably did not inhabit the open sea, but the vicinity of coasts, in shallow water, and that they here lived gregariously in vast numbers, chiefly of one species; that they moved only by swimming in an inverted position, and did not creep about on the bottom; that they lived on smaller water animals, and, in the absence of such, on the spawn of allied species."

Barrande supposed that they lived in deep water and swam on the surface of the sea.

Dr. Dohrn considers that they lived at the bottom of the sea, and with extremities like those of *Limulus* crawled about. This view was necessarily taken by all authors who considered the Trilobite as related by its zoölogical affinities to *Limulus*. From our present knowledge of its structure, we cannot but suppose that its habits and manner of living were similar to the living Arthropods to which it is most closely allied. That its natatory powers were slight there is evidence in the absence of swimming appendages that could have been of much service to the adult individual. In the younger stages of growth these were probably of great size as compared with the other appendages, and used for swimming. From the great geographical distribution of many species it is evident that its means of locomotion were greater during some period of its existence than when full grown, as, from its massive structure then, it must have been limited in its range and means of distribution.

Dr. Packard states * that Mr. Alexander Agassiz had captured the larva of *Limulus* swimming free on the surface of the ocean, three miles from the shore. From the comparisons made by Dr. Packard

* Development *Limulus polyphemus*, Memoirs Boston Soc. Nat. Hist., p. 155, 1872.

between the young *Limulus* and the young Trilobites as described by M. Barrande, there is no reason to doubt that the young Trilobite may have had the same power of distributing itself and its species over extended areas in the wide-spread palæozoic seas. As in *Limulus* its later growth changed its manner of life, and its movements were finally restricted to crawling about the sea bottom in search of food. We have seen from the views of Burmeister, Barrande, and others, that it has been thought to be both an inhabitant of shallow waters along the coasts and also of the deeper seas. It is found in both littoral and deep-water formations. Muddy or sandy, fine or coarse, hard or soft, argillaceous or calcareous deposits, it occurs in all. With these facts in view, it is probable that it ranged along the shore in quiet bays, and also in the habitat of the Brachiopods and other deep-water Invertebrates. In conclusion we may say that the Trilobite in its younger stages of growth was active and a free swimmer, thus distributing itself over broad areas. That on reaching a larger growth it became more limited in its natatory powers and crawled about the bottom in search of soft-bodied organisms for food and during the spawning season for a place to deposit its eggs.* From the presence of the swimming joints on the posterior pair of cephalic appendages it may have had limited natatory powers during the latter part of its existence.

Of the power to enroll itself and thus protect its vulnerable ventral surface from attack by an impenetrable coat of armor, the sections cut of *Calymene* and illustrated on Plate I. figs. 8 and 9, which were cut from an enrolled specimen, and Plate III. figs. 1 and 2, from one partially coiled, abundantly prove.

In the "Geology of Canada," p. 104, a number of tracks or trails of Crustaceans are illustrated. They occur in the Potsdam sandstone, a formation with an abundant Trilobitic fauna. From the structure and form of the legs of the Trilobites it is very probable that these tracks (Protichnites) were made by them.

Variation of the Form and Number of the Appendages in Various Genera and Species. — "We have presented to us in the Crustacea probably the best zoölogical illustration of a class, constructed on a common type, retaining its general characteristics but capable of endless modifications of its parts, so as to suit the extreme requirements of every separate species." (Woodward.) When the great extent and variety of the modifications of the dorsal shell of the Trilobite are taken

* See Dr. Packard's description of the spawning of *Limulus* and its probable occurrence in the same manner with the Trilobite. Ibid., p. 186.

into consideration, and with them the thought of the variation of the appendages that must necessarily correspond in a greater or less degree, the force of the above statement is very striking, and may equally be applied to the class under consideration. Such diverse forms as are found in the genera *Asaphus, Calymene, Deiphon, Remopleurides, Harpes, Agnostus,* and other genera, — the compact, small hypostoma of *Ogygia Buchii,** and the long-forked hypostoma of *Remopleurides striatulus,* extending back to beneath the sixth thoracic segment,† — the twenty-six segments of the thorax of *Harpes ungula,*‡ and the two of *Agnostus,* — the large massive pygidium of *Asaphus* or *Bronteus* and the limited area of the same in *Paradoxides* or *Remopleurides,* and all the varying intermediate forms, — afford ample material for those inclined to theoretically reconstruct the animal, and also for the palæontological investigator.

The two forms used to illustrate the results of the present investigation are much alike in some respects, as the head and thoracic regions differ but little. There are certain differences, however, that are quite marked. The legs of *Calymene* are more slender, and less apt to be straightened out. The joints are also more cylindrical. The branchiæ are more delicately constructed, and usually better defined than in *Ceraurus.* Sections cut from either species are very readily distinguished one from the other by the general appearance of the cephalic appendages, the legs, and branchiæ.

Ova of the Trilobite. —Plate IV. fig. 8 is an illustration of a median, longitudinal section of a *Ceraurus* in which the cephalic cavity and a portion of the thoracic cavity are preserved and filled with calcspar. The small elongate-oval and round spots seen in the spar, in the posterior portions of the cephalic cavity and the anterior thoracic cavity, are somewhat enlarged in Fig. 8 *a,* and their arrangement shown as when imbedded in the spar. To the groups of ova illustrated by M. Barrande§ they have a strong resemblance, and there is little doubt but that these small cylindroid bodies were the ova of the Trilobite, as there is nothing to lead to the view that they are of concretionary origin.‖

* Sil. Sys. Boh., I. Plate 2 A, fig. 26.

† Cincinnati Jour. Sci., II. p. 347.

‡ Sil. Sys. Boh., I. Plate IX. fig. 1.

§ Sil. Sys. Boh., I. Supplement, Plates II., XVIII., and XXXV.

‖ See 31st Report N. Y. State Museum Nat. Hist., Note on the Eggs of the Trilobite.

DESCRIPTION OF THE SECTIONS, ETC. USED FOR ILLUSTRATION.

PLATE I.

Fig. 1. Transverse section, perpendicular to the median axis, of the head of *Ceraurus pleurexanthemus*, on a line intersecting the eyes. The central lobe of the cephalic shield and hypostoma (*h*) entirely enclose the median cephalic cavity, which, in its present state, is filled with calcspar.

Fig. 2. A transverse section, cutting obliquely downward from near the posterior portion of the glabellar lobe to a point beneath, and a little back from the eyes. A ditsinct space occurs between the dorsal shell and hypostoma which is occupied by fragments of the manducatory appendages.

Fig. 3. This section is taken a little posterior to the preceding, and terminates beneath, farther back. The cephalic appendages are shown only near their bases.

Fig. 4. This is one of the most satisfactory sections obtained of the cephalic region of this species. In this and the three preceding, the appendages have been, apparently, crushed back between the hypostoma and dorsal shell, so as to give an incorrect idea of their true position when seen in the sections. In Fig. 4 the jointed appendages are indicated, and also the manner of their arrangement, the leg on the left side showing three joints. This would hardly be intelligible were it not for the sections of the species next to be mentioned. The four sections taken to illustrate the head of *Ceraurus* are among many that show similar features in about the same condition of preservation. The branchiæ shown in Figs. 3 and 4 are not considered cephalic, but as thoracic, and pushed beneath the cephalic shield after the death of the animal.

Fig. 5. A section of the head not far from the position of that illustrated by Fig. 4, but by reason of the enrolment of the animal, portions of the thoracic appendages are cut across, and, as mentioned of Figs. 1 – 4, the latter have also been forced beneath the head. One of the most interesting features of this section is the ribbon-like branchiæ, *b*, *b*. The appendage *o* is probably cephalic ; all others, thoracic.

Fig. 6. With this section we commence a series of five cut from different individuals of the species *Calymene senaria*. All show the cephalic appendages. Without exception they are cut transversely and obliquely down through the head from just back of the posterior segment to the lower anterior side, intersecting the hypostoma (*h*) towards its posterior end. The posterior or fourth pair of appen-

dages is well shown in all, 4, 4, of the figures, and the first three pairs the most distinctly in Figs. 9 and 10 (1, 2, 3, Fig. 10), although portions are finely illustrated in Figs. 6 and 8. Figs. 8 and 9 are considered as denoting the presence of swimming joints (*n*, *n*). The organs *b*, *b* of Fig. 8 are thoracic, comparable to *b*, *b* of Fig. 5.

In all the sections illustrated on this plate there is no connection of the central portion or visceral cavity with the doublure or incurved portion of the margin of the dorsal shell. The union of the portions of the membrane and enclosed organic substance, replaced by calcspar, in Figs. 6 and 8 *a*, *a*, and 4, would make such a connection complete. In many other sections not illustrated the same conditions prevail, so that we know that the space between the central mass of appendages and the margin of the dorsal shell was united by a thin membrane that left a narrow space between it and the dorsal shell. The suggestion made by Mr. E. Billings, that the central mass of legs, etc. of the Trilobite was probably supported in the same manner as the same parts in *Limulus*, is thus shown to be correct.

PLATE II.

Fig. 1. A transverse section of the thorax of *Ceraurus*. As is the case with the sections of the head, the central mass of the body is not united to the margins of the pleuræ in any of the sections, but the proof of such a union in the same manner as in the sections of the head is found in portions of such a membrane existing in many sections.

This section is of an enrolled individual. As the outline of the cephalic shield and central portion of the cephalic cavity only are shown in the lower portion, the half cutting across the thorax is used for illustration. The position and character of the jointed ambulatory legs is beautifully shown, and also the presence of the branchiæ : the left leg, as in the figure, gives the basal joint and an outline of the succeeding joints ; this is still more finely shown by the leg on the right side. The space occupied by the visceral cavity is compressed and filled with calcspar. No remains of the intestinal canal are to be distinguished.

Fig. 2. A section of the right side of the thorax of another enrolled individual. The spar filling the hypostoma is seen at *h*. The Trilobite was broken and the left side lost, so that but one half of the transverse section could be obtained. The leg is broken near its base, and also towards the extremity. It appears to be formed of seven joints, and perhaps eight, if the terminal portion is not a fragment of another leg brought into the plane of the section in line with the other joints. The branchial appendages were misplaced by the movement that carried the leg to the left, as seen in the figure.

Fig. 3. Another transverse section of the thorax of the same species, showing the mode of attachment of the basal joint of the leg, *o*; the simple ribbon-like branchiæ; and the distorted leg on the left side. The branchial ribbon on the right side, b'', appears to have been undulating and cut across so as to divide it into sections. The section crosses it obliquely, giving a curious outline to the dorsal shell.

Fig. 4. Transverse section of the extreme posterior end of the pygidium of this species. The section of the terminal spine is shown entire on the left upper side, *s*, and the base of the other on the right side, *h*. At *x* the base of the posterior appendage is shown, and, below, the transverse sections of several of the thoracico-abdominal appendages.

Fig. 6. Longitudinal section of a *Ceraurus* with appendages very much broken up. At *o* the basal joint of one of the thoracic legs is shown, with the following segments all appearing as one with it. This is not an uncommon mode of occurrence.

Fig. 8. Longitudinal section of the posterior portion of an individual of the same species. Four appendages are seen connected with the pygidium, one for each segment, the one at *x* corresponding to the one at *x*, Fig. 4, Plate II. The pygidium has been forced up out of its normal position, but the appendages are seen in another section in the same position, where there has not been any displacement. The appendages of the thorax are mere fragments. The unusual thickness of the spar filling the visceral cavity in this and the preceding section is owing to the contents of the visceral cavity having been forced into the curved portion of the shell. This is the usual mode of occurrence in half-enrolled shells of this species.

Figs. 5, 7. Two longitudinal sections of *Calymene senaria*, showing the cephalic cavity and the anterior portion of the thorax. Many such sections were cut, none of which show segments of the appendages or the structure of the manducatory apparatus. The separation of the appendages nearly to the dorsal shell in Fig. 5 is a curious feature.

Fig. 10. Transverse section of an enrolled *Calymene*. The hypostoma is seen at *h*, and the sections of the legs radiating out from it. The legs are cut across at a different distance from the base of each, and the general form of the leg of this species is taken from this and similar sections, as no approximately entire longitudinal section of the leg of *Calymene* has been obtained.

Fig. 9. Transverse section of the thorax of *Asaphus platycephalus*. The basal joint of the leg is only to be recognized, 4. Another section of the same individual, which was partially enrolled, gives a cross section of nine pairs of legs, and on the interior cast of an *Asaphus*, preserved much as Mr. Billings's specimen is, there are traces of the basal joints or points of attachment to the ventral membrane of nine legs on one side of the median axis of the pygidium.

PLATE III.

Fig. 1. Transverse section of an enrolled *Calymene*, cutting across the upper posterior margin of the head and the anterior upper side of the thorax in such a manner as to remove a portion of the dorsal shell and contents of the visceral cavity, laying open the visceral cavity and the basal portion of several thoracic appendages. These are setiferous, a condition not observed in any other section. But one side of the section shows the structure, as shown in the figure ; the other was destroyed in cutting, and the drawing is made to show the two sides from the data given by the right side.

Fig. 2. Transverse section of the upper side of the head and the anterior portion of the thorax of an enrolled *Ceraurus*. The central cephalic cavity is shown and also portions of the cephalic appendages. The upper side cuts across the thorax and the peculiar branchiæ are shown, the one on the right side having been pushed out of its normal position. A branchiæ, or branchial support of the same character, occurs in a section of *Acidaspis Trentonensis* and in the same position, i. e. in association with the anterior thoracic appendages, these organs may not have performed the respiratory function, but acted as the support of more delicate branchial filments or lamellæ, all traces of which are lost.

Fig. 3. Transverse section of a *Calymene* cutting across the head from the anterior side back to the lower posterior margins and thence across five segments of the thorax as the shell was enrolled. The basal joints of the legs are shown, and also the branchial apparatus. On the right side the latter has the usual appearance as seen in most sections of this species, but on the left side a variation is observed. The ribbon forming the spiral is very fine and closely coiled. The parts seen in Fig. 8 are of the same nature. The base is attached to the basal joint of the leg, but, owing to the section not being exactly transverse, this is not beneath the same segment as the basal joint on the right side. The combination of the two forms of branchiæ in this section and the presence of another variation in Fig. 2, a section from the same species, proves that variations existed in the thoracic branchial appendages.

Figs. 4 – 6. Longitudinal sections of *Ceraurus* with the branchiæ preserved. In none of these are the branchiæ in a normal position. In Fig. 5 they have been forced into the cephalic cavity, and the section cuts across the spinous extension of the pleuræ. Fragments of the legs are mingled with the branchiæ in the upper portion of the figure, but in their extension downward the spiral form is finely preserved. It appears as though the mass of the viscera, etc. had been forced towards the head, and that five of the spirals were left behind in the mud, and thus drawn out and compressed so that the plane of the section could pass through the spiral and bring to light its true structure. In Fig. 4 the same thing has occurred, except that the parts are in the pygidium and the spiral form is not as well shown. Fig. 6 shows the spirals towards the head, but in a reverse position from that of Fig. 5. These sections are instructive as showing the strength of the spiral branchiæ, and also one of the vicissitudes to which the appendages were subjected, antecedent to their mineralization.

Fig. 7. Transverse section of an enrolled *Ceraurus*, illustrating the position of the intestinal canal, and the transverse corrugations or segments of the ventral surface of the visceral cavity. A few fragments of the branchiæ and thoracic legs are shown.

Fig. 8. Transverse section of an enrolled *Calymene*, showing the branchiæ, etc., enclosed within the pleural lobe.

Figs. 9, 10. Two sections of an enrolled *Calymene* cut from the same individual. Fig. 9 is from the anterior portion of the thorax, and Fig. 10 was taken some distance farther back. The bifid spiral branchia is shown in each, as also the basal joint of the leg and the small epipodite (*e*) or branchial arm. The small appendage at *n* is probably one of the terminal swimming joints of the cephalic legs detached and happening to occur in this position. The branchia seen on the right side of Fig. 9, nearly touching the dorsal shell, is out of its normal position, as the space it occupies was taken by the membrane uniting the visceral cavity with the margin of the pleuræ. With this exception no sections have been cut showing any indication of an attachment of the branchia to the side of the visceral cavity. The large basal joint of the leg is distinctly shown in Fig. 9. The extension of the leg forward would give the section of it seen. The structure of the bifid spiral is better shown by these sections than any others. The base is attached to the basal joint of the leg on the same process with the epipodite. It projects directly outward a short distance and then bifurcates, each branch being nearly as large as the proximal portion. The spiral commences just beyond the bifurcation and continues nearly to the end, where, in most instances, it terminates in a slightly curved extension of the ribbon forming the spiral. Each branch of the spiral curves outward and downward, just within the pleural lobe, to nearly the margin of the dorsal shell. As shown in the section illustrated by Fig. 4, Plate IV., the coils of the upper portion of the spiral are attached to the base or support so as to give it additional firmness.

PLATE IV.

Fig. 1. The head of *Ceraurus*, with the dorsal shell broken away over the cephalic cavity, showing a cast of the interior and the enlarged opening of the intestinal canal.

Fig. 2. A transverse section of Fig. 1 across the third thoracic segment. The section of visceral cavity and intestinal canal are the only traces of parts other than the dorsal shell. The light spot in the centre of each dark spot represents the light shining through from the front. The division of the intestinal canal into two parts is undoubtedly of accidental occurrence.

Fig. 3. A detached thoracic branchia from the interior of an enrolled *Calymene*.

Fig. 4. Same from a *Ceraurus*, showing the manner in which the upper portion of the spiral is strengthened by an attachment to an arm-like support.

Fig. 7. The original specimen from which the interior cast is sketched was so badly broken that the outlines of the dorsal shell were taken from another specimen, and the break in the shell and interior from the original. The figure explains itself, as the cast of the basal joints of the legs and the openings leading into the legs is seen, and also the divisions of the ventral membrane leading to the central ridge.

Fig. 5. The interior surface of the dorsal shell of *Ceraurus*, showing the hypostoma in position and the very irregular surface of the thorax. The bifurcation of one of the cephalic spines has not been noticed in any other Trilobite, bearing spines, that has passed under my observation. It is analogous to the bifurcation of the terminal spine of *Limulus*. The two small, oval, dark spots on the inside of the first segment of the pygidium are always present in well-preserved specimens. They indicate a depression, and it may be an opening through the shell, but the exterior shows no trace of them.*

Fig. 6. Median longitudinal section of *Ceraurus*. The dorsal shell and hypostoma are alone preserved in the section. The line of the intestinal canal, *i*, and the ventral membrane, *v m*, are drawn to show their position as far as has been determined by the sections.

Fig. 9. Third and fourth thoracic segments of *Cyamus Scammoni* Dall. This is introduced to show the peculiar form of the branchiæ, *b, b*, for comparison with the spiral branchiæ of the Trilobite. Dr. Dall describes the branchiæ as follows : " The third and fourth segments each have a branchia attached on each side. This, near the base, divides into two cylindrical filaments spirally coiled

* For a detailed description of this figure see Annals New York Lyceum Nat. Hist., XI. pp. 159-169, 1875.

from right to left." The branchiæ of *Cyamus diffusus* Dall., Fig. 10, are described as "single, cylindrical, slender, with a very short papilliform appendage before and behind each branchia." They are attached to the segments as shown in Fig. 10.* The simple branchia is much like that observed in many sections of the Trilobite. Plate I. fig. 5, Plate II. figs. 2, 3.

Figs. 8, 8 *a*. An enlargement of one of the sections of *Ceraurus*, showing the ova of the Trilobite.

PLATE V.

Figs. 1 – 3. Longitudinal sections of a *Calymene*. Figs. 1 and 3 are cut so as to intersect the legs beneath the lateral margins of the median lobe, and Fig. 2 along the centre of the median lobe and between the two sections showing the legs. Owing to the legs extending obliquely outward, the section cuts across the first two or three joints, and thus gives the peculiar pointed form. The cephalic appendages are not satisfactorily preserved. One, however, in Fig. 2, is partially shown. Owing to an error in the figure but seven of the twenty transverse arches of the ventral membrane, beneath the median lobe, are represented in figure 2.

Fig. 4. Oblique longitudinal section crossing the median lobe. Anteriorly the basal portions of the legs are seen, and then along the centre the section crosses to the opposite side, cutting in its passage the arches of the ventral membrane and posteriorly the appendages on the other side of the median line. It combines the features seen in the first three figures. The transverse arches of the ventral membrane are represented too thick and large.

Fig. 5. Lateral view of an enrolled *Calymene*. The line *a*, *a*, is the general plane of the sections represented by Figs. 6 – 10, Plate I., and Fig. 3, *b*, *b*, of Plate III.

Fig. 6. Front view of the same. The line *a*, *a*, corresponding to Fig. 1; *b*, *b*, to Fig. 3; *c*, *c*, to Fig. 2; *o*, *o*, to Fig. 4, of Plate V.

Fig. 7. *A* young *Limulus* just after hatching from the egg. (Packard.) The legs are arranged as in the adult, and show the correspondence between the cephalic appendages of *Eurypterus*, Fig. 7, and those restored in the Trilobite, Plate VI.

Fig. 7. The ventral side of the head of *Eurypterus remipes*. (Hall.)

PLATE VI.

Fig. 1. Restoration of the under or ventral surface of the animal inhabiting the dorsal shell of *Calymene senaria*. In making this restoration

* Proc. California Acad. Sci., Vol. IV. pp. 281 – 283, 1872. Illustrated in Marine Animals and the American Whale Fishery, Chas. C. Scammon, 1874.

the sections described have been used, and also confirmatory evidence from many other. On Plate I. figs. 6–10, we have the strongest evidence of the arrangement and structure of the cephalic appendages. The large basal joints of the fourth or posterior pair are shown in all, as also more or less of the three anterior pair. If the student will take a specimen of *Calymene senaria*, or an allied form nearly detached from the rock, and study it as he examines the illustrations of the sections and restorations of that species, he will see how, in cutting across such appendages as are shown in the restoration, he would obtain sections like those figured on Plate I. figs. 6–10. The position and form of the thoracic legs are taken from such sections as represented on Plate III. fig. 9, Plate V. figs. 1–4, and Plate II. fig. 10, as also the confirmatory evidence of position in Plate II. figs. 1–3 of *Ceraurus*. The more cylindrical character of the legs of *Calymene* as compared with those of *Ceraurus* is shown in Plate II. fig. 10, and in Plate V. figs. 1, 3, 4. The character of the appendages beneath the pygidium is not as well known; many sections show their presence as far as one, two, or three joints, but beyond that their form is unknown. They are restored as jointed to the end as beneath the thorax. There is reason to think that some of the anterior appendages may have been modified in their terminal joints, as also the posterior appendages. Of the character of these modifications, if they existed, future investigation must enlighten us. The rough appearance given to the inner end of the large basal joints of the posterior pair of cephalic legs is the result of an attempt of the lithographer to change the form of the joints, and not designed to be so in the restoration.

Fig. 2. A transverse thoracic section of Fig. 1. In this there is given a view of the structure of the thoracic appendages as they appear from a study of the sections. The position of the intestinal canal, the cutline of the ventral membrane or ventral surface, and the character and position of the appendages, with the exception of the terminal joints of the legs, have been seen as represented. The spiral bifid branchiæ and branchial arms are seen in Figs. 9 and 10, Plate III. There are two other forms of branchiæ known in *Calymene*. One is shown in Plate III. figs. 3 and 8, and another in Plate I. fig 8.

Fig. 3. Transverse section of the thorax of *Ceraurus pleurexanthemus*, to show the character of the legs. The branchiæ are not attached, although the sections shown by Figs. 1, 2, and 3, Plate II., would fully warrant their restoration.

Fig. 4. The jointed legs figured by Eichwald.

Fig. 5. Jointed legs found on a slab of limestone associated with Trilobitic remains. From Cincinnati, Ohio.

PLATE I.

Figs. 1–4. Transverse sections of the head of *Ceraurus pleurexanthemus*. Slightly enlarged.

- *s*. Dorsal shell.
- *h*. Hypostoma.
- *c*. Cephalic cavity.
- *b*, *b*. Branchiæ.
- 4, 4. Cephalic legs.

Fig. 5. Transverse section of the head of the same species, with portions of the thoracic appendages. Enlarged to three diameters.

- *s*, *h*, *b*, *b*. As in preceding figures.
- 4, 4. Fragments of thoracic legs.
- *o*, *o*. Portions of cephalic legs.
- *v*. Visceral cavity.

Figs. 6–10. Sections of the head of *Calymene senaria*. With the exception of Fig. 10, which is enlarged to three diameters, all are enlarged to five diameters.

- *s*, *v*, *h*, *b*, *b*. As above.
- 1, 2, 3. Anterior cephalic legs.
- 4, 4. Posterior cephalic legs.
- *n*, Figs. 8 and 9. Natatory joints of the posterior cephalic legs.
- *a*, *a*, Figs. 6 and 8. Portions of the contents of the space enclosed between the dorsal shell and the membrane uniting the central visceral cavity and the outer margin of the dorsal shell.

PLATE II.

Figs. 1–3. Transverse sections of the thorax of *Ceraurus pleurexanthemus*. Enlarged to three diameters.

s. Dorsal shell.
b, *b*. Branchiæ.
4, 4. Thoracic legs.
a, Fig. 2. Basal joint of the leg, L.
o, Fig. 3. Transverse section of the basal joint.

Fig. 4. Transverse section of the pygidium of the same species. Enlarged to three diameters.

s. Dorsal shell.
s''. Section of one of the spines of the pygidium.
h. Base of the other spine of the pygidium. See Plate IV. fig. 5.
x. Base of leg.
4, 4. Sections of legs cut across.

Figs. 5, 7. Longitudinal sections of the anterior portion of *Calymene senaria*. Enlarged to three diameters.

s. Dorsal shell.
c. Cephalic cavity.
4, 4. Thoracic legs.

Figs. 6, 8. Longitudinal sections of *Ceraurus pleurexanthemus*. Enlarged to three diameters.

s. Dorsal shell.
v. Visceral cavity.
4, 4. Fragments of thoracic legs.
o, Fig. 6. Basal portion of one of the same.
x, Fig. 8. Legs attached to the pygidium.

Fig. 9. Transverse section of the thorax of *Asaphus platycephalus*.

s. Dorsal shell.
4. Basal joint of a thoracic leg.

Fig. 10. Transverse section of an enrolled *Calymene senaria*. Enlarged to three diameters.

s. Dorsal shell.
h. Hypostoma.
c. Cephalic cavity.
v. Visceral cavity.
4, 4. Sections of the thoracic legs.

PLATE III.

Figs. 1, 3. Transverse sections of *Calymene senaria* enrolled. Enlarged to three diameters.

s. Dorsal shell.
v. Visceral cavity.
b, *b*. Branchiæ.
4, 4. Cephalic legs.

Fig. 2. Transverse section of *Ceraurus pleurexanthemus*. Enlarged to three diameters.

s. Dorsal shell.
v. Visceral cavity.
c. Cephalic cavity.
e. Eye cut across.
b, *b*. Branchiæ.

Figs. 4–6. Longitudinal sections of the same species. Enlarged to five diameters:

s. Dorsal shell.
c. Frontal lobe of the dorsal shell of the head.
s. Sections of the spinous extension of the pleuræ. See Fig. 5, Plate IV.
p. Posterior extremity of the pygidium.
b, *b*. Branchiæ.

Fig. 7. Transverse section of the same species. Enlarged to two diameters.

s. Dorsal shell.
b. Branchiæ.
i. Position of the intestinal canal.
a, *a″*. Distorted basal portion of thoracic legs.

Fig. 8. Transverse section of a portion of an enrolled *Calymene senaria*. Enlarged to five diameters.

s. Dorsal shell.
v. Visceral cavity.
b. Branchiæ.

Figs. 9, 10. Transverse sections of the thorax of the same species. Enlarged to three diameters.

s, *v*, *b*, *b*. As in preceding figures.
4, 4. Basal joints of thoracic legs.
e. Epipodite or branchial arm.
n, Fig. 10. Detached segment, supposed to be from the posterior cephalic leg.

PLATE IV.

Fig. 1. Head of *Ceraurus pleurexanthemus* and two segments of the thorax. Enlarged to two diameters.

c. Cephalic cavity.

i. Intestinal canal.

Fig. 2. Transverse section of the thorax of the same specimen.

Fig. 5. Under or ventral surface of the dorsal shell of *Ceraurus pleurexanthemus.* This figure is restored from several specimens ; many specimens are entire, but some portion may be concealed by the imbedding matrix filling the various depressions in the ventral surface of the shell.

Fig. 6. Longitudinal section of the same, with the outline of the intestinal canal and ventral membrane restored.

s. Dorsal shell.

h. Hypostoma.

c. Cephalic cavity.

v. m. Ventral membrane.

i. Intestinal canal.

Fig. 3. A branchia from *Calymene senaria.*

a. Support of the spiral attached to a portion of the basal joint of the leg.

b. Spiral branchiæ.

Fig. 4. Same, from *Ceraurus pleurexanthemus.*

Fig. 7. Enrolled *Calymene senaria,* showing a cast of the interior of the ventral side.

Fig. 9. Branchiæ of *Cyamus Scammoni* Dall, attached to the thoracic segments.

Fig. 10. Branchiæ of *Cyamus diffusus* Dall, attached to the thoracic segments.

Fig. 8. Longitudinal section of the anterior portion of a *Ceraurus pleurexanthemus,* with ova enclosed within the visceral cavity.

Fig. 8 *a.* Enlargement of the ova.

PLATE V.

Figs. 1–4. Longitudinal sections of *Calymene senaria*. Enlarged to three diameters.

s. Dorsal shell.

c. Cephalic cavity.

4, 4. Oblique sections of the legs.

v. m. Median lobe of the ventral membrane.

Fig. 5. Lateral view of an enrolled specimen of the same species.

a, a. Line of section, Fig. 3, Plate III.

b, b. Line of sections, Figs. 6–10, Plate I.

Fig. 6. Anterior view of the same.

a, a. Line of the section, Fig. 1, Plate V.

b, b. Line of the section, Fig. 3, Plate V.

c, c. Line of the section, Fig. 2, Plate V.

o, o. Line of the section, Fig. 4, Plate V.

Fig. 7. Ventral view of a young *Limulus polyphemus*.

Fig. 8. Ventral view of the head of *Eurypterus nemipes*.

PLATE VI.

Fig. 1. Restoration of the ventral surface of *Calymene senaria.*

4, 4. Thoracic legs.

n, *n*. Posterior pair of cephalic legs.

Fig. 2. Transverse section of the thorax of the same: *s*, dorsal shell; *i*, intestinal canal; *l*, leg; *e*, epipodite; *b*, branchia.

Fig. 3. Transverse section of the thorax of *Ceraurus pleurexanthemus*, showing the position and character of the legs. The respiratory apparatus is not included. See description of the figure, *ante*, p. 224.

Fig. 4. Crustacean leg, as given by Eichwald.

a. Natural size.

b. Enlarged.

Fig. 5. Crustacean legs from the Hudson River formation, Cincinnati, Ohio.

a. Leg with seven joints.

b. Leg with six joints.

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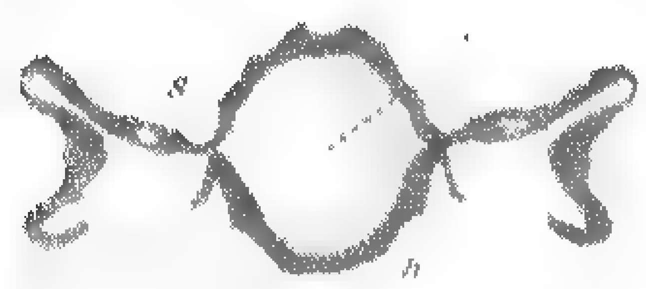

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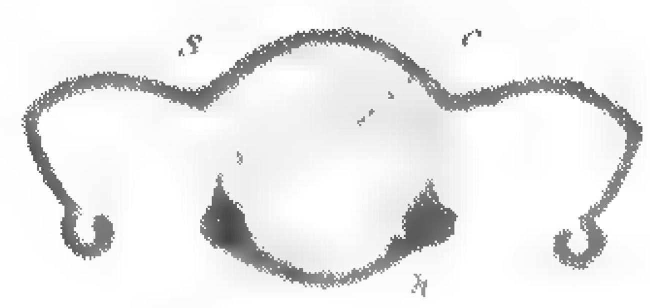

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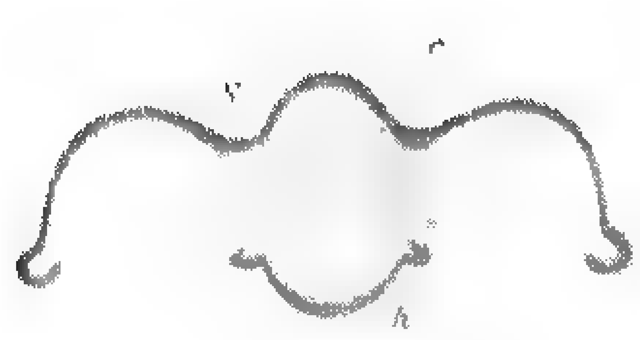

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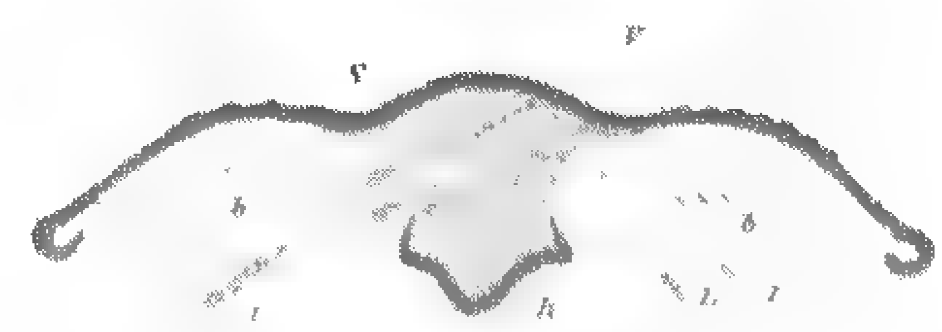

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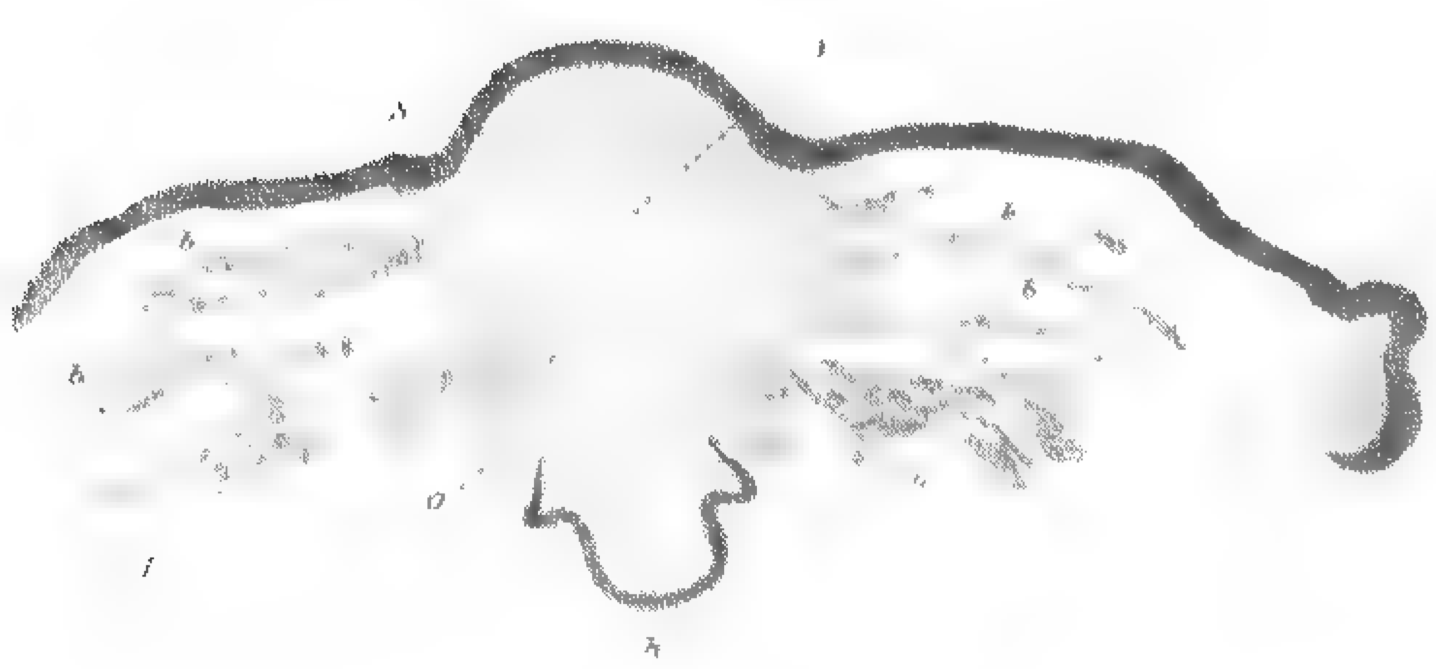

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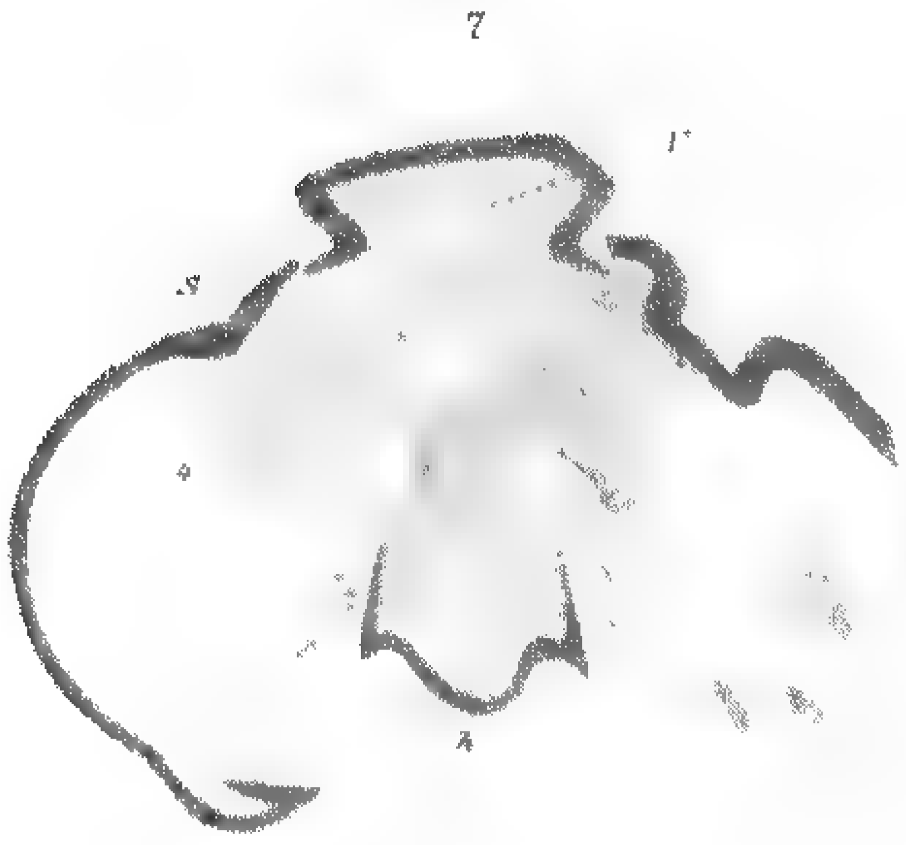

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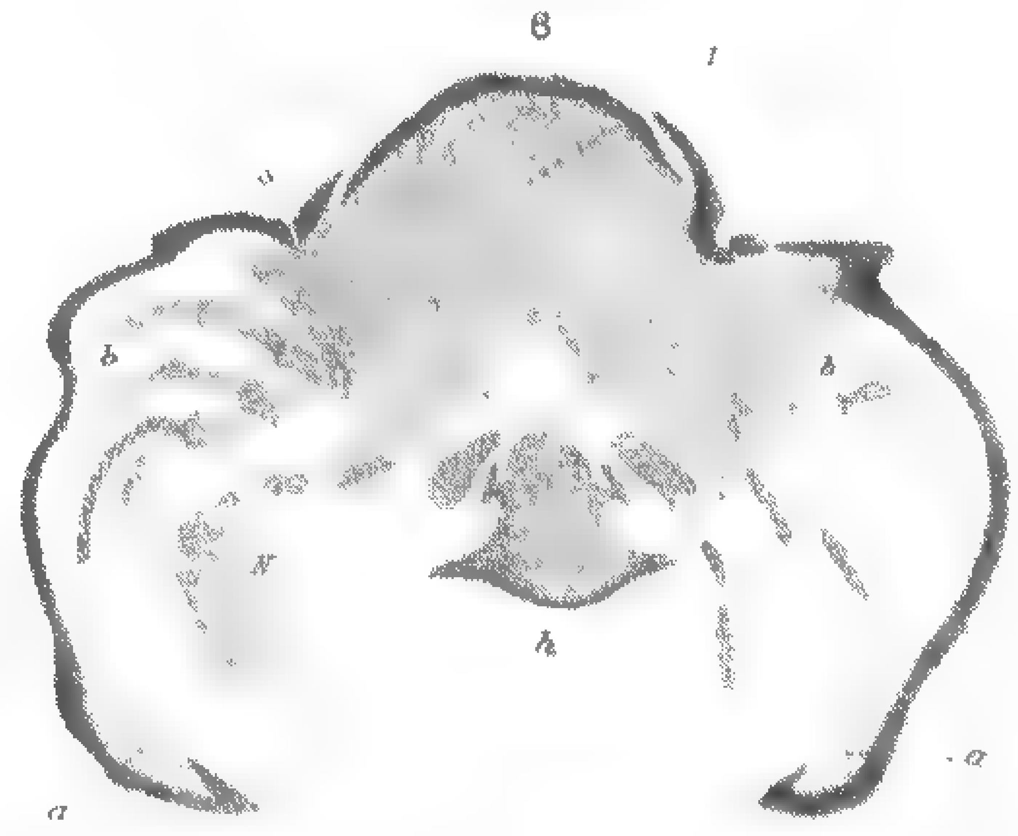

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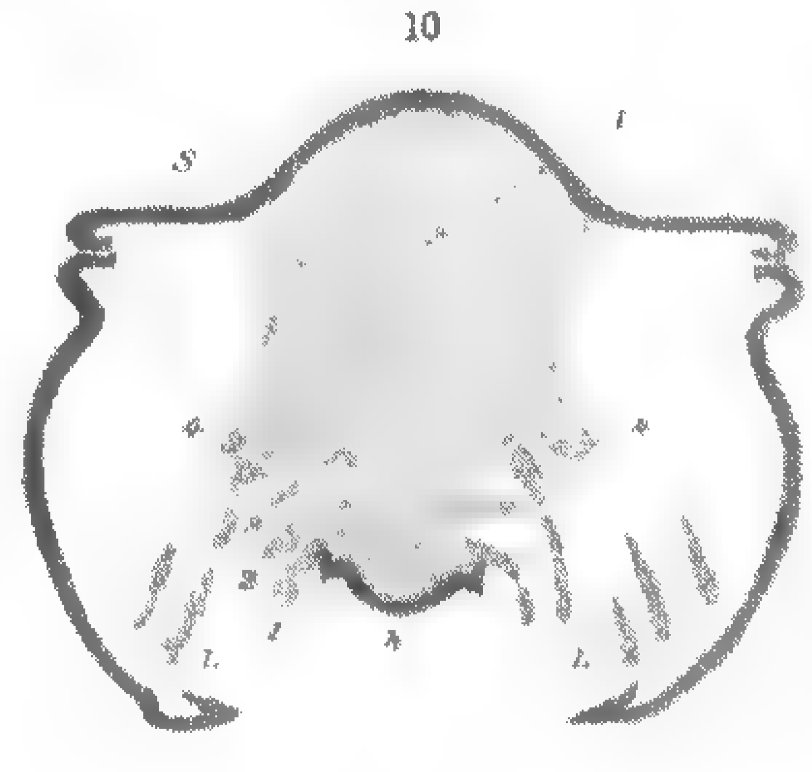

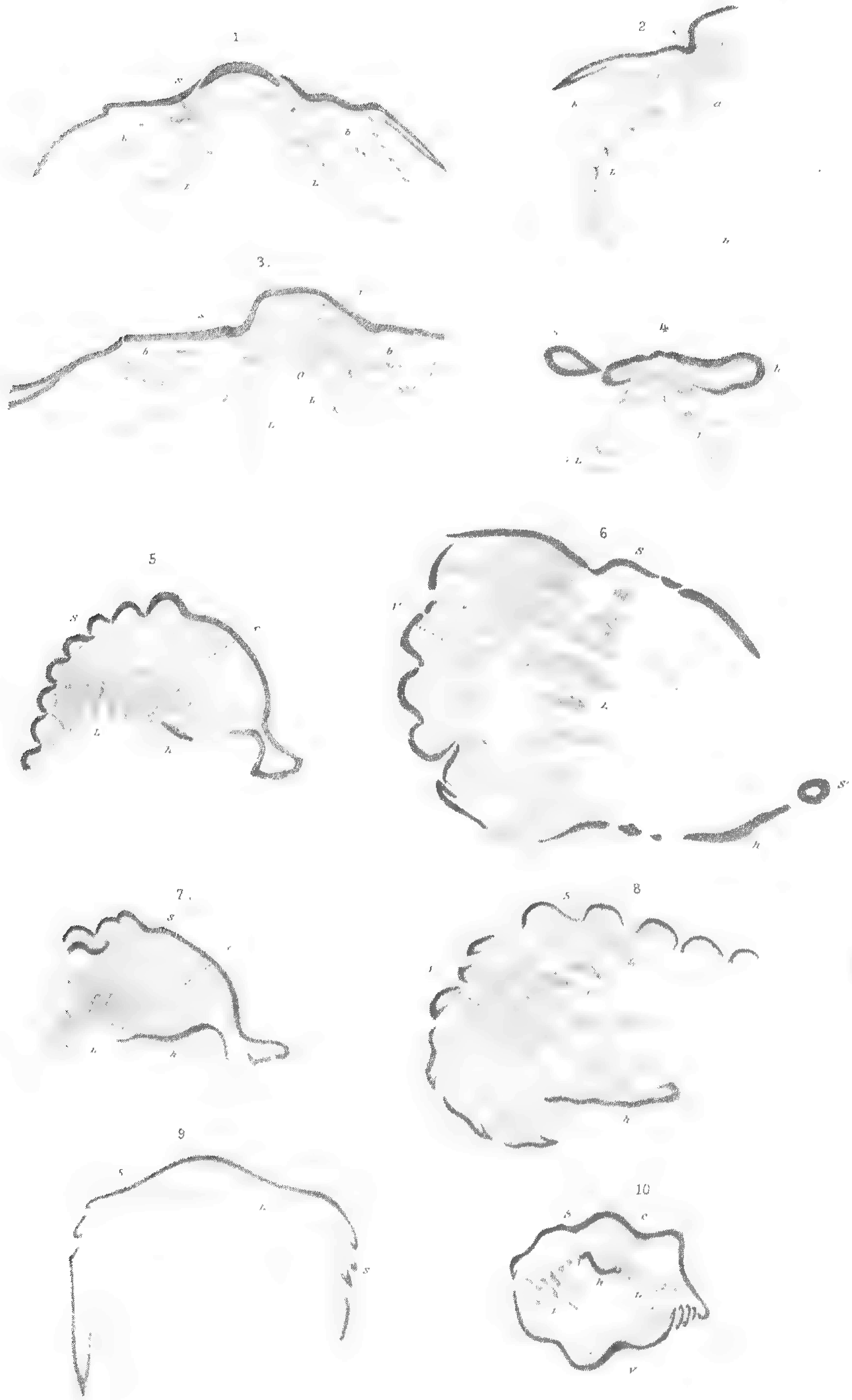

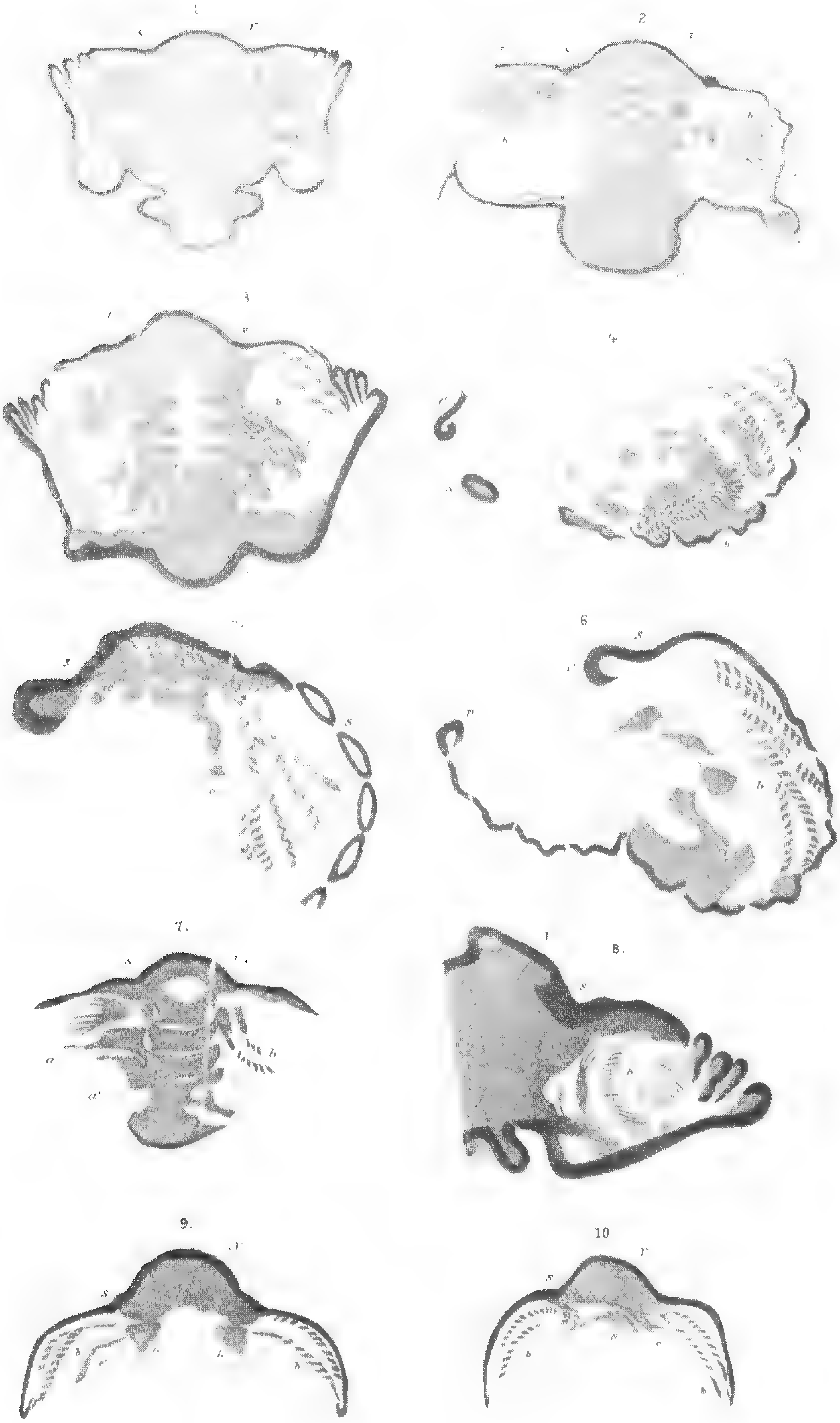
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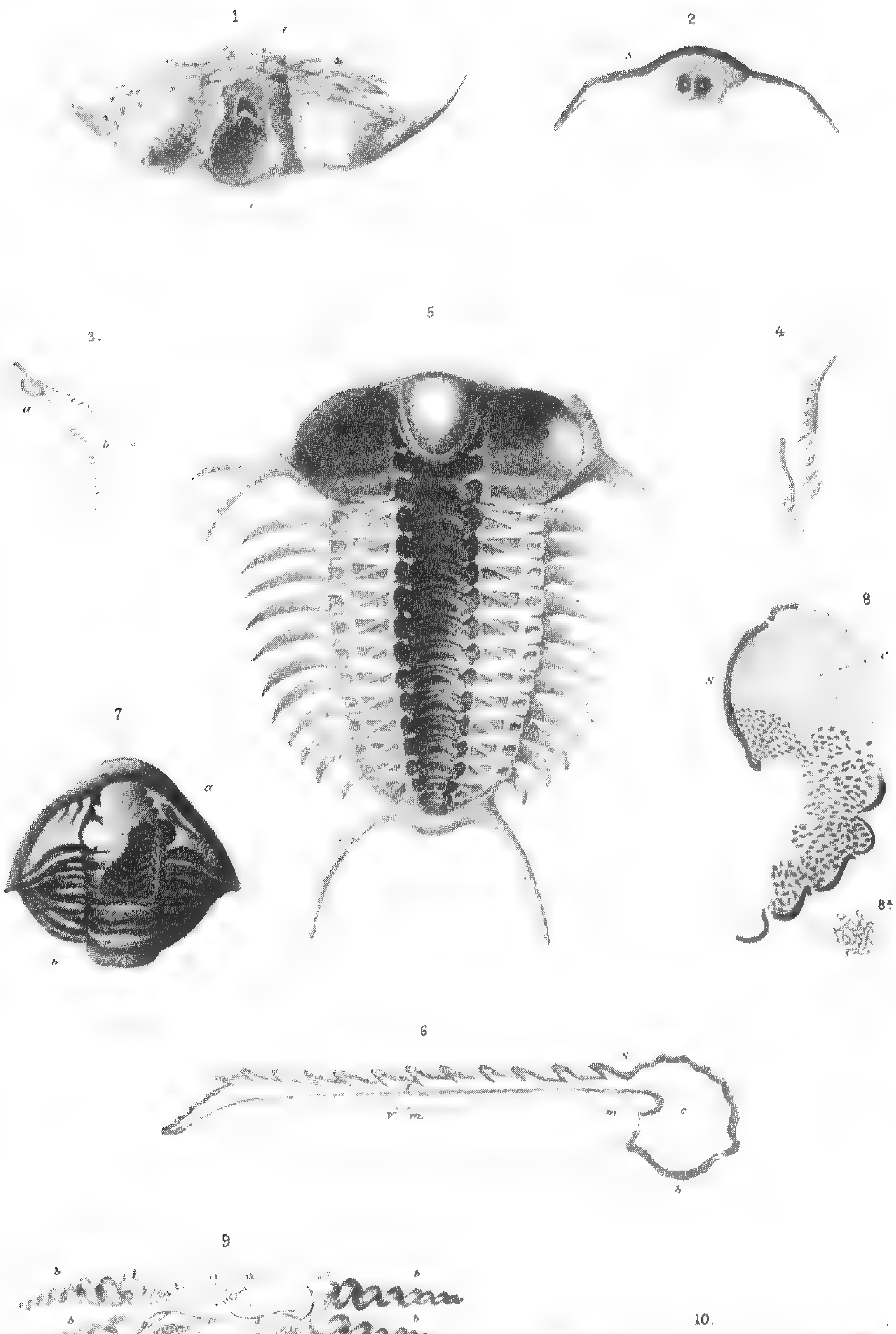
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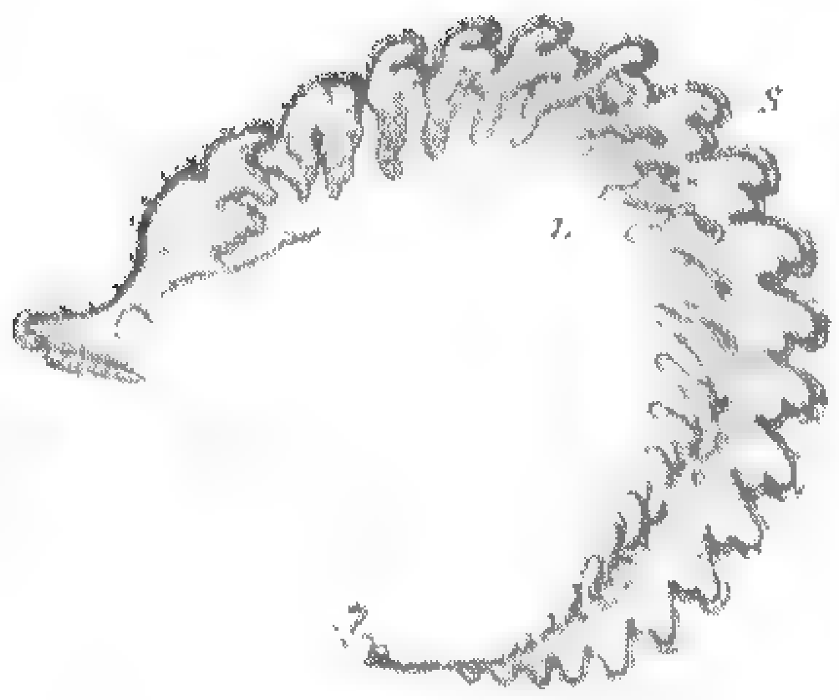

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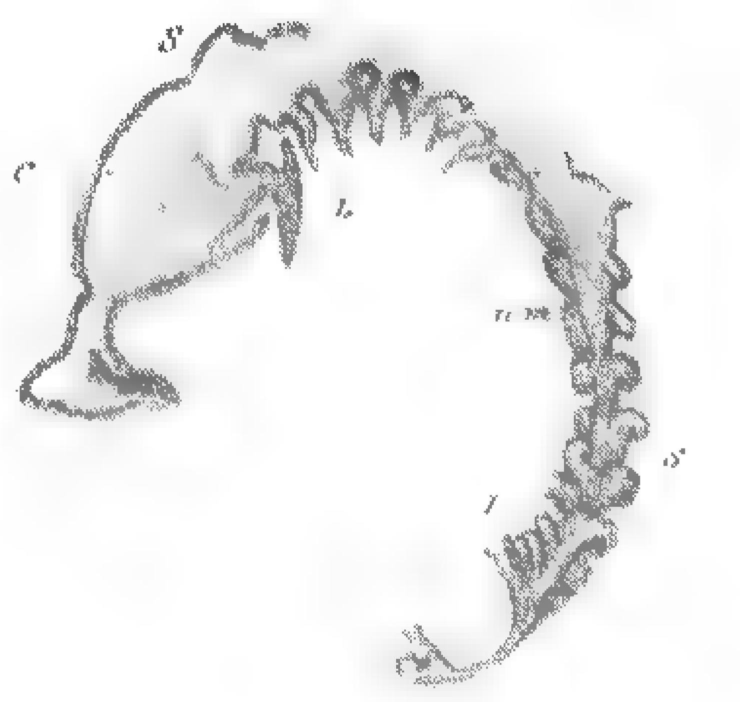

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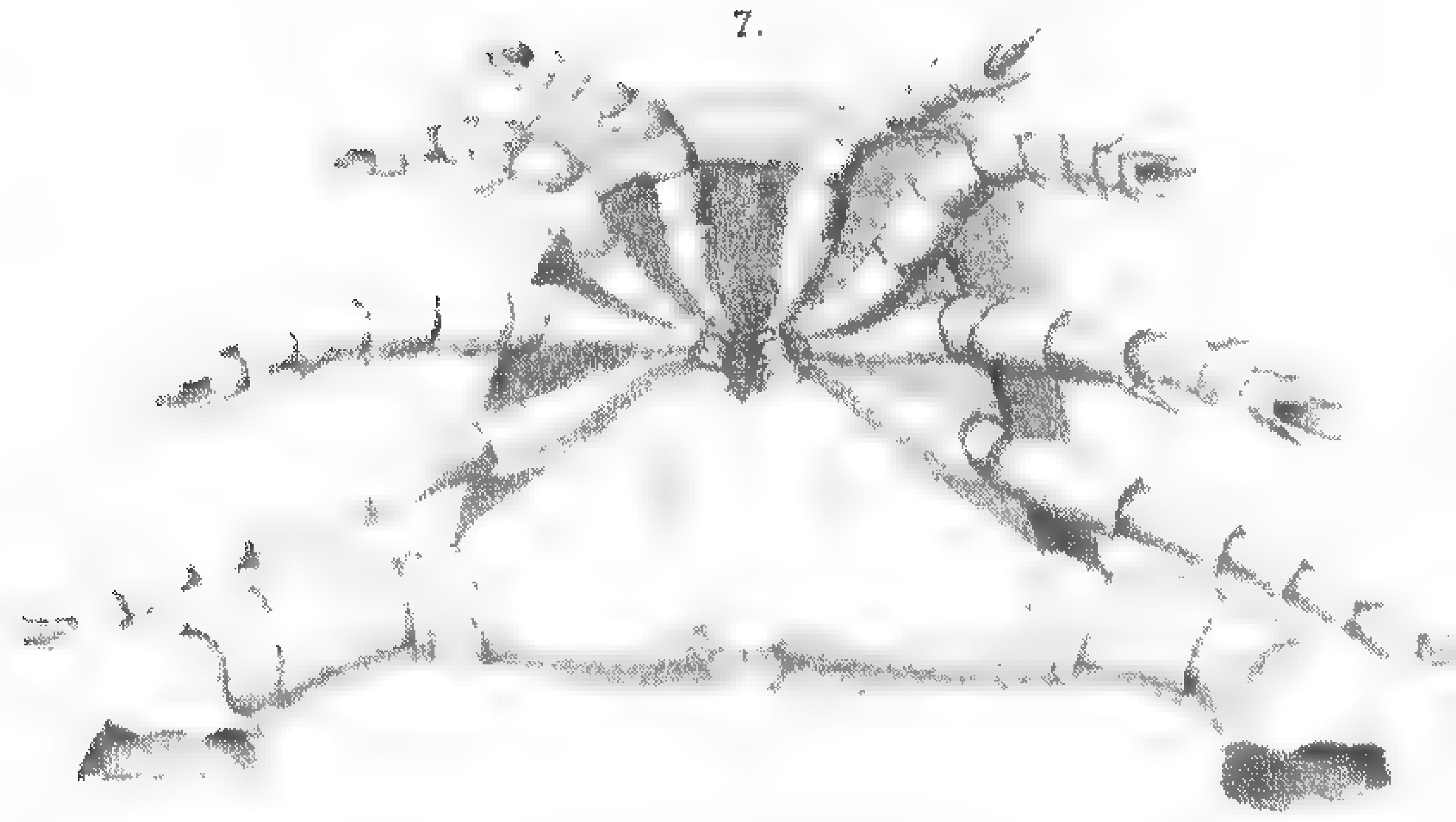

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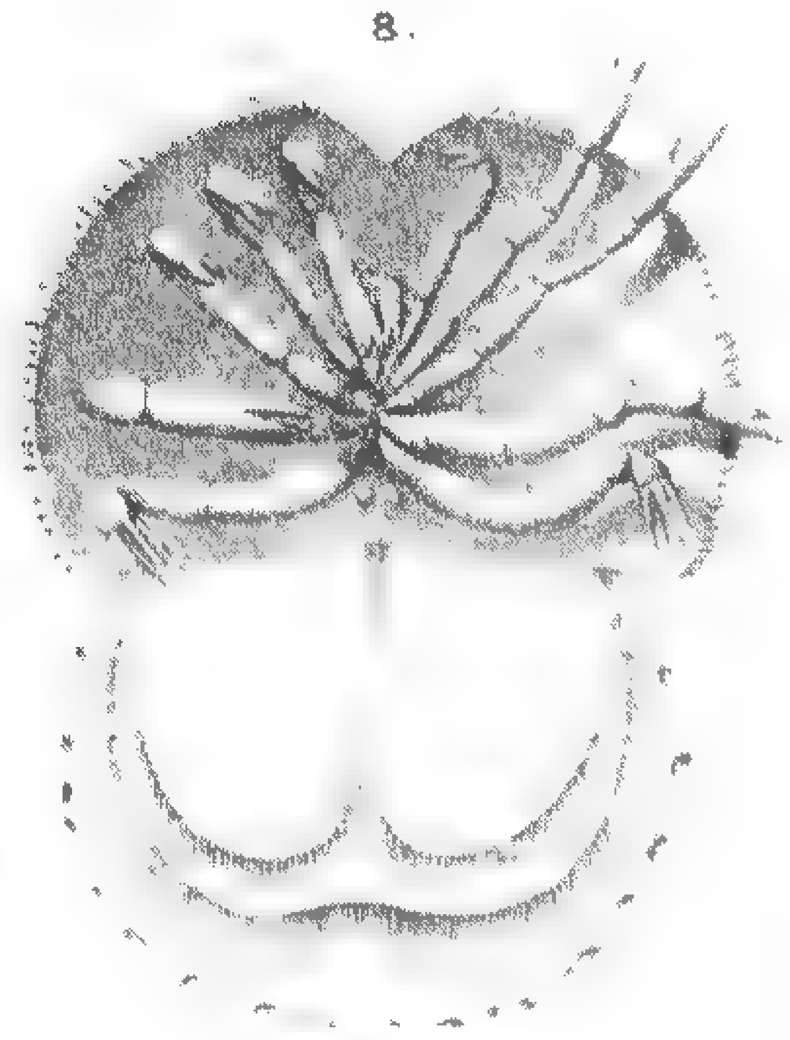

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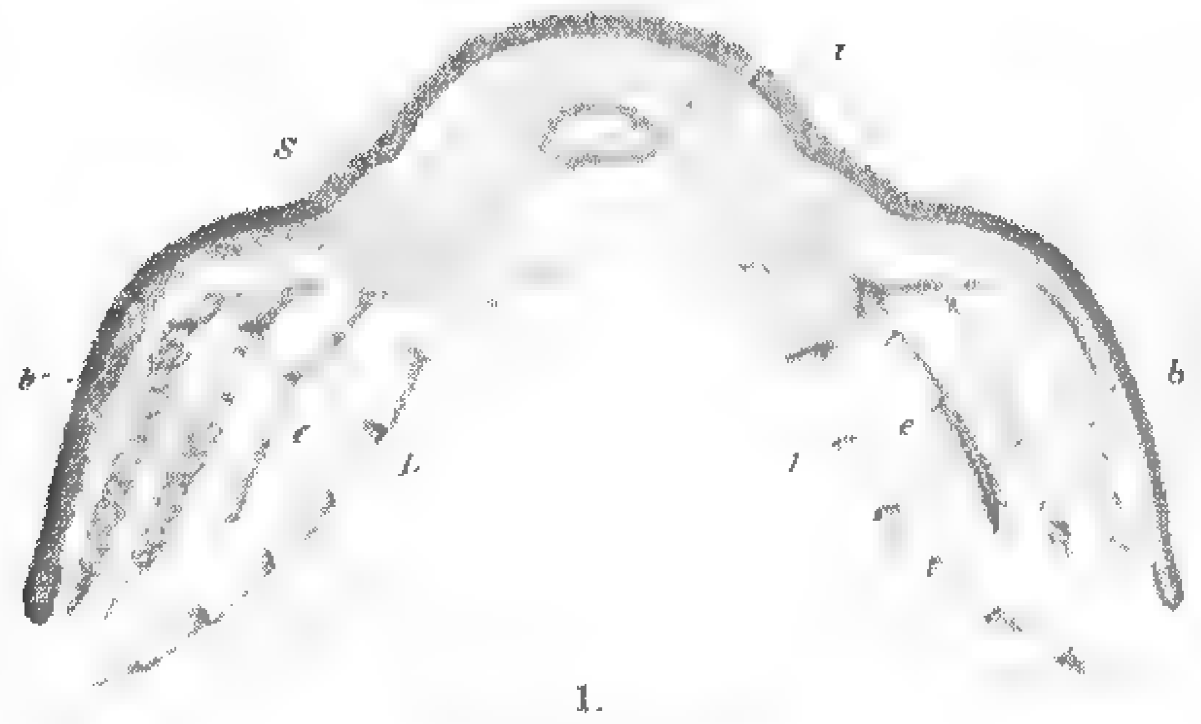

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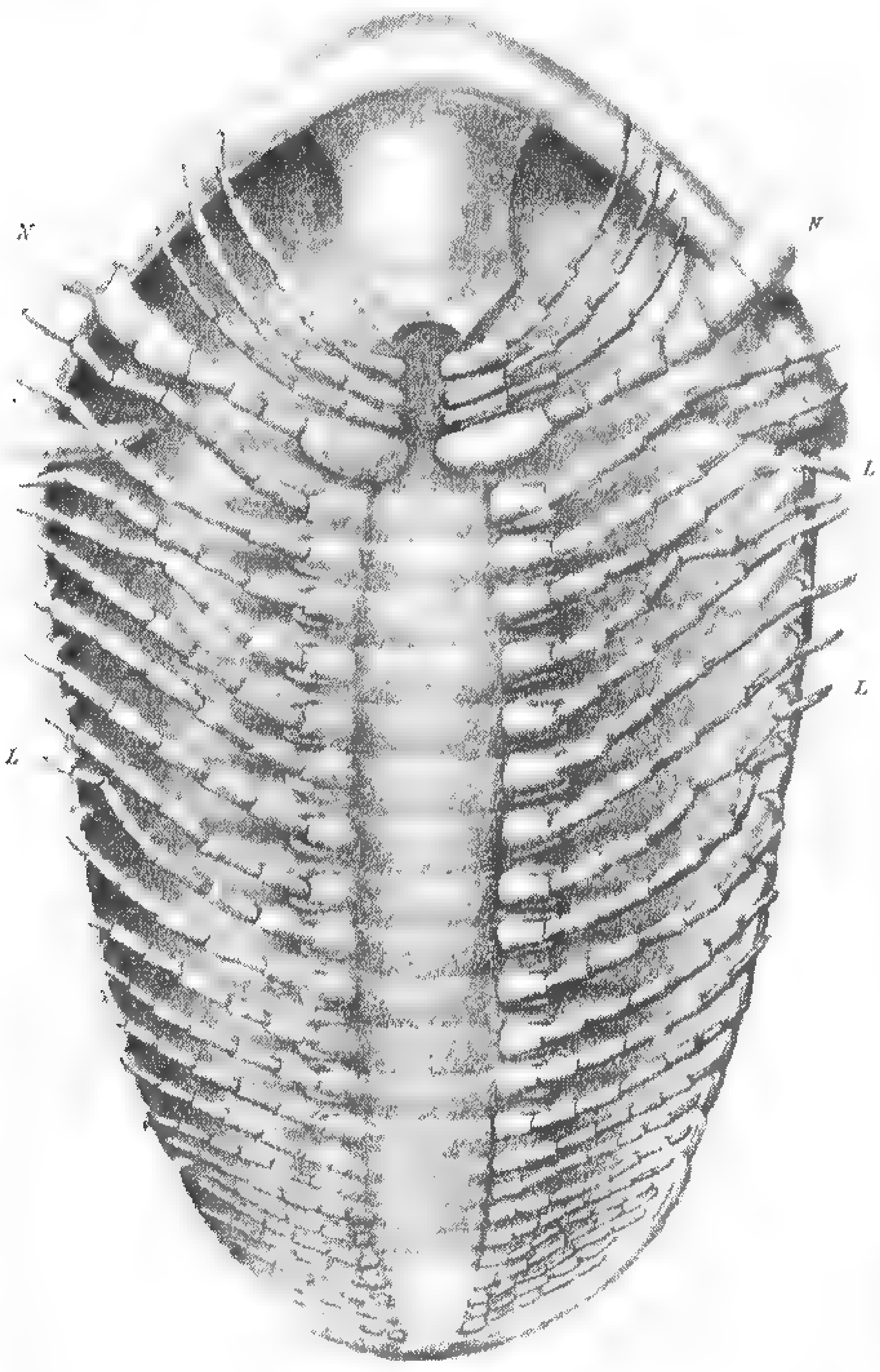

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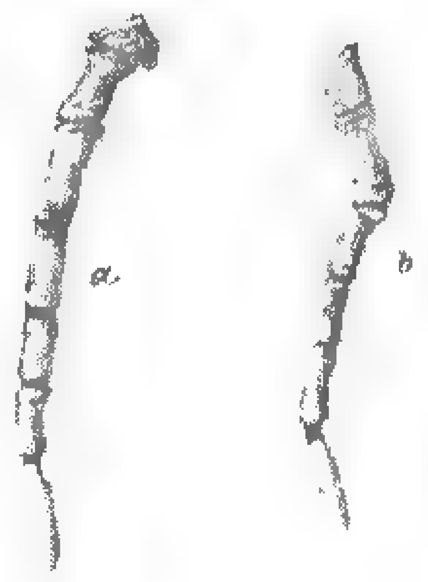

3.

No. 11. — *Reports on the Results of Dredging, under the Supervision of* ALEXANDER AGASSIZ, *along the Atlantic Coast of the United States, during the Summer of* 1880, *by the U. S. Coast Survey Steamer "Blake,"* COMMANDER J. R. BARTLETT, U. S. N., Commanding.

(Published by permission of CARLILE P. PATTERSON, Supt. U. S. Coast and Geodetic Survey.)

XII.

Report on the Selachians, by SAMUEL GARMAN.

THIS notice includes only what were taken during the last cruise of the steamer, with a few shoal-water species previously obtained. No attempt having been made to secure the latter, the collection is small. A single new species and a new variety were found among the captures in depths of less than thirty fathoms. All those coming from great depths appear to belong to species heretofore unknown. The notes secured on the different expeditions, as far as they relate to the Selachians, are by themselves insufficient for purposes of generalization. In connection with those taken from the results of other work, on Fishes as well as Selachia, they seem to point toward the following conclusions : —

First, That the migrations of these animals, including the fishes, are much more limited in extent than has generally been supposed ; and,

Second, That these creatures are more or less affected by a period of comparative inaction, in a measure corresponding to what obtains among Batrachia and Reptilia, most pronounced, perhaps, in the case of such as the skates.

Among both Selachians and Fishes there are many species in our waters whose movements do not amount to more than short runs from shoal to deeper water and back again. Others would seem to extend their travels from the coasts and banks to the Gulf Stream. And still others make much more extensive migrations. It is only a question of time and further investigation to enable our fishermen to follow their game with nearly as much certainty as the hunter now follows his, from highlands or lowlands, north or south. The question of inaction may prove a considerable factor in determining the profits. Other things being equal, those whose wanderings are shortest are most to be depended on, since their movements are less likely to change direction, or, being changed, are more easily followed. Something of the nature of a marine signal service will be necessary in order to follow the more erratic. It is often the variation in direction and extent of their journeys that causes the apparent scarcity of different kinds in particular localities, during certain seasons, rather than decrease in numbers. The motions of the sharks which wander most are to a greater or less degree determined by those of the fishes upon which they feed.

Carcharias (Prionodon) obtusus.

Squalus obtusus, Poey, 1858. Mem. Cub., II. 337.
Squalus platyodon, Poey, 1858, l. c. 331.

Through the exertions of Lieut. S. M. Ackley and the boatswain, Peterson, we were able to examine a number of large specimens. Several adult females bore young nearly ready for delivery. When in the water the tips of the fins of the large ones appeared white ; on deck the color was much more dull. The fins of the young were also lighter toward the extremities, but each was marked with a small black spot on the very end. The lobes of the pectorals and dorsals were broadly rounded at the tips. The pectoral did not quite reach to the hinder extremity of the base of the dorsal. From the base of the first dorsal to the hinder end of that of the second, the distance was just twice the length of the former.

Each female had nine young ones. This was during the last week in January, and probably two or three weeks before parturition, which would place the time of the appearance of the young in February. The little ones were about sixteen inches and a half in length, perfectly formed, and it does not seem possible that their birth was anticipated more than a week or two. When the cord was cut they were quite snappish, and swam away as if able to take care of themselves. In one case several dead ones, far advanced in decomposition, were found in the oviducts among the living, which did not appear to have suffered from their presence.

One to several specimens of an *Echeneis*, which I take to be *E. remora*, were taken with each large shark.

Cuba ; Santa Cruz ; Guadaloupe ; Dominica.

Zygæna tiburo, Val.

Numbers of hammerheads of this species were found among the fishes killed by "the epidemic," and strewn along the shores of Florida Keys.

Scyllium retiferum, sp. nov.

Moderate, portion behind the vent longer ; head depressed, width nearly equal to its length in front of the spiracles. Distance across the head at anterior angles of eyes, from angle of eye to end of snout, between angles of mouth, between outer angles of nostrils, or between angle of nostril and that of mouth, about equal. Shape of body similar to that of *S. canicula.* Snout moderate, length from mouth less than the distance between the outer margins of the nostrils. Nasal valves separated by an interspace of less than their width, not reaching the mouth, somewhat folded, without a free cirrus. Mouth medium ; the height of the irregular arch formed by its outline is little more than half its width. Labial fold on lower jaw extending nearly one fourth of the distance to the symphysis ; fold on upper jaw rudimentary. Teeth small, alike on upper and lower jaws, bearing a sharp central cusp, on each side of which are two smaller ones, several series in function at the same time. No nictitating membrane. Spiracles small. Gill openings small, fourth and fifth over the base of the pectoral. Pectorals moderate, broad, short, anterior margins curved, extremities rounded. Ventrals rather small, united for a short distance behind the claspers, outer extremity broadly rounded, posterior angle acute. First dorsal much larger than the second, about twice the length of its base in advance of the latter, extending forward above the free portions of the ventrals, insertion very near the middle of the total length. Second dorsal smaller than the anal, which extends below the anterior half of its entire length, not reaching the caudal. Caudal not large, a shallow notch between its upper and lower lobes, upper slightly indented on its hinder margin. Scales of shagreen small, unequal ; on those of the back there are three or five carinæ, the median of which is prolonged into an acute point.

Light brownish, or reddish brown, crossed at irregular intervals by groups of two to four narrow black lines which are joined toward the flanks by short lines in such manner as to enclose polygonal spaces, thus forming a network in which the meshes vary exceedingly in size and shape. Uniform light yellowish below.

Total length 12.25 ; snout to vent 5.75 inches.

One specimen. Lat. 38° 22′ 35″ N. ; Long. 73° 33′ 40″ W. ; 89 fathoms.

Ginglymostoma cirratum, M. & H.

One specimen from Kingston, Jamaica.

Narcine punctata.

Var. *N. brasiliensis* = *N. brasiliensis*, Var. 1, M. & H.

Specimens belonging to this variety were taken at St. Vincent. Compared with others from the east coast of South America it appears to depart more from the circular in the outline of the disk, the portion in front of the head being slightly produced. The posterior outlines of caudal and dorsals are more convex than in the variety *corallina*, and less so than in the Rio Janeiro specimens.

Uniform leaden or olive brown, with the markings outlined by a series of small round spots. This is probably what was considered by Müller & Henle and Duméril the first variety of the species.

Narcine corallina.

Var. nov. *N. brasiliensis.*

Two adult males belonging to this species which were taken at Key West differ in a marked degree from those secured at Rio Janeiro.

Ground color orange or reddish; a dark brown band across the head in front of the eyes, interrupted on the forehead ; a large triangular space of the light color on the snout in front of the dark band. The other dark markings behind the frontal band are reduced in size and indicated only by the margins, which are incomplete, or merely series of small round spots. All the dark color on the body is much faded, the band upon the head alone being very distinct. Posterior borders of caudal and dorsals truncate.

The truncation of the fins and the colors are the striking characters of this variety. Were it not for the excessive amount of individual variation in species of the genus I should have little hesitation in classing these specimens as representatives of a distinct species.

Raja Ackleyi, sp. nov.

Disk including the ventrals rhombic, longer than wide, anterior margins sinuous, posterior outline convex; tail moderate, depressed, with a narrow cutaneous fold on each side, tapering. The angle formed by the snout is less than right. Rostral cartilage rather slender. Mouth moderate, much curved, width one and two thirds times in distance from end of snout. Teeth small, cusps sharp, in forty-two rows on the upper jaw (male adult). Eyes moderately large, interorbital space narrow, deeply concave, width three times in the distance from the end of the snout to the eye. Spiracles smaller than the eye. Ventrals medium, portion in front of the notch rather small. Dorsals small, separated by a space with tubercles. A vertebral series of small tubercles on back and tail; two lateral series on each side of the tail ; a series on each orbital ridge ; a group of several above the end of the rostral cartilage ; a group on each pectoral opposite eye and spiracle ; a group of retractile spines opposite the shoulder near the outer angle of the pectoral. Excepting the above, in this specimen, the disk is smooth on the upper surface. The ventral surface is smooth, with the exception of the portion anterior to the mouth which is covered with fine sharp scales or shagreen.

Differing from *R. eglanteria,* which it resembles in shape, in a somewhat shorter snout and in coloration.

Disk, including ventrals, 9.5 ; width 9 ; tail from vent 9.6 ; and total length 16.25 inches.

Light yellowish brown, sprinkled with small spots of brown intermixed with others of white. On the base of each pectoral a little behind the shoulder girdle there is a transversely oblong spot of brown, half an inch in diameter, surrounded by a ring of small spots forming a sort of rosette. Uniform white beneath. Named for Lieut. Seth M. Ackley, U. S. N., to whose energy and enthusiasm we were indebted for much valuable assistance.

Yucatan Banks.

Raja ornata.

Var. nov. *R. Ackleyi.*

Disk, including the ventrals, little broader than long, anterior margins convex at the extremities of the pectorals ; tail depressed, becoming quite slender backward, with a narrow cutaneous fold on each side. Rostral angle obtuse. Snout not produced beyond the convex margins on each side of it. Rostral cartilage slender, acute. Mouth medium, moderately curved, width one and one third times in the distance from the end of the snout. Teeth small, smooth, in forty-four series in the upper jaw (young male). Eyes large, interorbital space more than three times in their distance from the end of the snout. Spiracles smaller than the eye. Ventrals medium ; posterior portion elongate, anterior small. Dorsals small, separate. Hinder margin of pectorals rounded. A vertebral series of spines on back and tail ; one lateral series on each side of this on the back, and two on the tail ; a series on each orbital ridge ; a single spine on the forehead between the eyes ; a group of several above the end or the rostral cartilage ; a spine on each shoulder ; a group near each ventral on the hinder angle of the pectoral, and a group on the anterior extremity of the latter. Entire upper surface rough with small sharp asperities ; smooth below.

Disk to end of ventrals 4.5, width 4, tail from vent 4.6, and total length 8 inches.

Light brownish, freckled with lighter, marked with scattered rosettes or groups of small spots of darker. One of these groups stands on the pectoral a little back of the shoulder, a couple near the hinder angle, and one opposite, or a little behind the spiracle. White beneath. Several spots on the tail ; one at the base of each dorsal.

One specimen off Alligator Key, Florida ; 138 fathoms.

Three specimens, Lat. 32° 24′ N., Lon. 78° 44′ W ; 142 fathoms.

Of the latter, one has only the vertebral series of spines well developed ; another has the vertebral and one lateral on each side ; and the third has the three series and scattered spines in the second lateral. One has a third dorsal considerably in advance of the usual pair, near the middle of the length of the tail. Tail extending behind the dorsals in a slender point. At present it seems likely that these young skates represent a variety of *R. Ackleyi.* Whether they are more distinct can only be determined by comparison of adults and young of each.

Raja plutonia, sp. nov.

Disk, including ventrals, broader than long, subquadrangular, broadly rounded in front and on the lateral angles ; snout forming a very blunt angle ; margin opposite the gill openings nearly straight. Tail about one and one half times the length of the disk, slender, depressed, with a cutaneous fold on each side near the extremity. Rostral cartilage short, not extending to the end of the snout. Mouth moderate, slightly curved, width equalling the distance between the outer angles of the nostrils, and contained twice in its distance from the end of the snout. Teeth about thirty-two series (a young specimen). Eyes large, longitudinal diameter of orbit greater than their distance apart. Interorbital space concave, narrow, width rather more than two and one half times in the distance of the eyes from the end of the snout. Spiracles small. Anterior nasal valve tubular ; posterior reaching the mouth, free on its outer margin. Hinder extremity of pectoral broad, rounded. Ventrals deeply notched, anterior portion narrow, extending farther from the middle of the pelvis than the posterior. Dorsals small, near the end of the tail, radial portion of bases narrow, anterior fin connected with the base of the posterior by a membranous expansion, posterior reaching almost to the extremity of the tail.

Back and tail covered with small, closely set, stellate-based scales, which bear elongate, slender, compressed, backward-directed points. Larger spines form a supraorbital row, and a single one stands on each side of the back of the head. The largest on the body form a close vertebral series on back and tail. On each side of the shoulder girdle there is an irregular series of five, and a short distance in front of each of these stands one or a pair. On each side of the tail there are two series, little smaller than those of the medial row. Smooth below. Very small specimens have not so many spines.

Brown, grayish in small to purplish in the largest specimens at hand, with more or less irregular transverse series of indistinctly defined spots of brown, often confluent into short bands, interspersed among which are spots of white of varying size and shapes. Tail with cross bands of light and of dark. Dorsals dark. Entire lower surface white.

The following measurements are taken from the largest. Width of disk 4.5 ; length of disk, including ventrals, 4.25 ; snout to hinder margin of vent 3.38 ; vent to end of tail 6.38, and total length 9.76 inches. The smallest specimen has a total length of 2, and a length of disk of .8 inches.

	Lat N.	Long. W.	Depth.	No. of Cast.
1 ex.	31° 57′ 0″	78° 18′ 35″	333 fath.	CCCXVII.
5 ex.	32° 7′ 0″	78° 37′ 30″	229 "	CCCXVI.
1	Without locality.			
1	32° 43′ 25″	77° 20′ 30″	233 "	CCCXXI.

If it is found to be the case that the rostral cartilage remains undeveloped in larger specimens, this species will have to be placed in the subgenus *Malacorrhina.*

Dasibatis sabina.

Many of these rays were found among the multitudes of dead fishes along the shores of Key West and islands in the neighborhood. Like the sharks and trunk-fishes (*Ostracion*) they seemed to possess much more vitality than the majority of the bony fishes. It was not an uncommon occurrence to find them struggling along in a feeble, half-paralyzed way, fully aware of their danger, but unable to make the efforts necessary for escape. In all likelihood they had been swept down from the bays and rivers of the mainland by the currents.

March 15th, 1881.

No. 12. — *Reports on the Results of Dredging, under the Supervision of* ALEXANDER AGASSIZ, *along the East Coast of the United States, during the Summer of* 1880, *by the U. S. Coast Survey Steamer* "*Blake*," COMMANDER J. R. BARTLETT, U. S. N., Commanding

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XIII.

Report on the Pycnogonida, by EDMUND B. WILSON.

THE specimens described in the following pages were dredged by Mr. Agassiz, during the summer of 1880, off the eastern coast of the United States, in a region extending from South Carolina to the northeastern extremity of St. George's Banks, lying between N. Lat. 31° 57′ and 41° 35′, and W. Long. 78° 18′ and 65° 35′; the range of depth was from 73 to 1242 fathoms.

It was at first intended to include descriptions of the Pycnogonida in the report on the Crustacea from the same region, which is in course of preparation by Professor Smith, of Yale College. Upon examination, however, the collection was found to possess features of considerable interest; and, though the species are few, they seem to merit independent description and illustration. The most striking feature of the collection is the remarkable size of most of the forms, which may fairly be called colossal in comparison with shallow-water or littoral species. Of the three species of *Colossendeis* (two of which are apparently undescribed) the smallest has a span of 14 cm. between the tips of its outstretched legs, while the largest has an extent four times as great. The new genus *Scæorhynchus* has an extent of more than 19 cm., — a gigantic size as compared with the dimensions of its nearest allies. The most abundant species of *Nymphon* is the largest of that extensive genus; and one species of the new genus *Pallenopsis* is more than twice as large as any of the species of allied genera (*Pallene, Phoxichilidium, Anoplodactylus*), which are known only from the littoral zone or comparatively shallow water.

It is, further, interesting to note that in a number of forms the visual organs (ocelli) are rudimentary and destitute of pigment (*Colossendeis colossea*, *C. macerrima*, *Scæorhynchus*) or entirely absent (*Colossendeis angusta*). On the other hand, in *Pallenopsis* the ocelli are relatively of unusually great size. All the other species are known to occur also in shallower water, and the ocelli are of the ordinary form.

Scæorhynchus and *Colossendeis* are of especial interest as showing clearly from anatomical evidence the complete independence of the accessory legs and first pair of ambulatory legs, which has been already proved by Dohrn from embryological data. The accessory legs have been something of a stumbling-block in the way of those who would trace the Arachnid affinities of the Pycnogonida by a direct homology of their appendages. In order to reduce the Pycnogonid appendages to a convenient number for such homologizing, the accessory legs have by certain writers been assumed off-hand to be simply branches of the first pair of ambulatory legs, with which they are usually closely united. Dohrn showed that in the early stages there was every reason to believe that the two appendages were innervated by entirely distinct ganglia, and therefore belonged to different segments of the body. And in some adult forms the first ventral ganglion, which supplies nerves to the palpi, accessory legs, and first ambulatory legs, is divided into an anterior part supplying the two former appendages, and a posterior part sending nerves to the latter pair of appendages. In *Nymphon*, and perhaps in some other forms, these two portions are quite separate as two independent ganglia, although remaining in close proximity. In *Scæorhynchus* they are separated by a considerable interval, and connected by slender commissures. These two ganglia are nearly as large as the other ventral ganglia, so that there seems to be one more than the usual number. Moreover, the accessory legs are separated by a wide interval from the ambulatory legs, and are articulated to prominent lateral processes from the body, scarcely distinguishable, except in size, from those to which the ambulatory legs are attached. It is clear from this case that this pair of appendages has nothing to do with the ambulatory legs, but really belongs to another segment. In *Colossendeis* the accessory legs have undergone still another and very remarkable change of position. They have moved forwards and become so closely united to the *palpi* that the two appear precisely like the outer and inner rami of a single appendage. As in the case of *Scæorhynchus*, the ganglion from which they derive their nerves is entirely distinct from that of the first ambulatory legs, the two being connected by long commissures.

In all cases, however, the palpi and accessory legs are innervated by the same ganglion, and the latter shows, in the adult, no indication of being composed of two coalesced ganglia. So that if the accessory legs are not independent appendages, they must belong to the same segment with the *palpi*. According to Dohrn, however, the ganglion in question is represented in the larva (of *Achelia*) by two partially coalescent ganglia, and it must be regarded in the adult as representing two segments.

In the face of these facts, it seems impossible to homologize the Pycnogonid appendages with those of the Arachnida unless a segment of the latter has been suppressed somewhere between the cheliceræ and ambulatory legs. The possibility of such a suppression is shown by the fact that in a number of Pycnogonida the process has taken place, and without leaving a trace in the embryological record. Thus in *Pallene* the palpi are wholly wanting, both in the adult and in the larva. Granting that such a suppression may have taken place, the homology of the Pycnogonid and Arachnid appendages is manifest. This suggestion must however be taken for what it is worth, for it is easily possible that the external resemblances of a Pycnogonid to an Arachnid are those of analogy only, and have no morphological significance. This is the more probable from the extreme variability of the three anterior pairs of appendages in position and structure.*

One more point of interest may be noted. In *Scæorhynchus* the anterior pair of appendages (cheliceræ or "antennæ") present very decided sexual differences. This has not before been observed in the Pycnogonida, and furnishes another illustration of the surprising modifications which the anterior pairs of appendages undergo in this group.

Following is a list of the species: —

Pycnogonum littorale, STRÖM.
Colossendeis angusta, SARS.
colossea, nov. sp.
macerrima, nov. sp.
Scæorhynchus armatus, nov. gen. & sp.

* I may take this opportunity to correct a misleading statement on page 466 of my "Report on the Pycnogonida of New England and adjacent Waters," in the Report of the United States Commissioner of Fish and Fisheries, Part VI., for 1878. The account there given of the innervation of the three anterior pairs of appendages, taken from Zenker's paper, is certainly incorrect, as I have since satisfied myself by studies on the development of *Pallene*. Zenker appears to have mistaken the anterior ganglionic mass for a single (supra-œsophageal) ganglion, and his statements are therefore very misleading. There is still considerable doubt as to the exact origin of the nerves of the so-called antennæ, but there is no doubt that the palpi and accessory legs are innervated from the first sub-œsophageal ganglion.

Pallenopsis forficifer, nov. gen. & sp.
longirostris, nov. sp.
Nymphon grossipes (L.), CHR. FABR.
Strömii, KRÖYER.
pallenoides, SARS.

Of these, the five previously known species have their geographical and bathymetrical range greatly extended by the collection; two of them were previously known only from the extreme North Atlantic.

Through the courtesy of Prof. Verrill I am enabled to insert a description and figures of a second species of the genus *Pallenopsis* from the deep-water dredgings of the Fish Commission, off the coast of Southern New England.

Pycnogonum littorale, STRÖM.

The geographical and bathymetrical range of this species, already surprisingly great, is considerably increased by the Blake dredgings. The specimens are as follows.

Stat.	Locality.	Depth.	No. and Sex.
302	N. Lat. 41° 30′ 0″, W. Lon. 66° 0′ 0″	73 fathoms.	1 ♀ sp.
303	" 41° 34′ 30″, " 65° 54′ 30″	306 "	9 ♀ 4 ♂ sp.
304	" 41° 35′ 0″, " 65° 57′ 35″	139 "	1 ♀ sp.
305	" 41° 33′ 15″, " 65° 51′ 25″	810 "	1 ♀ sp.

The greatest depth hitherto recorded is 406 fathoms (off St. George's Banks, Smith and Harger, U. S. Fish Comm. 1872). At Eastport, Me., it occurs between tide marks. The specimens appear in all respects similar to those from shallow water. The males are rather smaller than the females. A large female specimen measured, body (without rostrum), 10 mm.; rostrum, 5 mm.; legs, 15 mm.

COLOSSENDEIS, JARZYNSKY.

"Antennæ" wanting. Palpi 10-(9 ?)-jointed. Accessory legs 11-(10 ?)-jointed. Legs without auxiliary claws upon the dactylus. A remarkable feature of this genus, as pointed out before, is the close union of the accessory legs with the palpi, and their complete separation from the ambulatory legs. In counting the joints of the palpi it is hard to say whether there are two distinct short basal joints, or only one articulated to a prominent process of the body. In our specimens there appear to be two joints. The point is of little importance save to avoid confusion in description. Other authors describe only one joint.

This genus, including, for the most part, species of colossal size, differs from Wood-Mason's genus *Rhopalorhynchus* only in the absence of distinct segmentation of the body, and the greater development of the abdomen. These characters do not appear of sufficient importance to warrant a separation of the genera ; for the segmentation is sometimes obscurely indicated in *Colossendeis*, and the size of the abdomen cannot have more than a specific significance. Unfortunately, I have been unable to obtain Jarzynsky's paper, and I cannot ascertain its exact date. *Rhopalorhynchus* was described in 1873, and probably has priority. In the want of certain evidence, however, I have preferred to follow Sars in adopting the former name. Miers has recently redescribed the genus (Annals and Magazine of Natural History, January, 1881) under the name *Anomorhynchus*. If *Rhopalorhynchus* and *Colossendeis* are distinct, Miers's genus is identical with the latter, with which his description agrees in every particular.

The species described by Jarzynsky as *C. borealis* is stated by Sars to be identical with Sabine's *Phoxichilus proboscideus*, described many years ago. If Sabine's description is trustworthy, his species is widely different from any of the forms described below.

Colossendeis angusta, Sars.

Prodromus Descriptionis Crustaceorum et Pycnogonidarum, quæ in Expeditione Norvegica Anno 1876, observavit G. O. Sars. < Archiv for Mathematik og Naturvidenskab, Andet Bind, 1877, pp. 268, 269 (368, 369 by error).

Plate III. Figs. 8, 13.

SPECIMENS EXAMINED.

Stat.	Locality.	Depth.	No.
338	N. Lat. 38° 18′ 40″, W. Long. 73° 18′ 10″	922 fathoms.	1 sp.
308	" 41° 24′ 45″, " 65° 35′ 30″	1242 "	2 sp.
305	" 41° 33′ 15″, " 65° 51′ 25″	810 "	2 sp.

This beautiful species has hitherto been known from three specimens dredged by Sars off the west coast of Norway, N. Lat. 63° 10.2′, W. Long. 4° 59.6′, 417 fathoms. Its range is thus extended nearly 25 degrees of latitude southwards, and from 417 down to 1242 fathoms, — a striking instance of the southward extension of arctic forms in deep water.

The specimens differ slightly from Sars's description, but the disagreement is probably within the limits of variation. It may be convenient to describe some of the characters of the specimens.

The body is very trimly built, with nearly parallel sides, and with only very obscure indications of articulations between the segments. Lateral processes short, separated by nearly equal intervals about as wide as the processes. Abdomen about one third the length of the body (without the rostrum). Oculiferous segment very short indeed, suddenly widening just in front of the first pair of lateral processes, and there forming the widest portion of the body. The oculiferous tubercle is variable. Sars described it as "spinam longam et acuminatam formans . . . ., pigmento et lentibus omnino destituta." The spine is scarcely "long and acuminate" in our specimens, though forming a very acute conical elevation. The ocelli are very rudimentary, or entirely wanting. The rostrum is almost as long as the body and abdomen together. It is somewhat cylindrical, more or less swollen a little behind the middle, and also toward the tip. In one specimen the rostrum is almost clavate.

The palpi extend considerably beyond the rostrum; their joints have, in a general way, the same proportions as in the species described below, but the eighth (counting ten joints in the palpi) is very short, even globose.

Accessory legs much as in the other species. The terminal claw, though small, is distinct from and movable upon the preceding. The spines of the outer joints are of peculiar and characteristic form (Fig. 13), being flattened, obliquely truncate, broadest at base and tip, and narrower in the middle. They are arranged in several irregular rows along the lower (i. e. concave) sides of the 7th to 10th joints. They are longest in the inner rows; in the outer rows they become much shorter, and finally quite disappear; those of the outer rows are not truncate at the tip, but evenly rounded, and of a broadly spatulate form. Legs long and slender, four times as long as the body (including rostrum and abdomen). Fourth joint longest; tarsus and propodus (7th and 8th) nearly equal, former a little longer; both are simple and unarmed. Dactylus (Fig. 8) *excessively long and slender*, — more so than in any other Pycnogonid known to me; it is much longer than the propodus. Color varying from straw-yellow to nearly white.

Length of body (including rostrum and abdomen)	17 mm.
Rostrum	8.5 "
Palpi	11 "
Accessory legs	27 "
Ambulatory legs	67 "
Extent	138 "

Colossendeis colossea, sp. nov.

Plates I. and III.

Body very short and stout, unsegmented; three anterior pairs of lateral processes separated by very small intervals, last pair usually separated from the next anterior by a somewhat greater interval. The processes are very short and swollen; their length scarcely equals the width of the body; they are constricted at the base, and separated from the body by a suture. Abdomen very small, less than one fourth the body (exclusive of rostrum), of slender pyriform shape, obtusely conical towards extremity.

The rostrum is of great size, its length being about one and a half times that of the body, and of peculiar and characteristic form. At the base it is of slightly less diameter than that of the body (2.5 mm.) and continues of the same size for about one third its length; it then suddenly expands to a diameter of nearly 5 mm. and then gradually tapers toward the tip; the terminal portion is cylindrical and about 3.5 mm. in diameter. The rostrum is articulated to the body, upon which it is somewhat movable. Mouth large, sharply triangular.

Oculiferous segment very short, anterior part nearly triangular. Oculiferous tubercle in the middle of the anterior part, large, smoothly rounded, or sometimes terminating in a low conical tip, transverse diameter greatest; ocelli two, widely separated, without pigment, rudimentary.

Palpi (Fig. 5) nearly twice the rostrum, attached at the sides of and a little below the latter. Two extremely short basal joints are followed by a long slender one, and this by a short quadrate one; 5th is seven eighths the 3d; 6th, one fourth to one third the 5th; 7th, a little more than twice the 6th; 8th, a little longer and much more slender than the 6th; 9th, equal to the 8th, or a little less; 10th, about equal to the 9th, very slender, rounded at the end. Basal joints nearly naked; outer joints with rather sparse, stoutish, simple hairs, which are somewhat more numerous on the lower side.

Accessory legs (Fig. 6) of great length, more than twice as long as the entire body (including rostrum and abdomen). The three basal joints are very short, the 5th about three times as long as broad, the 4th and 6th greatly elongated; 6th longest, very slender, nearly straight; 7th to 10th, short, curved, bearing the peculiar spines characteristic of the appendage; terminal joint claw-like and coalescent with the preceding. The five terminal joints can be folded tightly together and form an efficient prehensile organ. Terminal claw without spines, with a marked and peculiar curvature. Spines of the 7th to 10th joints arranged as in the last species, forming a crowded mass on the concave side of the joint. They are of a slender spatulate shape, those of the inner row larger and more or less truncate at the end; along their edges they are very finely serrate.

Legs enormously long, five and a half times the body (including rostrum and abdomen). The three basal joints very short; 4th, very long and slender (seven times the three basal ones taken together); 5th, exactly equal to the 4th; 6th, three fourths the 5th; 7th, about one eighth the 6th; 8th, a little more than one half the 7th; 9th (dactylus), less than one half the 8th, very slightly curved, acute. Propodus and tarsus (Fig. 7) entirely without spines along the lower side.

The surface is everywhere finely tuberculose. Scattered at considerable but pretty regular intervals over the legs are short, stout, appressed hairs which show a distinctly linear arrangement. At the distal extremities of the joints they are more numerous, and form incomplete rings.

Color clear straw-yellow. A narrow dark stripe runs along each side of the appendages, representing a thickening of the chitin.

Length of body, inclusive of rostrum and abdomen	5 cm.
" rostrum	3 "
Diameter of rostrum at base	2.5 mm.
" " at widest part	4.7 "
" " at tip	3.5 "
Length of palpi	5.7 cm.
" accessory legs	10.3 "
" ambulatory legs	27.2 "
Extent	55 "

The description and measurements are taken mainly from the largest specimen, captured at locality 307, in 980 fathoms. So far as I know, this is the largest Pycnogonid of which exact measurements have ever been given, though Willemoës-Suhm has recorded a species taken by the "Challenger" Expedition in the Indian Ocean "measuring nearly two feet across the legs."

SPECIMENS EXAMINED.

Stat	Locality.				Depth.	No.
305	N. Lat.	41° 33′ 15″,	W. Long.	65° 51′ 25″	810 fms.	3 sp.
306	"	41° 32′ 50″,	"	65° 55′ 0″	524 "	1 "
307	"	41° 29′ 45″,	"	65° 47′ 10″	980 "	1 "
339	"	38° 16′ 45″,	"	73° 10′ 30″	1186 "	4 "
342	"	39° 43′ 0″,	"	70° 55′ 25″	1002 "	1 "

Colossendeis macerrima, sp. nov.

Plates I., III., and V.

Body slender, unsegmented, lateral processes separated by intervals equal to about one half their width. The anterior pair of processes turn sharply forwards and somewhat upwards; the anterior side is extremely short, so that the articulatory surface looks nearly forwards. Oculiferous segment (Fig. 32), considerably longer than in the two preceding species, rather swollen, with nearly parallel sides. It is concave in front, and the antero-lateral angles are very prominent and darker colored. Oculiferous tubercle scarcely at all elevated, otherwise as in the last; ocelli widely separated, rudimentary, without pigment. Rostrum of remarkable length, being twice as long as the body (including abdomen). In its present condition it is pretty regularly triangular in outline, but this appears to be due to shrinkage; normally, it is probably round. It is very slender, swelling slightly a little behind the middle; toward the tip the sides are parallel. Viewed from the side, the rostrum is seen to have a peculiar and characteristic curvature; the basal half is gently convex toward the dorsal side, the distal half gently convex toward the ventral side.

Abdomen a little more than one third the rest of the body (without rostrum) slightly clavate.

Palpi (Fig. 9) only a little longer than the rostrum, very slender. There are two very short basal joints; 3d, extremely long and slender; 4th, very short and small; 5th, greatly elongate, more than one and one half times the 3d, almost perfectly cylindrical, though slightly swollen near the distal end; 6th, about one seventh the 5th; 7th, equal to the 6th; terminal three joints nearly equal, very short and small.

Accessory legs (Fig. 10) attached to the extreme anterior end of the oculiferous segment immediately below and behind the palpi. The proportions of the joints are nearly as in the preceding species, but the 4th and 6th are still more elongated and attenuated. The terminal claw (11th joint) is movably articulated with the preceding; the spines of the 7th to 10th joints (Fig. 12) are of slender spatulate shape, evenly rounded at the end, and beautifully and finely serrate. Legs excessively slender and elongated, three and three fourths times the length of the body (with rostrum and abdomen). The proportion of the joints are much as in *C. colossea* but the tarsus (7th) is more than twice the propodus, and the dactylus is scarcely more than one third the propodus. Both tarsus and propodus (Fig. 11) are unarmed. The surface is everywhere finely granular. The legs have a few hairs, arranged as in *C. colossea*. Color pale yellowish, the stomach showing through as a conspicuous reddish-brown stripe.

Length of body (including rostrum and abdomen)	44.5	mm.
" rostrum	31	"
" palpi	35	"
" accessory legs	62	"
" ambulatory legs	165	"
Extent	343	"

A single specimen from locality 338, 922 fathoms, N. Lat. 38° 18′ 40″, W. Long. 73° 18′ 10″.

This wonderfully attenuated species is widely different from the two preceding, from which it is easily distinguishable by its extraordinary rostrum, peculiar oculiferous segment, and the proportions of the palpal joints.

SCÆORHYNCHUS, gen. nov.

Body conspicuously segmented. Oculiferous segment elongate. Rostrum large, pyriform, unjointed. Accessory legs present in both sexes, with eleven joints. "Antennæ" four-jointed, chelate. Palpi composed of ten joints. Abdomen unjointed. Legs slender; dactylus without auxiliary claws.

This genus resembles in general appearance *Eurycide*, Schiödte (*Zetes*, Kröyer), and forms one of a very distinct group of genera, including *Eurycide*, *Parazetes*, *Ascorhynchus Gnamptorhynchus*, which should perhaps constitute an independent family. All possess a very characteristic, large, pyriform, three-sided rostrum, which is usually directed downwards, and may be folded backwards under the body. They further agree in the small rudimentary "antennæ," well-developed palpi, slender legs, straight and simple tarsus and propodus, absence of auxiliary claws, and in the possession of accessory legs by both sexes. The most marked character of *Scæorhynchus* is the presence of strongly chelate "antennæ" in the male, while in the female the chelæ are quite rudimentary. *Eurycide*, as described by Kröyer and others, has non-chelate, three-jointed "antennæ." The form figured in Gaimard's *Voyages en Scandinavie, Laponie, etc.*, as Kröyer's species, appears to have the rudiment of a fourth joint, agreeing with the *female* of *Scæorynchus;* and it is therefore possible that the two genera do not differ essentially in the structure of the "antennæ." The other characters are, however, quite sufficient to separate them.

It may be questionable whether our form should be generically separated from

Böhm's genus *Gnamptorhynchus.* The presence of dactyli in the first pair of legs and the differences in the antennæ appear, however, to warrant the separation.

Scæorhynchus armatus, sp. nov.

Plates II. and V.

Body slender, segments constricted in the middle. Lateral processes longer than the width of the body, widely separated. The two anterior pairs are directed somewhat forwards, the two posterior somewhat backwards. Each has a very prominent conical vertical spine near its outer end. In the median line of each of the three hinder segments of the body is a similar, though somewhat shorter spine.

Oculiferous segment as long as the rest of the body to the base of the abdomen, narrow, with nearly parallel sides. A little behind the middle is the very prominent, acute, conical oculiferous tubercle. Ocelli rudimentary, without pigment.

Abdomen slender, clavate, two thirds as long as the oculiferous segment.

The rostrum (Fig. 4) has been partially described above. At its point of attachment its diameter is not more than one fifth that of the widest part. Mouth large, triangular, with three powerful chitinous jaws and three fleshy lips corresponding in position with the jaws.

"Antennæ" a little more than one third the rostrum, directed straight forwards, separated by a considerable interval; the oculiferous segment is not at all emarginate between them. There are two equal cylindrical joints followed in the female (Fig. 27) by a very small swollen rudimentary chela, and in the male (Fig. 26) by a still small but well developed chela with long, slender, curved unarmed claws.

Palpi (Fig. 28) nearly or quite twice the rostrum, slender, tapering, and simple. The two basal joints are very short, as in *Colossendeis;* 3d, about seven times as long as the two basal joints taken together; 4th, about one fifth the 3d; 5th, seven eighths the 3d; 6th, short, quadrate; 7th, one third the 3d; 8th, one half the 3d; 9th, a little less than the 8th; 10th, straight and slender, less than the 9th. Outer joint sparsely hairy; hairs simple, short, more numerous along the lower side. The palpi usually have a sigmoid flexure bending sharply backwards at the fourth joint and forwards again at the sixth.

The accessory legs (Fig. 30) are rather larger in the male, but do not otherwise differ markedly in the two sexes. There are three very short basal joints; 4th, more than twice as long as the three basal joints taken together, curved, with a slight scarcely conical elevation on its anterior side which is very constant and characteristic; 5th, slightly clavate, shorter than 4th; 6th, 7th, 8th, 9th, 10th, diminish pretty regularly in length; 6th, strongly clavate, with a brush of slender hairs at its lower distal angle which are much longer and more numerous in the male. Spines of 7th to 10th joints (Fig. 31) arranged, as in *Colossendeis,* in several irregular rows. They are lanceolate, acute, coarsely serrate, more numerous and larger in the male. Terminal joint claw-like, very short and stout.

Ambulatory legs (in the female) about three times as long as the body (without the rostrum), slender and tapering; 2d joint about two and one half times the 1st or 3d, with a slight but characteristic elevation on the anterior side outside the middle; 4th and 5th, longest, equal; 6th, two thirds the fifth; 7th, one third the 6th; 8th, less than 7th; dactyli (Fig. 29) very short and small; those of the anterior pair of legs are considerably smaller than the others, but are unmistakably present (compare *Gnamptorhynchus*).

In the male the legs are relatively shorter. The whole surface is granular with fine close-set tubercles. Color pale dull yellow to dusky, sometimes irregularly mottled with yellowish and dingy chocolate-brown.

As shown by the measurements, the sexes differ conspicuously in size.

Female: — Length of body (not including rostrum)	30.5	mm.
" rostrum	17	"
" antennæ	5.8	"
" palpi	35.5	"
" accessory legs	36	"
" ambulatory legs	90	"
Male: — Length of body	22	"
" legs	58	"

Four males and five females from locality 308, N. Lat. 41° 24′ 45″, W. Long. 65° 35′ 30″, 1242 fathoms.

This is an interesting species. The accessory legs, as noted above, arise from distinct lateral processes, near the middle of the oculiferous segment. The palpi also are attached to prominent processes of the same segment. The presence of well-marked sexual characters in the "antennæ" has not before been observed in the group. The male seems for some reason to retain the larval chelate antennæ, which undergo in the female a further retrograde development, and become functionally useless.

I cannot absolutely demonstrate the specific identity of the two forms described as male and female, though there can be scarcely a doubt that they are of the same species. They are all from the same haul, agree in every respect except size and the structure of the antennæ and accessory legs; and the differences of the latter correspond with those known to exist among other Pycnogonida. The sexes were determined by examination of the internal generative organs.

The chelate or simple character of the "antennæ" is commonly accepted as a family character, but the small value of such a distinction is shown by the structure of this species. A very slight further reduction of the antennæ in the female would bring the latter into the *Achelidæ*, as now defined, while the male falls into the *Nymphonidæ*. The need for an entire revision of the systematic arrangement of the Pycnogonida is sufficiently obvious, but no acceptable one seems possible until our knowledge of the development is more complete.

PALLENOPSIS, gen. nov.

Body slender, as in *Phoxichilidium*, segmented. Rostrum cylindrical. Abdomen slender, simple. Antennæ with four joints, large and chelate. Palpi rudimentary, composed of a single joint. Accessory legs present in both sexes, ten-jointed. Legs slender, dactylus with auxiliary claws. Two very unequal pairs of large ocelli.

This genus has the general appearance of a *Pallene* or *Phoxichilidium*. It is however very distinct from them on account of the division of the basal joint of the antennæ into two, and in the different structure of the accessory legs; and it differs from all known genera in the existence of rudimentary palpi, which are reduced to a single joint like the antennæ of *Tanystylum* or *Lecythorhynchus*. In all other genera, so far as I know, palpi are either quite absent or fully developed (apparently serving as tactile organs); and their presence or absence is a convenient family character. Their structure in this genus shows of how little value this character is, save as a matter of convenience. The genus is exactly intermediate between the Nymphonidæ and Pallenidæ, as *Scæorhynchus* is intermediate between the former family and the Achelidæ.

The peculiar glandular duct near the middle of the fourth joints of the legs in the *male* is perhaps a character of generic significance. It has not to my knowledge been observed in any other Pycnogonid.

Böhm has described and figured * a form from Patagonia which he identifies with Kröyer's *Phoxichilidium fluminense* from Rio Janeiro, and which evidently should be referred to *Pallenopsis*. Kröyer did not observe the rudimentary palpi, but the close agreement in other characters leaves little reason to doubt the correctness of Böhm's identification. Neither Kröyer nor Böhm mentions the extra joint of the antenna, though the latter observed a "charakteristischen durch eine Linie stärkerer Haare markirten Knick," near the middle of the basal joint. There can be no doubt of the presence of a distinct articulation at this point in our specimens. The species described below are very distinct from Kröyer's species; the most striking difference is the much smaller size of the auxiliary claws in the former, and the non-plumose character of the hairs on the ambulatory legs.

Pallenopsis forficifer, sp. nov.

Plates IV. and V.

Body (Fig. 15) comparatively stout, distinctly segmented. Lateral processes very distinct and prominent, slightly longer than the width of the body, separated by intervals less than their own width. The anterior pair are directed somewhat forwards and upwards, the posterior pair obliquely backwards like the branches of a V.

* Monatsbericht der Königlich Preussischen Akademie der Wissenschaften zu Berlin, Februar, 1879, p. 180, Tafel I. Fig. 4.

Oculiferous segment swollen, of greater diameter than that of the body, narrowing slightly in front; it is nearly as long as the two following segments taken together. Its vertical diameter is much less in front than behind, the lower surface being oblique. Oculiferous tubercle extremely prominent, conical, acute, placed at the extreme anterior end of the segment, almost directly above the attachment of the antennæ. Ocelli dark chestnut-brown, iridescent; anterior pair three times as large as the posterior, lying at a much lower level.

Rostrum considerably longer than the oculiferous segment, nearly cylindrical but slightly swollen near the middle and again near the tip. Abdomen slender, slightly clavate, about as long as the three posterior body-segments taken together.

"Antennæ" (Fig. 18) with two slender equal basal joints which extend beyond the rostrum; they are separated by a delicate slightly marked articulation; chelæ stout, swollen, very hairy; claws very short, flattened, with thin overlapping cutting edges forming a scissors-like organ.

Palpi (Fig. 17) represented by a pair of simple rounded knobs at the sides of the rostrum. They are articulated to the body, and seem to represent a single joint.

Accessory legs (Fig. 17) stout and well developed in the male, small and weak in the female; 1st joint (male) short, swollen, about equal to 3d; 2d, 4th, and 5th, nearly equal and about twice the 3d; 6th, less than 5th, strongly curved, swollen at distal extremity; 7th, still less, with a peculiar twist, so that the appendage cannot be straightened; 8th and 9th, equal to 7th, or less; 10th, very small, rounded. Outer joints sparsely covered with simple hair-like spines, many of which are directed backward, especially at the distal extremity of the 6th joint, where they are very short and stout, and form an irregular circlet.

Legs long, rather slender, three and a half times as long as the body (including rostrum and abdomen); 1st and 3d joints very short; 2d, much longer, clavate; 4th, 5th, and 6th, very long and slender; 6th, longest and most slender; 7th (tarsus), very short, nearly triangular, with a row of strong spines along the lower side; 8th (propodus), gently curved, three and a half times the tarsus (longer margin) armed with an irregular series of strong, more or less appressed spines along the lower side (Fig. 16), which vary in arrangement, but are longer towards the proximal end; dactylus a little more than one half the propodus, auxiliary claws one fourth the dactylus.

The surface is everywhere finely tuberculose; the tuberculation is coarser on the accessory legs than elsewhere. The body is sparsely hairy, the rostrum is also hairy, and the abdomen still more so. The legs are rather conspicuously hairy, the hairs becoming stouter and more spine-like on the outer joints.

Color, pale yellowish or straw-color. A narrow brown stripe, representing a thickening of the chitin, extends along each side of the legs.

Near the middle of the fourth joint of each ambulatory leg on its anterior side, in the *male*, is a slight elevation, from which arises a short tubular organ, which is apparently the duct of a glandular organ within the joint.

Length of body (without rostrum)	. . . .	12 mm.
" rostrum	. . . .	4 "
" legs	. . . .	54 "

SPECIMENS EXAMINED.

Stat.	Locality.	Depth.	No. and Sex.
317	N. Lat. 31° 57′, W. Long. 78° 18′ 35″	333 fathoms.	2 ♂ and ♀
319	" 32° 25′, " 77° 42′ 30″	262 "	1 ♂

Pallenopsis longirostris, sp. nov.

Plates IV. and V.

I have received from Professor Verrill a second species of this curious genus from the deep-water dredgings of the Fish Commission, which may be advantageously described in connection with the last. Body somewhat more robust than in the last. Oculiferous segment longer than the two following taken together, much swollen in front, so that there appears to be a distinct neck, which is, however, scarcely narrower than the rest of the body. Oculiferous tubercle obtuse, much less prominent than in the last; ocelli nearly the same, lighter colored.

Rostrum as long as the oculiferous and two succeeding segments taken together, somewhat fusiform, slightly swollen a little behind the middle, expanding very slightly near the tip.

"Antennæ" (Fig. 21) extremely slender; the two basal joints barely extend beyond the tip of the rostrum. Chelæ rather slender, scarcely swollen; claws much longer and more slender than in the preceding form, and decidedly curved towards their tips. Along the middle part of their cutting edges they are finely but very irregularly serrate.

Palpi in the male nearly as in the preceding species; in the female, still smaller and more rudimentary.

Accessory legs (Fig. 25) much as in the last species, much smaller and less spinose in the female. In the male the sixth joint is sub-globose at its distal extremity, where it is surrounded by a tolerably definite circlet of very strong tapering, acute, backward-pointing spines or hooks, by means of which the egg-mass is securely held.

Legs more slender than in the former species. Tarsus usually with a larger spine at the lower distal angle. Spines of the propodus far less numerous than in the last; there are usually three larger ones on the basal half of the joint, followed after a naked space by three or four shorter ones, and these by a pair of divergent slender longer spines. Dactylus about one half the propodus.

Surface everywhere finely tuberculose. Hairs absent from body, and less numerous on legs than in the last. On the legs (as in the preceding species) the hairs are longer and more slender on the upper side. They have on the outer joints a very peculiar structure; along their outer margins are a number of more or less prominent barbs pointing towards the tip of the spine.

As in the last species, there is a tubular organ near the middle of the fourth joint of each leg; but this is relatively six or eight times as long as in the former, and has the appearance of a long, blunt spine.

Color nearly white.

Length of body (without rostrum)	6.0 mm.
" rostrum	3.5 "
" legs	26.5 "

One male (with egg-mass) and one female specimen from locality 891, N. Lat. 39° 46′, W. Long. 71° 10′, 500 fathoms, mud and fine sand. U. S. F. C. 1880.

It seems possible that a larger series may show the two forms described to be only varieties of the same species. But so far as shown by the specimens at hand (which are adult), they appear perfectly distinct, the most striking points of difference being in the "antennæ," rostrum, oculiferous segment, and especially in the armature of the propodus, which is characteristic and pretty constant. There is also a marked difference in the length of the glandular duct of the fourth joint of the legs.

Nymphon grossipes (L.), Chr. Fabr.

A single specimen from locality 306, N. Lat. 41° 32′ 50″, W. Long. 65° 55′, 524 fathoms, which extends its known range of depth more than 100 fathoms. It is of the variety described by Kröyer as *Nymphon mixtum*, the tarsus being much longer than the propodus, and the oculiferous segment long and slender. The oculiferous tubercle is not much elevated, and the auxiliary claws are rather large. Ocelli are well developed. Color nearly white.

Length of body (including rostrum, etc.)	8.0 mm.
" legs	33.5 "

Nymphon Strömii, Kröyer.

Eight specimens (of which three are males with eggs) from locality 306 (with last species), one specimen from 310, N. Lat. 39° 59′ 16″, W. Long. 70° 18′ 30″, 260 fathoms.

The greatest depth previously recorded for this species is 115 fathoms; its range is thus extended downwards more than 400 fathoms. The specimens are in every respect typical, but are not of unusually great size for the species, as shown by the measurements (from an average male specimen).

Length of body (including rostrum, etc.)	12.0 mm.
" rostrum	3.5 "
" legs	75.0 "

Nymphon pallenoides, Sars.

Crustacea et Pycnogonida nova in Itinere 2do et 3tio Expeditionis Norvegicæ Anno 1877 et '78 collecta (Prodromus Descriptionis) < Archiv for Mathematik og Naturvidenskab, Fjerde Bind, Fjerde Hefte, p. 470.

Plate III. Fig. 14.

I have, with some hesitation, referred a single specimen in the collection to Sars's species. While agreeing much more nearly with it than with any other known form, it differs in certain slight characters. These differences probably fall, however, within the limits of variation.

The body is robust, the lateral processes short, and separated by rather small intervals. Oculiferous segment nearly as in N. Strömii, i. e. constricted in the middle, swollen in front and slightly emarginate between the bases of the antennæ. Oculiferous tubercle conical, rather low. Ocelli of unequal size, as in *Pallenopsis*, of a dark chestnut-brown color. Rostrum cylindrical, scarcely as long as the oculiferous segment.

Chelæ of "antennæ" with rather long much curved claws, armed along their opposable margins with about seventeen strong, slightly curved, oblique, *well separated* spines, most of which are of a brownish color; they cease abruptly at some distance from the tip.

Palpi rather small. Basal joint very short; second and third longest, nearly equal; fourth and fifth equal, one half the third.

Accessory legs of the usual structure; spines rather blunt, and with the serrations irregular and ill-defined. Legs with the fourth joint rather swollen and fusiform; sixth joint longest, very slender. Tarsus about one half the propodus, somewhat expanded at its distal end. Propodus (Fig. 14) gently curved. Both joints are armed along the lower margin with rather weak, crowded, appressed spines. Dactylus more than one half the propodus, very acute, *flattened*, with a thin knife-like edge. Auxiliary claws very slender, one fourth to one third the propodus.

The body and appendages are rather hairy, though less so than in *N. hirtum*. The legs are rather robust.

This is a peculiar species, looking like a *Pallene*. Its distinctive characters are the unequal size of the ocelli, short neck and rostrum, small palpi, *short tarsus*, and flattened dactylus. Its nearest ally is, perhaps, *N. hirtum*.

Length of body (including rostrum and abdomen)	7.8 mm.
" rostrum	2.4 "
" legs	28.0 "

A single specimen from locality 338, N. Lat. 38° 18′ 40″, W. Long. 73° 18′ 10″, 922 fathoms. Sars's single specimen was from "Saltenfjord."

EXPLANATION OF FIGURES.

[Plates I. and II. were drawn by Mr. J. H. Emerton, the others by the author.]

PLATE I.

Fig. 1. *Colossendeis colossea*, from one of the smaller specimens, natural size, from the dorsal side.
Fig. 2. *Colossendeis macerrima*, natural size, from the dorsal side.

PLATE II.

Fig. 3. *Scæorhynchus armatus*, natural size, from the dorsal side.
Fig. 4. The same ; lateral view, with the legs omitted.

PLATE III.

Fig. 5. *Colossendeis colossea*, palpus.
Fig. 6. The same ; accessory leg.
Fig. 7. The same ; terminal joints of leg.
Fig. 8. *Colossendeis angusta ;* terminal joints of leg.
Fig. 9. *Colossendeis macerrima ;* palpus.
Fig. 10. The same ; accessory leg.
Fig. 11. The same ; terminal joints of leg.
Fig. 12. The same; spines from accessory legs (the serrations are too fine to be indicated).
Fig. 13. *Colossendeis angusta ;* spines from accessory legs.
Fig. 14. *Nymphon pallenoides ;* terminal joints of leg.

PLATE IV.

Fig. 15. *Pallenopsis forficifer ;* dorsal view of body.
Fig. 16. The same ; terminal joints of leg.
Fig. 17. The same ; lateral view of anterior part of body.
Fig. 18. The same ; chela of "antenna."
Fig. 19. *Pallenopsis longirostris ;* terminal joints of leg.
Fig. 20. The same ; characteristic spines from ambulatory legs.
Fig. 21. The same ; chela of "antenna."
Fig. 22. The same ; cutting edge of chela.

PLATE V.

Fig. 23. *Pallenopsis forficifer* ; glandular duct from 4th joint of ambulatory legs in the male.

Fig. 24. *Pallenopsis longirostris ;* the corresponding duct.

Fig. 25. The same ; outer joints of accessory legs.

Fig. 26. *Scæorhynchus armatus ;* chela of "antenna" in male.

Fig. 27. The same ; chela of female.

Fig. 28. The same ; palpus.

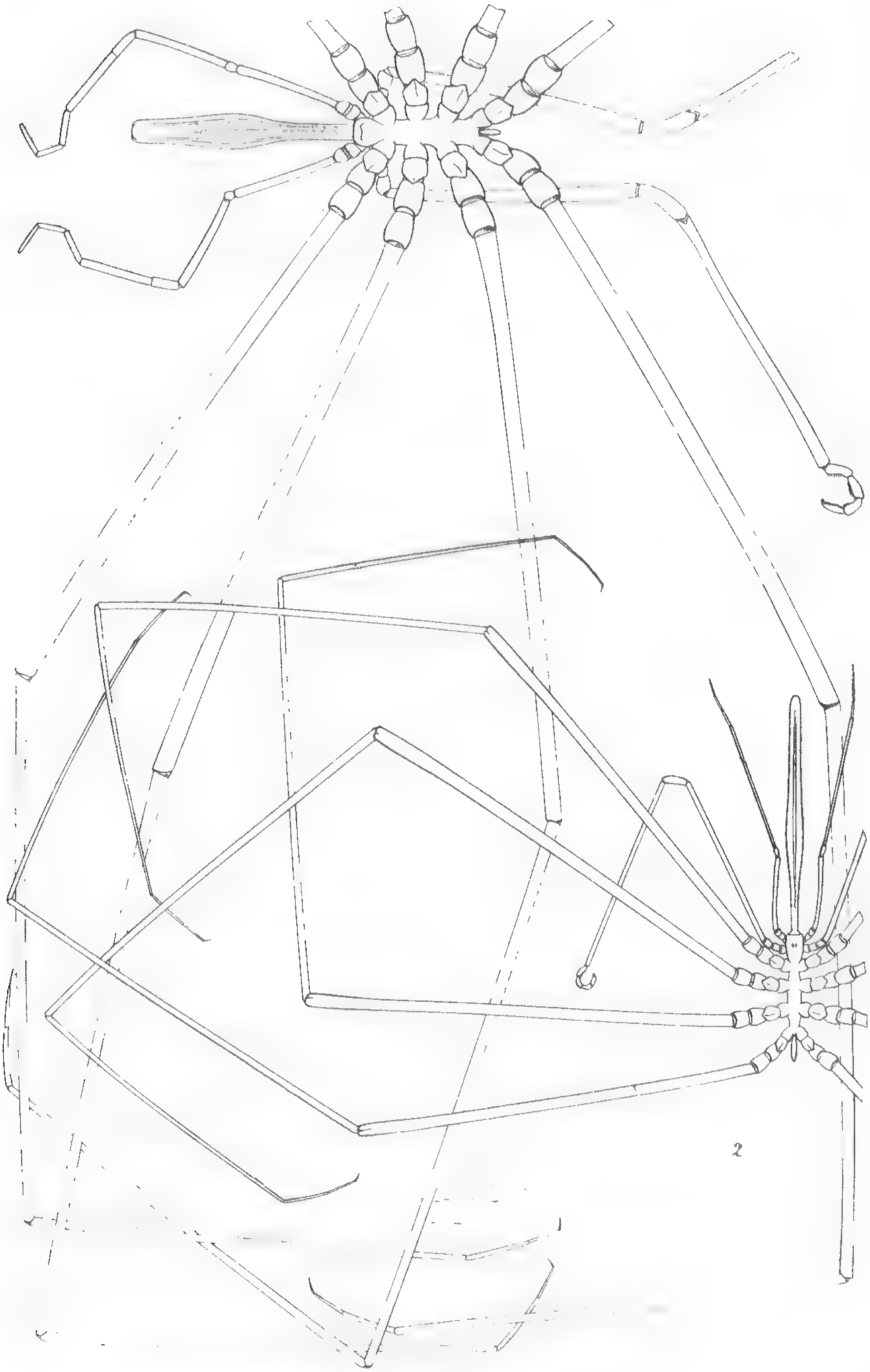
Fig. 29. The same ; terminal joints of leg.

Fig. 30. The same ; outer joints of accessory leg in the female.

Fig. 31. The same ; spine from accessory leg, male.

Fig. 32. *Colossendeis macerrima ;* dorsal view of oculiferous segment showing origin of palpi, accessory legs, and first pair of ambulatory legs.

NOTE. — While this article was going through the press an important paper by Dr. P. P. C. Hoek was received. (The Pycnogonids, dredged during the Cruises of the "Willem Barents" in the Years 1878 and 1879. Niederländisches Archiv für Zoologie, Supplementband I., Erste Lieferung, 1881, Art. II., pp. 1–28, Plates I. and II.) The author states that *Colossendeis* was described in the year 1870; this name has therefore priority over *Rhopalorhynchus.* From the excellent figures given of *Colossendeis proboscidea* it is evident that this species is very distinct from the two species described as new in this report. The huge swollen rostrum, stout short legs and body, closely approximated lateral processes, elevated conical oculiferous tubercle, the proportions of the palpal joints and of the outer joints of the ambulatory legs, and the very acute lanceolate spines of the accessory legs, — all these are strikingly different from the corresponding characters of both *C. colossea* and *C. macerrima.*



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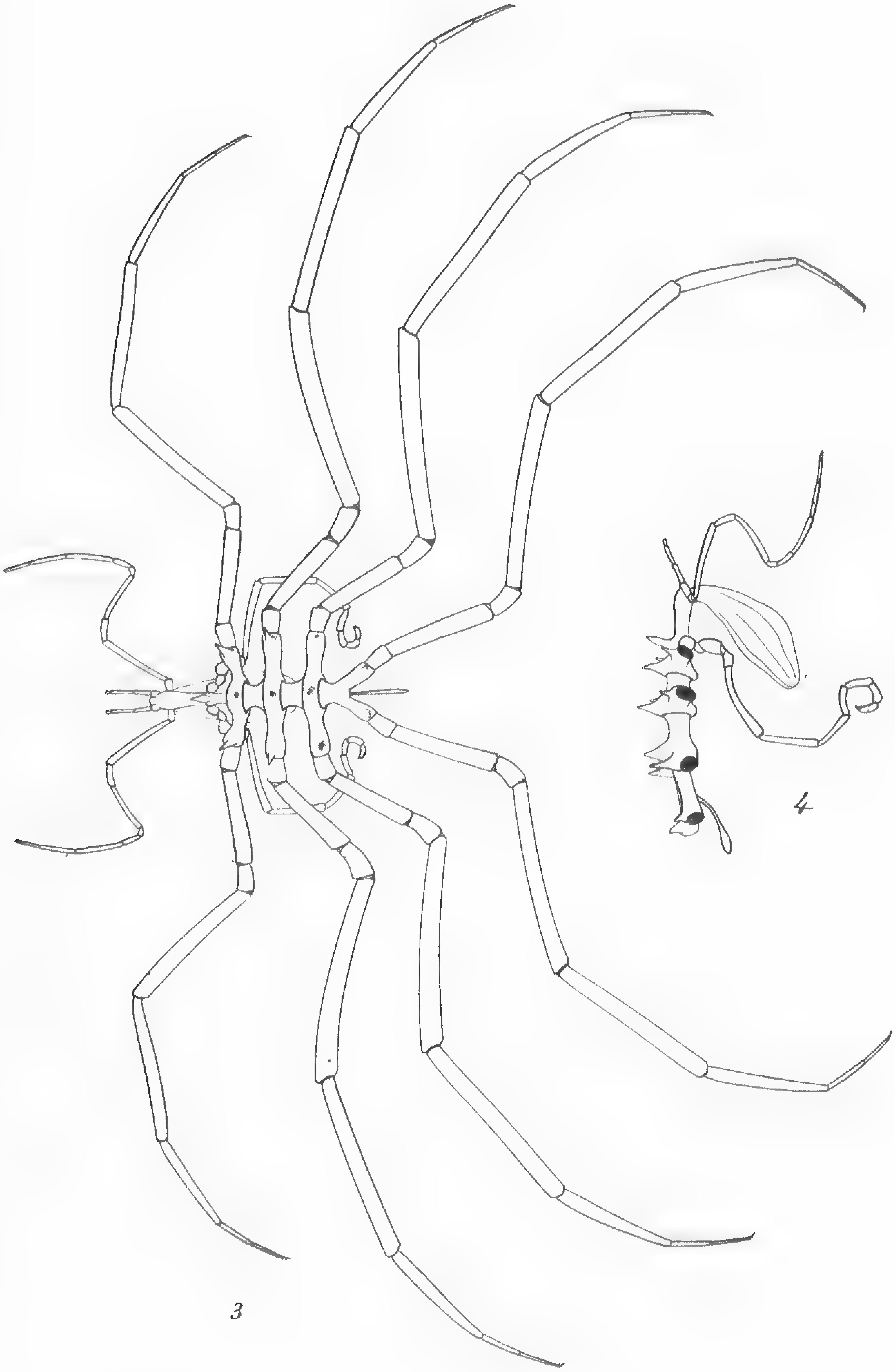

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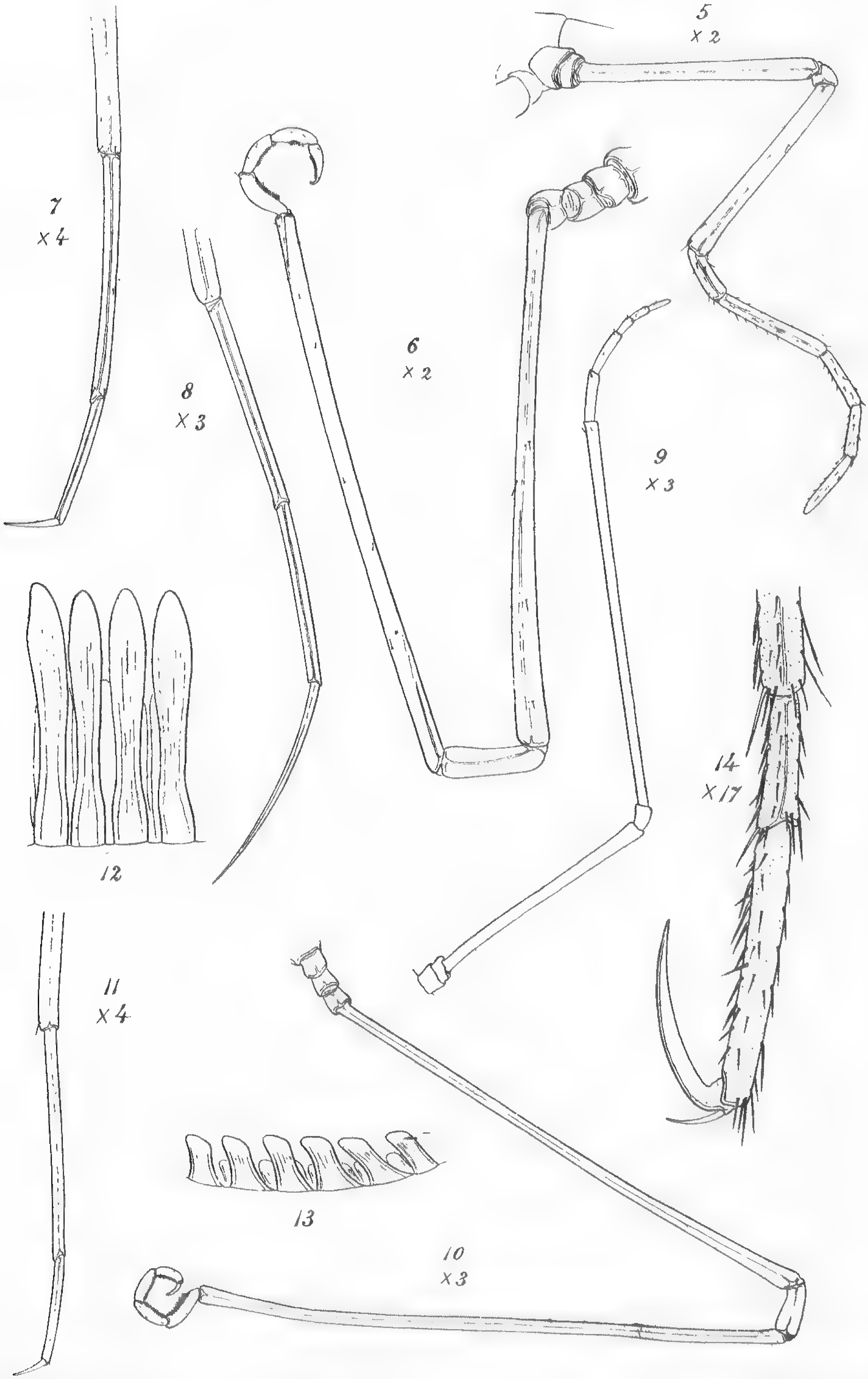

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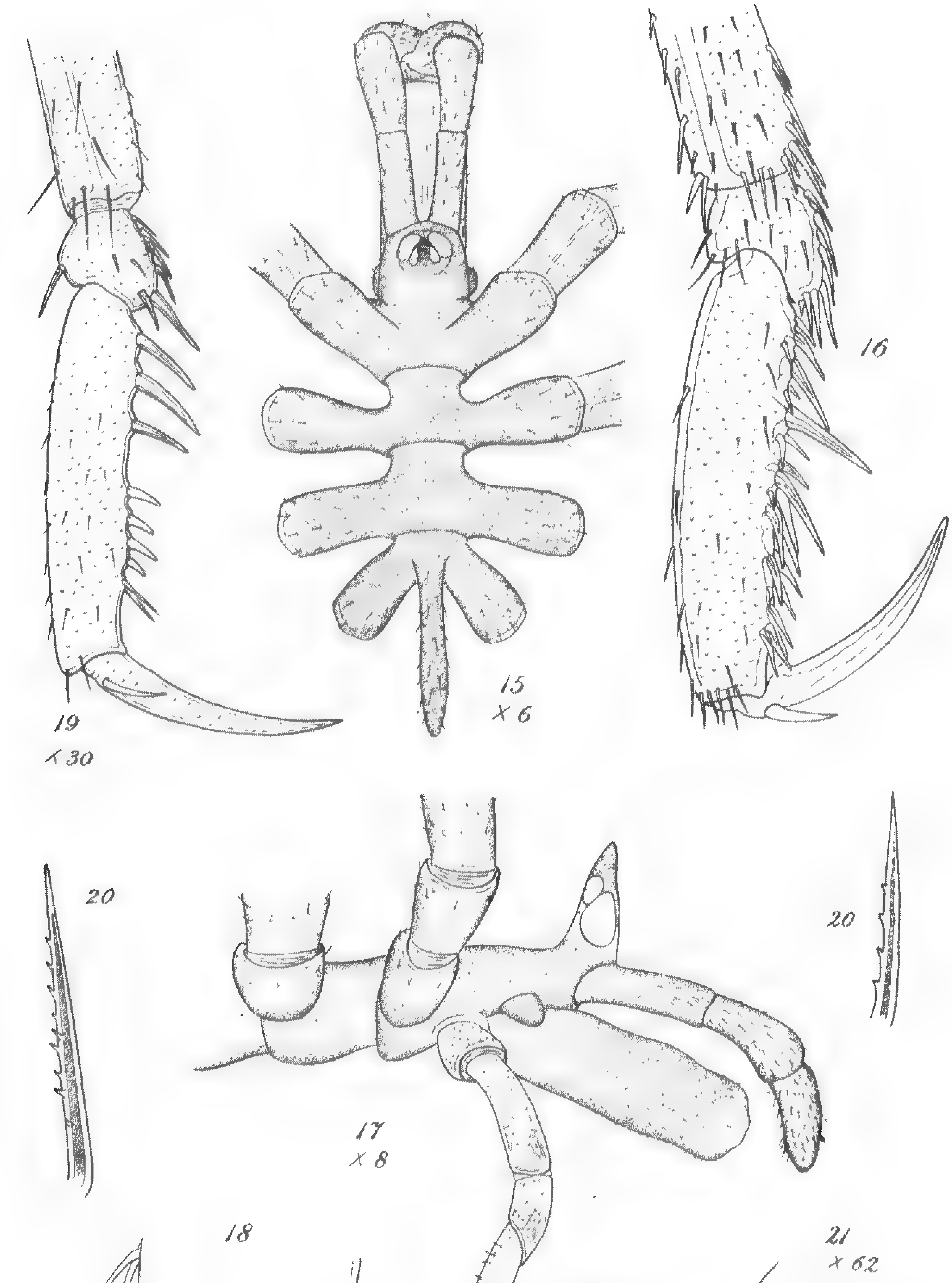
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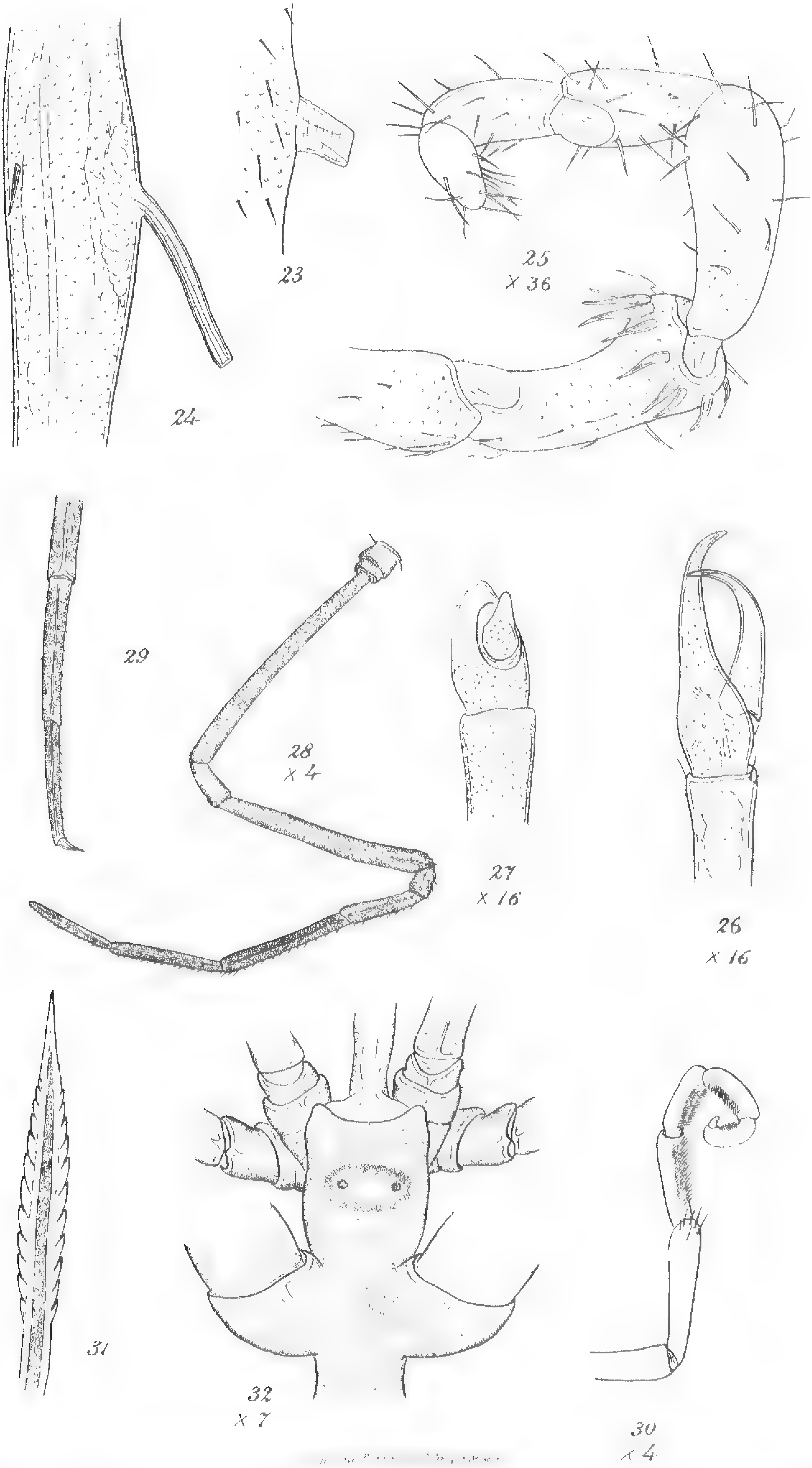
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No. 13. — *On some Crustacean Deformities.* By Walter Faxon.

In November, 1879, the Museum bought of K. D. Atwood, a fish-dealer of Portland, Me., a collection of nearly two hundred deformed lobster claws. The malformations range from slight deformities resulting from incomplete restoration of lost parts, abnormal curvature of the fingers, etc., to such as may, from the enormous development of abnormal outgrowths or the duplication of parts, be truly cálled monstrosities. Some of the most remarkable of these specimens are here described and figured. One (Plate I. fig. 16) from the collection of the Peabody Academy of Science, Salem, Mass., for which I am indebted to Prof. E. S. Morse, a deformed claw of *Callinectes hastatus* from Chesapeake Bay (Plate II. fig. 5) kindly communicated by Dr. S. F. Clarke, of Johns Hopkins University, and an abnormal lateral spine of the carapace of the same species (Plate II. fig. 8) in the Museum of Comparative Zoölogy, are also figured. Most of these irregularities have clearly resulted, as Rösel long ago remarked of similar malformations in the European crayfish, from injuries received after moulting, before the new cuticle had become calcified.

Plate I. Fig. 1 (right chela).* — In this claw the dactylus (*a*) is curved strongly outwards towards the index, and thrust upwards from its normal plane so that it does not meet, but crosses, the index when closed. The prehensile power of the claw is thus destroyed. From the inner border of the dactylus there is developed an enormous flattened process, which divides at the tip into two prongs (*b*, *c*), which are toothed on their opposed edges. Near the middle of the process is a deep scar (*d*), visible on both sides.

There is a specimen quite similar to this, for a drawing of which I am indebted to Prof. S. I. Smith, in the Museum of Yale College, New Haven, Conn.

Plate I. Fig. 2 (left chela). — In this specimen the dactylus is curved and bent from its true plane as in the last specimen. From the inner edge of the dactylus (*a*) arise two diverging horns (*b*, *c*), which are furnished with teeth upon their opposed edges, and simulate very closely the dactylus and index of a normal claw. The dentition of the proximal

* All the figures on Plate I. are *Homarus Americanus*, one half natural size.

horn (*b*) resembles that of the index (*a*), while the teeth of the distal horn (*c*) mark it as the analogue of the index. There is no trace of articulation at the base of either horn.

There are several specimens similar to this in the collection of the Peabody Academy of Science, Salem, and two or three in the collection of the Boston Society of Natural History.

Plate I. Fig. 3 (right chela). — Dactylus (*a*) slightly flexed from the plane of the index and broken off about an inch from the tip. From the inner side of the dactylus, near the fracture (*d*), arise two toothed processes (*b*, *c*), directed forwards, which repeat in form the lost tip of the dactylus and the tip of the index. A short, blunt process, directed upward and forward, projects from the inner margin of the dactylus, at a point a little beyond the middle.

Plate I. Fig. 4 (right chela). — Here the dactylus (*a*), a short distance from its articulation with the hand, is bent at a right angle with its normal trend, and thrown out from the plane of the hand so that it crosses the index when closed. The tip is broken off. From the untoothed margin of the dactylus, near the proximal end, proceed two processes (*b*, *c*) at an angle of about 45° to one another, the distal one (*c*) taking the normal direction of the index. Both of these processes are toothed on their opposed margins, but it is noteworthy that the teeth of the two processes are not directed exactly toward each other, but are inclined a little downward, as if by attraction to the teeth of the thumb. It is curious to observe that the toothed margins of the index and thumb are beset with an uncommonly large number of stiff setæ, and that this character is repeated in the toothed edges of the monstrous processes *b*, *c*.

Plate I. Fig. 5 (left chela). — Similar to Fig. 2, but the processes *b* and *c*, instead of diverging from one another, cross one another near their tips like the index finger and thumb of the claw when closed.

Plate I. Fig. 6 (right chela). — In this claw, unlike what we have seen in those before noticed, the prehensile power has not been lost, the dactylus closing accurately upon the index. Just beyond the middle of the dactylus springs a simple branch directed forwards at an angle of 45° with the long axis of the dactylus. This branch shows no tendency to form teeth.

Plate I. Fig. 7 (left chela). Here the dactylus (*a*) is bent near the middle, at almost a right angle with its normal direction, away from the index, but is thrown very little, if any, from its true plane of motion. It has acquired an abnormal length, and developed two processes from its toothed margin. One of these (*b*) seems to be developed in order to recover the prehensile power which was lost by the distortion of the dactylus. The other (*c*) is broken off near its tip, but corresponds to the process *c* described in the next figure.

There is another dactylus in the collection quite similar to this.

Plate I. Fig. 8 (right chela). — This deformity belongs to the same category as the one represented by the last figure. The dactylus (*a*) is curved strongly away from the index, and lengthened. At *d* is the scar resulting from the wound that probably caused the curvature of the dactylus. An outgrowth (*b*) provided with teeth, and meeting the thumb when the claw is closed, replaces functionally the distorted extremity of the dactylus. In addition to this a second process (*c*) projects at a right angle with the deflected part of the dactylus. This process presents a line of teeth opposite to those on *a*. My reason for considering *a* rather than *b* to be the end of the original dactylus, and *b* and *c* to be secondary outgrowths, comes from the arrangement of the punctures and the striæ on the cuticle of these parts, which seem clearly to show that *b* and *c* are the newer portions.

Plate I. Fig. 9 (right chela). — The index here is split into two parts. The outer (*a*) is toothed on its inner border. The inner (*b*, *c*) is toothed on both margins, and shows a tendency to divide at the end. The lines on the cuticle show that *a* is the original index, and *b*, *c*, a secondary process developed from it. The dactylus does not meet the index when closed.

Plate. I. Fig. 10 (right chela). — The dactylus is abnormally short and curved, and its proximal half produced into a large roundish plate, toothed on its margin, only the basal part of which closes against the index.

Plate I. Fig. 11 (left chela). — A large triangular crest, directed outward and forward from the middle of the outer margin of the penultimate segment. This crest-like process has a strong curve downward.

There are several claws similar to this in the collection.

Plate I. Fig. 12 (right chela). — The inner border of the hand is distorted by a wound (*d*) which has resulted in the outgrowth of a simple, blunt, movably-jointed segment (*a'*), which evidently represents an abortive supernumerary dactylus. On its upper side (the figure shows the lower surface), near the articulation with the hand, is the small spine characteristic of the normal dactylus. The abnormal finger moves in a plane at right angles to the plane of motion of the normal dactylus.

There is another specimen in the collection similar to this, — a left chela with a supernumerary dactylus articulated with the lower face of the hand. The dactylus is lost.

Plate I. Fig. 13 (right chela). — This specimen, like the last, is didactyle. The two dactyli (a, a') are here articulated with the hand side by side; both are thrust to one side, so that they do not close against the index finger. The index itself shows a tendency to duplication; first, by a slight bifurcation at the end; secondly, in the alteration of the tooth-bearing edge into a flat surface, bearing a row of teeth on each margin, directed toward the dactyli, but not met by them on closure.

One can easily believe that this is a congenital monstrosity, while most if not all the others on the plate are more naturally explained as malformations arising from injuries received after moulting.

Plate I. Fig. 14 (right chela). — A severe injury to the hand has resulted in the growth of a process (c) from near the base of the index, which duplicates the index. It is curved downward and inward, under the lower face of the primary index, and furnished with sharp teeth on its inner border. At the base of the toothed margin of the secondary index springs a very small process (b), which shows a line of very minute teeth on its inner border, and seems to be a rudimentary third index. The dactylus does not meet the primary index when the claw is shut.

Plate I. Fig. 15 (left chela). — The dactylus is here bent upward and outward at a right angle, at a point midway between the base and the tip. Two finger-like processes (b, b') arise near one another from the bend of the dactylus. Of these the proximal (b) is a little longer than the distal (b'). Both lie in the normal trend of the dactylus, and present a row of teeth directed towards the teeth of the distal end of the index. When the dactylus is closed, however, the teeth of neither of these processes exactly meet the teeth of the index, but fall on each side.

Plate I. Fig. 16 (left chela). This specimen resembles Fig. 12 of the same plate. From the inner and lower part of the hand arises a process (x) which is not articulated with the main portion of the hand. On its upper surface (turned away from the observer in the figure) is a prominent spine, like those developed along the inner margin of the normal hand. Articulated with the distal extremity of this process is a long, curved, pointed, toothless segment (a'), which is an imperfectly developed duplication of the dactylus (a). On the upper face of this supernumerary dactylus, close to its articulation with the process x, is the short spine characteristic of that point in the normal dactylus. The secondary dactylus almost equals in length the primary one, and, as in the example represented by Fig. 12 of the same plate, swings in a plane nearly at right angles with the plane of motion of the normal dactylus (a). Here, then, in addition to the duplication of the dactylus seen in Fig. 12 (a' indicating homologous parts in the two figures), one sees an imperfect attempt to duplicate the propodite in the process x.

Plate I. Fig. 17 (left chela). — This monstrous claw is similar to the one described and figured by Lucas (*Homarus vulgaris*, in No. 7 of the Bibliography). The dactylus (a) does not close upon the index. From the base of the index there arises from the upper side a very large unjointed appendage, which shows a strong tendency to divide into two branches (b, c), each furnished with a row of teeth. The teeth of the branch b point toward the teeth of the index, while those of the branch c are directed toward the row of teeth on the dactylus when the latter is opened. The tendency seems to be to duplicate the dactylus in b, the index in c. As there is no articulation at the base of the monstrous appendage, the teeth on the branch b are useless, and as the branch c is not in the plane of motion of the dactylus its teeth are likewise functionless. Thus, although these two extra lines of teeth are developed, there are no two in the claw which can be applied to one another.

Plate II. Fig. 1 (*Homarus Americanus*, dactylus of right chela).* — Beyond the middle, this dactylus is bent downward at nearly a right angle. From the upper side are developed two processes (b, b'), which are forked at their ends and furnished with two rows of teeth within. The propodite is lost. Resembles the dactylus of the claw figured on Plate I. fig. 15, but differs in the fission of the processes b and b'.

Plate II. Fig. 2 (*Homarus Americanus*, one of the small chelipeds). — This leg is provided with two chelæ. One of them has the ordinary form and structure, but is bent at a strong angle with the long axis of the leg. The second claw appears to have budded off from an amputated surface of the propodite. It consists of two fingers, which have the form of the normal dactylus and index, but neither is articulated with the other at the base. The two fingers together seem to be morphologically equivalent to a single segment, and represent a two-branched supernumerary dactylus.

Plate II. Fig. 3 (*Homarus Americanus*, left chela). — In this small chela the index is curved sharply upward and deeply channelled on its lower face. Unlike all those previously noticed in this paper, this is a simple malformation through distortion, without any development of accessory parts.

Plate II. Fig. 4 (*Homarus Americanus*, dactylus of right chela). —

* All the figures on Plate II. are of natural size.

Near the base the dactylus divides into two branches, a long one (*a*), which appears to be the distal part of the original dactylus bent so as to make almost a right angle with its proximal portion, and a shorter one which forks at the end (*b*, *c*), and presents a row of teeth on both the inner and outer borders. This shorter branch has the normal direction of the dactylus, and is probably a secondary outgrowth from the primitive dactylus. This malformation resembles that seen in Plate I. figs. 7 and 8. The propodite is lost.

Plate II. Fig. 5 (*Callinectes hastatus*, left chela). — The dactylus is divided longitudinally, nearly to its base, and furthermore the lower of the two branches thus produced forks at a point midway between the base and the tip. One of the prongs of the fork (*c*) inclines toward the upper branch of the dactylus (*b*), the other prong (*a*) is curved downward toward the index finger. The dactylus thus becomes tridactyle instead of monodactyle. The superior branch (*b*) is toothed along its lower edge, the inferior branch along both its upper and lower edges, the teeth of the upper edge being continued along the upper margin of the upper prong (*c*), while the teeth of the lower edge are continued along the lower margin of the lower prong (*a*). All the branches are much shorter than the index finger. The teeth on *a* do not strike against those on the index when the claw is shut. Even the coloration of *a*, *b*, and *c* is like that of the normal fingers.

This monstrosity is like that described and figured by Lucas (*Carcinus mænas*, in No. 7 of the Bibliography). I differ from Lucas in the interpretation of the finger-like parts of the tridactyle segment. He considers *b* to be the normal dactylus, and *a* and *c* to be supernumerary fingers, *a* being the analogue of the dactylus (*b*), and *c* the analogue of the index. From the analogy of this deformity with those represented on Plate I. figs. 1–5, I conceive *a* to represent the original dactylus, and *b* and *c* to be the supernumerary parts, representing the dactylus (*a*) and the index respectively.

Plate II. Fig. 6 (*Homarus Americanus*, right cheliped). — The first segment (coxa) is wanting. The second and third segments, instead of having their normal flattened form, are subcylindrical. The third segment (meros) further shows a tendency to divide, a deep groove running across the distal end. The upper half of this segment repeats antitropically, or in a reverse manner, the lower half: thus the spine *sp* on the anterior border is symmetrically repeated in *sp'*, and the articulating process *z* has its homotype in *z'*. The symmetry of the segment is not complete, however, inasmuch as the two or three short spines on the internal border of the segment (turned away from the reader in the figure) are not duplicated on the homologous margin of the upper half of the segment. Articulated with the distal end of this segment are two carpi (4, 4′). The supernumerary carpus (4′) does not have the exact form of the normal carpus (4), but is slenderer, subcylindrical, and much more spiny. The normal carpus is followed by a propodus and dactylus (5, 6) of the regular form. The supernumerary carpus bears at its distal extremity an abortive propodus (5′) in the shape of a small stump-like segment, bifurcated at the end and armed with a blunt spinous tubercle (y') on its inner margin. This tubercle is homologous with the tubercle y at the proximal end of the external border of the normal propodus. Curiously, the supernumerary carpus is set upon the meros in a position almost the reverse of that of the normal carpus, so that the surface of the accessory carpus and propodus, which is homologous with the upper surface of the regular carpus and propodus, looks in almost the opposite direction. It is as if the abnormal carpus were rotated upon the meros through nearly 180 to the left. It thus comes about that the articular tubercle x' falls on the same side with its homotype, x, instead of on the opposite side, as one would expect from the reversed symmetry of the two carpi. If the two propodal segments (5, 5′) were flexed at the same time, they would move in nearly opposite directions. This distortion seems to me very singular, and I think nothing like it has been observed among the many cases of double legs in insects.

In this specimen we have the nearest approach to complete duplication of a limb yet observed among Crustacea. It reminds one of the monstrosities among insects, frequently described by entomologists, in which the duplication of a leg may involve all the joints down to the trochanter. Whether this monstrosity be congenital, or the result of injuries received later in life, I cannot tell.

Plate II. Fig. 7 (*Homarus Americanus*, left chela). — In this small chela only a rudiment of the index is present, and the dactylus is curled underneath it in the form of a semicircle.

Plate II. Fig. 8 (*Callinectes hastatus*, left lateral portion of the carapace). — The lateral horn, instead of being simple, as in normal specimens, has three spines, one directed forward, outward, and downward, one backward, outward, and upward, and one, very small in size, backward, outward, and downward.

Plate II. Fig. 9 (*Homarus Americanus*, right chela). — The whole of the index as well as part of the hand is wanting in this sadly mutilated claw. The amputated part was evidently removed when the shell was soft, and the wound has completely healed. The dactylus has the form of a cylindrical stunted segment, with an imperfectly developed line of teeth on its cutting surface. The character of the shell leads me to believe that the amputation passed through the line indicated by x, and that the part of the hand distal to this, as well as the dactylus, was reproduced by budding after the wound was received.

Although as early as 1671 the fanciful Von Berniz (No. 1) described and figured two misshapen Crustacean claws, the number of deformities among animals of this class recorded by naturalists is small compared with those observed in insects. Of the thirty cases which I find hitherto recorded, fifteen belong to the European crayfish (*Astacus fluviatilis*).* Leaving out of account the claw represented by Fig. 3 on Plate II., in which we have a simple distortion arising from an abnormal curvature of the fingers, it appears that all the deformities just described belong to the two categories of *monstrositates per defectum* and *monstrositates per accessum.* The former (such as Plate II. figs. 7, 9) are without doubt the result of an accidental amputation of certain parts when the animal was soft-shelled, which parts would probably have been restored after subsequent moults if the animal had lived. Such deformities can hardly be termed true monstrosities, and are of minor interest. The latter, — in which category all the other cases figured will be included, — while accompanied in most cases by a distortion of normal structures, and probably for the most part the result of injuries, present irregular, secondary outgrowths, and are of considerable interest. Among these we have, *first,* cases of duplication of joints in a limb (as in Plate I. figs. 12, 13, 16, Plate II. fig. 6), similar to the many cases described among insects; *secondly,* processes budding out from either the propodus (Plate I. figs. 9, 11, 14, 17) or the dactylus (Plate I. figs. 1–8, 15, Plate II. figs. 1, 4, 5) without any articulation. These processes frequently simulate a true claw in a marvellous manner, e. g. Plate I. figs. 1–5, and are worthy of especial attention. A Crustacean claw is, morphologically viewed, a composite structure involving two segments of the series of seven which are found in the typical leg. The ultimate segment of the series develops teeth along its inner border, and when flexed closes against an immovable toothed process from the penultimate segment. But in these fictitious claws (see Plate I. figs. 2, 5, etc.) the two

* It is remarkable that in the vast number of American crayfishes examined by Hagen in the preparation of his *Monograph of the North American Astacidæ*, no deformities, strictly speaking (see p. 269), were observed.

digits *b*, *c*, are simply processes developed from the ultimate segment of the leg without the least mobility. We have here a structure which is neither morphologically nor functionally a claw, but only a counterfeit of one. What force produces the perfect development of teeth on the opposed edges of these immovable digits, where they cannot be of the slightest service? It is to be observed that these spurious chelæ are always found on the dactylus of claws which have lost their function through the displacement of the dactylus. In such cases there seems to be a futile effort to form a new claw in the way indicated. When one sees how perfectly the dactylus *a* (e. g. in Plate I. fig. 5) is repeated in the process *b*, and the index in the process *c*, even to the details of dentition and setæ, he is at once tempted to call upon Darwin's hypothesis of pangenesis † to explain the resemblances. It will be observed (see Plate I. figs. 13, 16, Plate II. fig. 6) that a movable dactylus may be duplicated on the propodal segment, but in no case is an *articulated* segment developed from the dactylus.

It would be extremely interesting to know whether these monstrous developments are perpetuated throughout the life of the individual, or whether they are got rid of by exuviation. The latter seems hardly probable. Huxley ‡ says the deformities persist, but whether this statement be based on observation or not, I do not know.

As the specimens which have come under my observation are dry, and the soft parts removed, I can record nothing concerning the arrangement of the muscles, nerves, and arteries in those deformed claws. What modifications of the soft parts are brought about by the deformities would be a most interesting subject of study for any one who may come into possession of such specimens in a fresh or alcoholic state.

Almost all the malformations of the hard parts of Crustacea which have been described are confined to the big claws. These claws, being the chief weapons of offence and defence, are much more liable to receive wounds than any other part of the body, and, as before pointed out, deformities such as are described in this paper are undoubtedly in most cases the result of injuries. Rösel (No. 4) speaks of deformities of the rostrum of crayfishes; Herklots (Nos. 11, 15) describes and figures a triple dactylus of the second pair of legs in *Lithodes arctica*; A. Milne

* In such specimens as that figured on Plate I. fig. 8, where the chela has its functional power, the spurious claw is formed in a different way, *a* being the original dactylus. See p. 258.

† The Variation of Animals and Plants under Domestication, Vol. II. Ch. XXVII.

‡ The Crayfish. An Introduction to the Study of Zoölogy, p. 39, 1880.

Edwards (No. 12, see p. 268) records a monstrosity affecting the eye-stalk of *Palinurus penicillatus;* and finally Packard (No. 17) has noticed a deformity of the caudal spine of *Limulus Polyphemus.* The last is probably not so rare as Packard supposes, as I have found two specimens of *Limulus* with similarly deformed spines. There is also in the Museum of Comparative Zoölogy a small deformed specimen of *Limulus Polyphemus,* in which the left side of the gill-bearing segment of the body is marked by a deep concavity and absence of the lateral spines. Further, Figs. 2 and 8 on Plate II. of this paper portray deformities of other parts than the great claws. Fig. 2 represents a monstrous condition of one of the small chelipeds of the lobster, and there is another specimen in the Museum in which the index or immovable finger of the chela of either the first or second pair of legs is double. Another lobster presents a deformity of one of the third pair of maxillipeds, the terminal segment being divided into three lobes. Plate II. fig. 8 represents a deformed lateral spine of the carapace of *Callinectes hastatus.*

Reviewing all the deformities which have been described among Arthropods, I would divide them into five categories, as follows.

Deformities : — *a,* of deficiency.
b, of excess.
c, of transformation.
d, of arrested development.
e, of hermaphroditism.

a. In individuals affected with deformities of this class, certain parts normally present are wanting. Among Crustacea such cases are, as far as I am aware, never congenital, but result from accidental amputation of parts commonly restored by new growths, as before observed.

b. Monstra per accessum. Under this head fall the majority of the monstrosities that have been described among Arthropods. Among insects the numerous cases recorded by Asmus,* Mocquerys,† various contributors to the *Annales de la Société Entomologique de France,* and lately by Jayne,‡ etc., etc., for the most part belong here. In these cases it is commonly the antennæ and legs which are the seat of the monstrous developments, which usually take the form of a duplication, or even triplication, of the appendage. In most cases such double or triple appendages are single at the base, the duplication or triplication

* Monstrositates Coleopterorum, 1835.

† Recueil de Coléoptères anormaux, 1859.

‡ Descriptions of some Monstrosities observed in North American Coleoptera, *Trans. Amer. Ent. Soc.,* VIII. p. 155, 1880.

involving only the distal segments. In the leg, for instance, all the segments beyond the coxa may be duplicated, while in other cases one or two of the distal joints of the tarsi alone will be repeated.

Among Crustacea the examples of a real duplication or triplication of segments in an appendage are very rare. The most marked instance of the kind is afforded by the lobster cheliped figured on Plate II. (Fig. 6) of this paper, in which there is a clear tendency to duplication, at least from the coxa onward. Duplication of the dactylus is seen in Plate I. figs. 12, 13, 16, and in Plate II. fig. 2.* Jäger (No. 10, p. 38, figs. 12, 13) has described and figured a claw of *Uca una* with two dactyli, and a similar case in *Eriphia spinifrons* has been published by Herklots (No. 15, figs. 6, 7, 8).

On seeing such a specimen as the *Prionus* figured by Jayne,† in which the tibiæ and tarsi are duplicated in all the legs, and perfectly symmetrical on the two sides of the body, one cannot doubt that in insects at least these monstrosities by duplication may be referred to a *vitium primæ conformationis*, and in examples from Crustacea such as those represented by Fig. 13, Plate I., and Fig. 6, Plate II., of this paper, it is very probable that we are dealing with a monstrosity which is not the result of injury.

Most of the *deformities by excess* among Crustacea, however, do not result from a true duplication of more or fewer segments of an appendage, but from the outgrowth of unarticulated processes of various shapes, often furnished with teeth, and simulating true segments. But in such cases, e. g. where there is a process that has the form of a supernumerary dactylus, we find that it is commonly developed from the normal dactylus, and devoid of any articulation, instead of joining by an articular surface with the propodus as a true supernumerary dactyle would do.

In this category the *Astaci* noticed by Emmanuel Rousseau (No. 8) and Eugène Desmarest (No. 9) will also be included. In these abnormal female specimens an extra pair of vulvæ were present on the basal segment of the fourth pair of legs, the oviduct of each side dividing into two branches after leaving the ovary.

c. Monstrosities of this class result from an organ being replaced wholly or in part by another organ. Such monstrosities are common in plants, but exceedingly rare in animals. A few have been described

* There are two or three lobster claws with two dactyli in the collection of the Peabody Academy of Science, Salem.

† *Op. cit.*, Plate IV. fig. 12.

among Arthropods. I am indebted to Dr. Hagen for references to the following cases among insects: —

1. *Prionus coriarius* with two perfect legs in place of the elytra.*

2. *Cimbex axillaris* with a claw like those of the tarsi, on the end of the left antenna.†

3. *Zygæna filipendulæ* with one of the hind legs replaced by a wing.‡

Among Crustacea the only example of this kind of monstrosity is the *Palinurus penicillatus* described by A. Milne Edwards (No. 12), in which a flagellum like one of those of the antennules is developed from the centre of a rudimentary cornea on the end of the eye-stalk.

Monstrosities of this class are especially interesting on account of their bearing on the morphology of organs. If we admit teratological conditions as evidence of homology, as the botanists do in the case of the metamorphosis of the parts of a flower, we must regard the wings and legs of insects, as well as the eye-stalks and antennæ of Crustacea, as morphological equivalents,§ a view which is not supported by the mode of development of these parts in the embryo.

* Saage, *Preussische Provinzial Blätter*, Vol. XXII. p. 191, 1839; *Stettin. Entomol. Zeitung*, Vol. I. p. 48 (cited from Hagen, On some Insect Deformities, *Mem. Mus. Comp. Zoöl.*, Vol. II. No. 9, p. 22, 1876).

† G. Kraatz, Ueber eine merkwürdige Monstrosität bei *Cimbex axillaris* (Hymenopt.), *Deutsche Ent. Zeits.*, XX. Heft II. p. 377, Taf. I. fig. 8 *a*, *a*, *b*, 1876.

‡ N. M. Richardson, *Nature*, Vol. XVI. p. 361, August 30, 1877. Dr. Hagen tells me that he is sure he has seen another similar case recorded, but he has lost the reference to it.

§ Dr. Hagen (in his lectures) also adduces evidence from comparative anatomy of insects to support the theory of the homology of wings and legs. Most authors (Gegenbaur, Lubbock, Fritz Müller, etc.) who have discussed the question of the morphology of insects' wings consider them to have originated independently of the ventral appendages, as tracheal gills or otherwise. Balfour (Treatise on Comparative Embryology, Vol. I. p. 337, 1880) even doubts whether the antennæ of insects have the same morphological value as the succeeding appendages! None of these writers take notice of the above-mentioned monstrosities in this connection.

With reference to the homology of eye-stalks and antennæ in Crustacea, A. Milne Edwards (No. 12), Gerstaecker (Bronn's Klassen und Ordnungen des Thier-Reichs, V., 1 Abt., 1 Hälfte, pp. 202, 343, 1868), and Rolleston (Forms of Animal Life, pp. 113, 119, 1870) bring forward the abnormal development of an antennulary flagellum from the eye-stalk in the *Palinurus* mentioned above as proof of the homology of the eye-stalk with the antenna, a view long ago advanced by Savigny and H. Milne Edwards. The embryologists on the other hand, as Claus and Fritz Müller, generally deny the equivalence of the parts in question. E. van Beneden says of the eye-stalk in *Mysis*: "Ce pedicule n'apparait aucunement comme les autres appendices, et paraît avoir une autre valeur morphologique." (*Bull. Acad. Roy. de Belgique*, 2 Ser., *d.* The existence of dimorphism among the males of the genus *Cambarus,* first observed by Agassiz, has been fully discussed by Hagen (No. 16), who conjectures from the resemblance of the "second form" males to young individuals and the small development of the internal organs of generation, that they are sterile. In *Lupa* and some other genera of *Brachyura* dimorphism occurs in the females, many full-grown specimens having a narrow and acute abdomen, instead of the broad, roundish abdomen of the normally developed individuals. Agassiz learned from anatomical examination that the females with a narrow triangular abdomen were sterile.

These sterile forms may be properly classed among abnormal variations caused by arrest of sexual development.*

e. Hermaphroditism.—While numerous cases of hermaphroditic insects have been put on record by entomologists, I can find but two undoubted cases of hermaphroditism among Crustacea outside of those groups in which it is the normal condition, viz. the Cirripeds and parasitic Isopods. The first case is that of a lobster (*Homarus vulgaris*) described and figured by F. Nicholls, in 1730, in the Philosophical Transactions of the Royal Society of London (No. 3 of the bibliographical list appended to this paper). In this specimen the right half of the body was female, the left half male, as regards both internal and external organs. The second case is a similar one of *Eubranchipus vernalis,* lately described by Gissler (No. 18).

E. von Martens (No. 14) has published an account of three specimens of *Cheraps* from Adelaide, with openings in the first segment of the third pair of legs answering to the sexual apertures of the normal female, coexisting with the normal male sexual orifices in the first segment of the fifth pair of legs. An examination of the internal parts showed the coiled *vasa deferentia* of the normal male opening out through the apertures in the fifth pair of legs. No ovary or duct leading to the openings in the third pair of legs was detected. The specimens had lain in alcohol some seven years, however, so that the evidence against the existence of any internal female organs cannot be taken as positive. Similar open-

XXVIII., 1869). Gegenbaur (Grundzüge der vergleichenden Anatomie, 2te Aufl., p. 397, 1870) also excludes the eye-stalk from the series of appendages.

* Among insects the *Phalæna heteroclita* [*Bombyx monacha ?*], described by O. F. Müller (an imago with the head of the larva), is probably to be explained as a deformity arising from arrest of development. In other cases recorded of the retention of the larval head by a perfect insect, the head of the imago was probably within the head of the larva, which was not cast off at the time of transformation. See Hagen, On some Insect Deformities, *Mem. Mus. Comp. Zoöl.*, Vol. II. No. 9, 1876.

ings were seen in the third pair of legs of male *Parastacus pilimanus* and *P. Brasiliensis.*

Abnormal cases of hermaphroditism in Decapods acquire a peculiar interest in the light of the recent discovery of hermaphroditism as the normal condition in another group of the higher Crustacea, viz. the parasitic Isopods.* Mayer has even found indications of hermaphroditism in *Cirolana* and *Conilera,* genera of free Isopods.†

* Bullar, The Generative Organs of the Parasitic Isopoda, *Jour. Anat. and Physiol.*, XI. p. 118, 1876. Id., Hermaphroditism among the Parasitic Isopoda, *Ann. Mag. Nat. Hist.*, 4 Ser., XIX. p. 254, 1877.

Paul Mayer, Ueber den Hermaphrodismus bei einigen Isopoden, *Mittheilungen aus der Zoolog. Station zu Neapel*, I. p. 165, 1878.

† *Op. cit.*, p. 177.

CAMBRIDGE, March, 1881.

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Chela Astaci marini monstrosa alia. *Op. cit.*, Observatio CI., p. 175 (fig.) The figure is reproduced in MICHAEL BERNHARD VALENTINI'S *Museum Museorum*, Zweyter Theil, p. 177. 1714.

(This "*chela monstrosa et tota petrefacta*" evidently does not belong to a lobster.)

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(Right side *female*, left side *male*. See p. 269.)

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6. GEORG JÄGER. Zwei Beispiele missgebildeter Krebsscheeren. *Archiv für Anatomie und Physiologie*, Jahrgang 1826, p. 95, Tab. II. fig. 3, 4. Figures reproduced by the same author in No. 10, fig. 1, 3.

(*Astacus fluviatilis*).

7. H. LUCAS. Notice sur quelques Monstruosités observées dans des Crustacés appartenant aux Genres *Carcinus*, *Lupa*, *Homarus* et *Astacus*. *Annales de la Société Entomologique de France*, 2e Série, Tome II. p. 41, Pl. I. 1844.

8. EMMANUEL ROUSSEAU. *Annales de la Société Entomologique de France*, 2e Série, Tome VI. p. 481. 1848.

(Female *Astacus fluviatilis* with two pairs of vulvæ on the base of the third *and fourth* pairs of legs.)

9. Eugène Desmarest. Note sur une Disposition anormale des Organes Génitaux observée dans *l'Astacus fluviatilis* Fabricius. *Annales de la Société Entomologique de France*, 2e Série, Tome VI. p. 479, Pl. 13. 1848.

(Female *Astacus fluviatilis* with four vulvæ disposed as in the one described by Rousseau. Two oviducts on each side pass from the genital apertures to unite in a common trunk before reaching the ovary.)

10. G. Jäger. Vergleichende Darstellung der missgebildeten Scheeren des gemeinen Flusskrebses (*Astacus fluviatilis*) und der missgebildeten Scheere einer Krabbe (*Cancer uca Linn. Uca Una Latr.*) aus Surinam. *Jahreshefte des Vereins für vaterländische Naturkunde in Würtemberg*, Jahrhg. VII., p. 33, Pl. I. 1851.

11. J. A. Herklots. Notice Carcinologique. *Bijdragen tot de Dierkunde. Uitgegeven door het Koninklijk Zoologisch Genootschap Natura Artis Magistra*, Amsterdam, Deel I. Afl. 5, p. 37, fig. B. 1852. Figure reproduced by the same author in No. 15.

(Deformed dactylus of the second pair of legs of *Lithodes arctica*.)

12. Alphonse Milne Edwards. Sur un Cas de Transformation du Pédoncule oculaire en une Antenne, observé chez une Langouste. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, Tome LIX. p. 710. 1864.

(Antennulary flagellum developed from the end of the eye-stalk in a *Palinurus penicillatus* from Mauritius.)

13. Sidney I. Smith. A Fiddler-Crab, with two large Hands. *The American Naturalist*, Vol. III. p. 557, 1869.

Notes on Amerian Crustacea. No. I. Ocypodoidea. *Transactions of the Connecticut Academy of Arts and Sciences*, Vol. II. p. 133, 1870.

(Notice of an anomalous specimen of *Gelasimus pugnax* Smith, in which the chelipeds were nearly equal in size and form.)

14. E. von Martens. *Sitzungs-Bericht der Gesellschaft naturforschender Freunde zu Berlin* am 18 Jan., 1870, p. 1.

(Male specimens of *Cheraps plebejus*, *Parastacus pilimanus*, and *Parastacus Brasiliensis*, with openings in the first segment of the third pair of legs representing the genital orifices of the female. See p. 269.)

15. J. A. Herklots. Misvormingen bij Schaaldieren waargenomen. *Tijdschrift voor Entomologie, uitgegeven door de Nederlandsche Entomologische Vereeniging*, XIV. Jaargang, p. 69, Pl. I. 1871.

(Malformation of .the claw of *Xantho punctulatus*, *Eriphia spinifrons*, and the deformed dactylus of *Lithodes arctica*, previously published by the same author in No. 11.)

16. Hermann A. Hagen. Monograph of the North American Astacidæ. *Illustrated Catalogue of the Museum of Comparative Zoölogy, at Harvard College* [*Memoirs*, Vol. II.], No. III. p. 21 *et seq.* 1871.

(Variation of form accompanying sterility (?) in *Cambarus*, *Lupa*, etc. See p. 269.)

17. A. S. PACKARD, JR. The Development of Limulus Polyphemus. *Memoirs of the Boston Society of Natural History,* Vol. II. p. 201, fig. 36. 1872.

(Forked caudal spine.)

18. C. F. GISSLER. Description of a Hermaphroditic Phyllopod Crustacean (Eubranchipus). *The American Naturalist,* Vol. XV. p. 136, fig. 1–3. 1881.

(*Eubranchipus vernalis,* showing lateral hermaphroditism both in the external claspers, etc. and in the internal genital organs. The internal female organs are but poorly represented, — although a single egg was observed in the ovarial string, — while the internal male organs have their normal size and shape.)

EXPLANATION OF THE PLATES.

[NOTE. — A detailed description of the specimens figured in the plates will be found on pp. 257-264. Unless otherwise stated, the specimens are in the Museum of Comparative Zoölogy, and were obtained from K. D. Atwood, Portland, Me. Those figured on Plate I. are reduced one half. Those figured on Plate II. are of the natural size.]

PLATE I.

Fig. 1. *Homarus Americanus*, right chela.
" 2. " " left "
" 3. " " right "
" 4. " " right "
" 5. " " left "
" 6. " " right "
" 7. " " left "
" 8. " " right "
" 9. " " right "
" 10. " " right "
" 11. " " left "
" 12. " " right "
" 13. " " right "
" 14. " " right "
" 15. " " left "
" 16. " " left "
(From Mus. Peabody Acad. Science, Salem, Mass.)

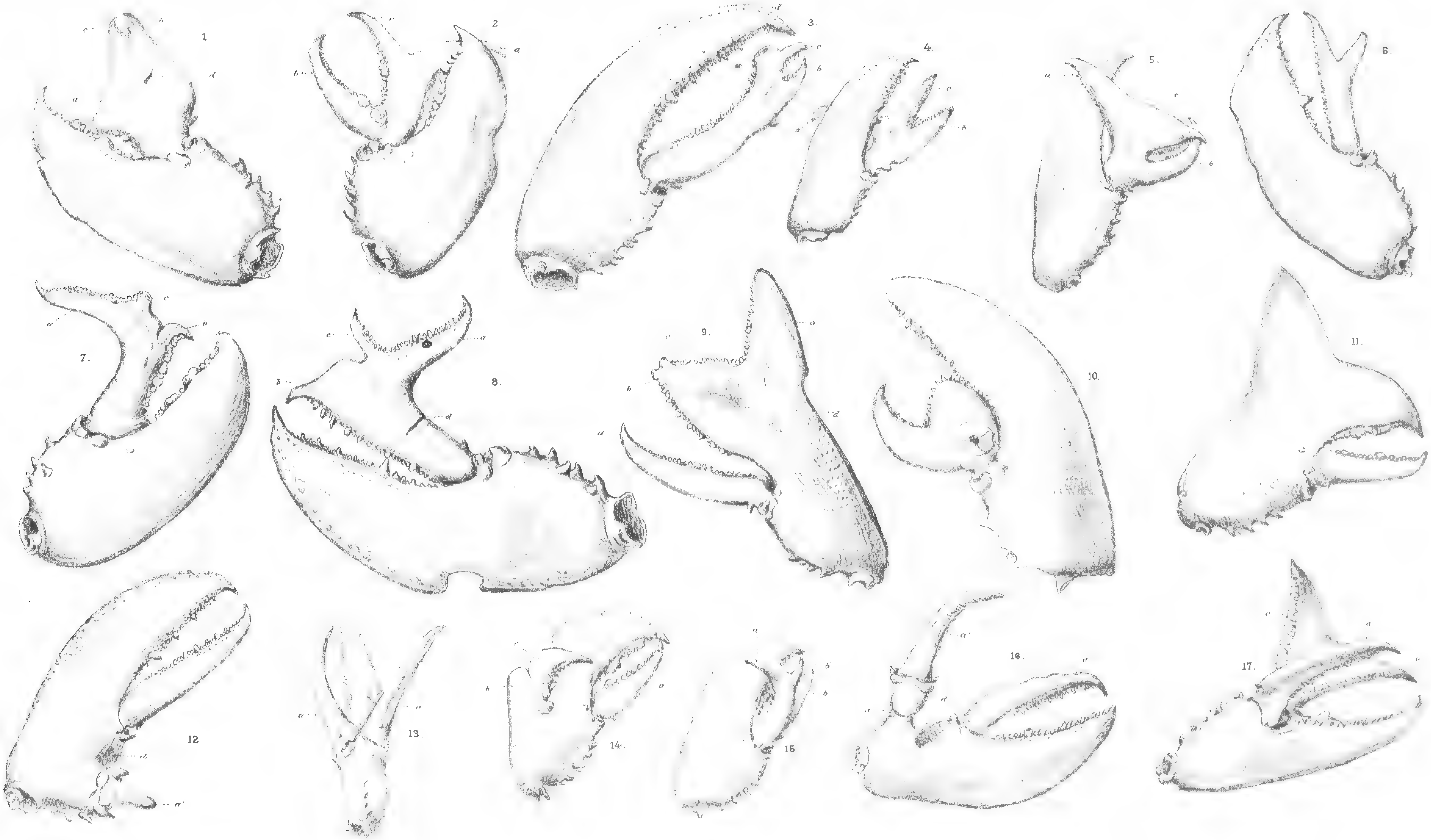
" 17. *Homarus Americanus*, left chela.

PLATE II.

Fig. 1. *Homarus Americanus*, dactylus of right chela.
" 2. " " one of the small chelipeds.
" 3. " " left chela.
" 4. " " dactylus of right chela.
" 5. *Callinectes hastatus*, left chela.
(From Chesapeake Bay; coll. Dr. S. F. Clarke.)

" 6. *Homarus Americanus*, right cheliped.
" 7. " " left chela.
" 8. *Callinectes hastatus*, left lateral part of the carapace with branched spine.
(Coll. M. C. Z.)

" 9. *Homarus Americanus*, right chela.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No. 14. — *The Devonian Insects of New Brunswick.*

By Dr. H. A. Hagen.

Having lately had occasion to examine anew the venation of Neuroptera with special reference to their affinities with the older fossil insects, I have made a detailed comparison of the majority of the types of the Devonian Insects with the Neuroptera and Pseudoneuroptera of the present day. The conclusions at which I have arrived from this study are radically different from the views entertained by Mr. Scudder. I have thought that the simplest method of presenting my views would be to give them in the form of a detailed review of the last memoir on the subject by Mr. Scudder.

This memoir is a part of the "Anniversary Memoirs of the Boston Society of Natural History," 1880, 4to, p. 41, Plate I. The fragments of the six described insects were discovered in 1862 by the late Prof. C. F. Hartt, and are considered to be the six oldest known fossil insects. They are especially interesting, not only as the most ancient representatives of their class yet discovered, but as (p. 30) "nearly all are synthetic types of a comparatively narrow range," filling in some way the gaps between more or less widely separated families and orders of the actually existing insects. Indeed, four of them are reported to belong to new families, all of a synthetic character: Atocina, Homothetidæ, Cronicosialina, Xenoneuridæ. The prominent value of those fragments justifies a large number of more or less detailed communications by the same author since 1865, which are now followed by this very elaborate memoir, with entirely new and improved figures, and with a number of important conclusions as the final result of his work. It must be acknowledged that these conclusions would be of the greatest importance for the history of the evolution of insects, if the descriptions, the determinations, and the statements by the author could be accepted without any further reserve. Of course, they must be able to stand the most severe tests, if they are to be accepted. The obvious importance of these questions, and the fact that I have studied through many years the living and fossil insects of the families to which these fragments belong, may explain why I give here in detail the result of my studies, and my objections to the views of the author. Science needs truth, and consists in truth. Otherwise no advance in the solution of the great question here treated — the evolution of this class of insects — is possible. The facts to be registered for such an advance must be unquestionable facts, and that is not the case with those stated in this publication.

"As the simpler Devonian Insects have certain special relations with the Ephemeridæ, their description is preceded by an account of the wing structure of the modern Mayflies, as a basis of comparison." (p. 4.)

The simple fact that none of the fossils has any relation whatsoever to the Ephemeridæ, is a sufficient objection to the descriptions and conclusions relating to this family. Some exceptions made by the author in the account of the wing-structure of Lachlania and Oligoneuria prove erroneous after a careful examination of the insects. The mediastinal vein is present in Lachlania and Oligoneuria, and the scapular vein terminates at the tip in Lachlania. The intercalary vein of Coloburus is to be found also in *Ephemerella gibba* and in *Heptagenia Bellieri.*

Platephemera antiqua.

The specimen is in excellent condition; I have before me the type, Fig. 9. This species has nothing whatsoever to do with the Ephemeridæ, and I remark here that my deliberate determination is not based upon a difference of opinion, but merely on the simple evidence of facts. The specimen is a part of the apical half, without the tip, of a wing of a gigantic dragonfly. Fig. 10 shows on the hind margin the end of the sector medius, where the margin is often a little retracted. Nearer the tip (in Figs. 9 and 10) the sector nodalis and sub-nodalis run one near the other, as commonly in dragonflies. No pterostigma is visible; but we find it wanting or sometimes slightly indicated in other fossil species. The statement of the author, that "the marginal vein runs close to, but does not form, the margin," confirms my determination, as just in Odonata this structure is very common, but not in Ephemeridæ. The conclusion of the author that a general similarity of structure of *P. antiqua* "with Dictyoneura may be conceded," will not be shared on comparing the figures of the species published by Goldenberg. The existing part of the wing compared with the known fossil species from Solenhofen cannot be larger than about one third of the whole length of the wing. To judge from the termination of the sector nodalis, something less than 20 mm. of the tip are wanting, much more than is indicated by the outline of the figure. To judge from the distance and the direction of the mediana and the sector nodalis to the base, about 20 mm. must be wanting to the nodus. It would be the largest known species, the length of the wing about 100 mm. There is no character in the fragment for a closer determination except the suddenly narrowed second cubital space ; and this is not mentioned by the author. We find a similar arrangement in Stenophlebia.

Gerephemera simplex.

I have not seen the type, but only the unfigured and undescribed reverse of a small portion, belonging to the Boston Society of Natural History. Therefore my opinion is based chiefly upon Fig. 8 and the very detailed description. The description differs from the figure (of natural size) in the statement (p. 13) that "the merest fragment of the costal border 2 to 3 mm. long is preserved," whereas the figure has it 8 mm. long, with two oblique cross veins and indications of quadrangular cells between them. As these cells are not mentioned in the description, they were perhaps not present in the specimen. These cells would be of prominent importance if they were really situated near the costal border. But it is not uncommon to find in badly preserved fossil wings some parts folded up and appearing in the wrong place. If they are present as figured, they could be explained in another manner, which will be quoted hereafter. The specimen is unfortunately not on a level, but upon a somewhat rounded ground-floor, and shows a kind of sulcus, which certainly does not belong to the wing. Therefore all parts of the wing situated in the sulcus are not quite in a natural position. The statement of the author (p. 14), "that the mediastinal vein is never a depressed one in such insects," should have been just the contrary.

The fragment represents a diagonal part of the middle of the wing of a dragonfly. What is called "the uppermost vein of the lower set" is probably the sector medius, and the vein running a little below in the same direction is the sector brevis. All the parallel veins above those sectors, which give so much trouble to the author, are easily to be accounted for in the venation of the Odonata. The fragment is very rudimentary, and it seems by no means certain that the two veins indicated on the tip (if figured in the right place) belong to the marginal veins. Perhaps they may belong to the sector nodalis and sub-nodalis. The determination of Fig. 8 cannot go farther than to state that the specimen belongs to the Odonata and to a very large species. All important characters for the determination of the genus, and even of the subfamily, are to be found in parts of the wing which are not here preserved. It seems, to judge from the veins which are visible, that the small part called the front margin was situated behind the nodus. Species are known with an irregular venation just behind the nodus, but not of a similar irregularity. Considering the other characters agreeing with the Odonata, this peculiar feature would not indeed warrant us in excluding this species from this family. But it is more probable that the small part does not belong to the front margin, and similar cells are likewise found in Isophlebia.

The new family Atocina, created by the author for this specimen, and the whole discussion about it, cannot be accepted as it is. In his first letter, in 1865, the author states that "this species borrows some striking points of the peculiar wing-structure of the Odonata, and combines with them those of families remote from that, and even belonging to a distinct section of the Neuroptera, exhibiting to our view a synthetic type combining the Pseudoneuroptera and the Neuroptera. I am unable to find in the figure and in the new description any character not agreeing with the Odonata, except the dubious cells of the front margin, and these are nowhere mentioned in the description.

The small portion of the reverse, which I have examined, is a triangular fragment 20 mm. long and 2 to 8 mm. broad. It belongs to a part of the base of the wing, which is not preserved in Fig. 8. It does not reach the costal margin, and contains several sectors crossed by a straight vein (sector trigonuli inferior) similar to the arrangement in Isophlebia. The reverse strongly confirms my determination. This sector is to be found only in Odonata, never in Ephemeridæ. The specimen was probably a hind wing.

Lithentomum Harttii.

I have examined the type (Fig. 3) of the Boston Society of Natural History. It is very difficult to determine the fragment. A part of the base and of the lower part of the wing lies below (or perhaps above, as some fragments seem to indicate) a Calamites. The base with the stronger triangular basal attachment of the wing is seen on the other side of the plant. There are strong indications that the other wing of the same side lies below this wing, and the margin of it a little before the margin of the fragment that is figured. A deeper linear impression on the opposite side of the Calamites makes it probable that here the upper wing of the other side of the insect may be in the slab. The fragment is 36 mm. long; the breadth (at 24 mm. from the base) is 15 mm., where a very short portion of the hind border is to be seen. Farther off the hind border is broken, so that at 32 mm. from the base only 9 mm. of the breadth is preserved. The veins are very faint, and in some parts the veins of the underlying wing make them somewhat uncertain. In the costal space some very weak oblique cross veins are visible. What is to be seen of the longitudinal veins, of their forms, and of some oblong cells between them, which are contracted at both ends, reminds us of the venation of the actually living Sialids, and more of the Chauliodes type. The base of the externo-median shows above and below an arrangement which is to be found in the wing of Chauliodes. The other parts of the venation give no help for a nearer determination. The paucity of the off-shoots of the scapular branch is by no means exceptional, as the author believes; the living Chauliodes possesses only one, the character claimed by the author for his new family Cronicosialina. Therefore I do not understand why we should consider the fossil species as a precursor of the Sialina, before a better knowledge of the species supports this suggestion. Fig. 3 is less accurate than the other figures.

Homothetus fossilis.

This interesting fragment, of which I have not seen the type, shows near the tip of the wing some irregularities of the venation, as if a fragment of another wing lay above or beneath the specimen. The author declares it to belong to a family allied to the Sialina. A small basal vein considered to be homologous with the arculus of the Odonata induced him to consider the specimen as a connecting link between the Neuroptera and Pseudoneuroptera. Therefore a new synthetic family, Homothetidæ, is proposed.

It is obvious that the wing belongs to the Sialina, and is perhaps a fore wing. But then the basal vein is easily explained. The fore wings of Corydalis possess a horny basal part, ending in front in a straight line; here a softer membrane connects the wing with the basal part. When broken off here — and the formerly published figure makes this more evident — the basal vein is explained. Some Hemerobidæ show an arrangement similar to the arculus, without giving us a right to consider them as a synthetic type. The fossil fragment recalls some of the figures published long ago by Westwood as belonging to a genus but little known, Orthophlebia, related to Corydalis, but the living species possess a larger number of transversals. Perhaps some of the restored connections in the missing parts of the wing will have to be transferred in another way. A more exact determination cannot be made; we may state, however, that the fragment shows nothing foreign to the Corydalis type, excepting a smaller number of transversals.

Xenoneura antiquorum.

I have examined the type of Fig. 7. This is the interesting wing which was formerly supposed to exhibit at the base a character to be compared only to the stridulating organ of some male saltatorial Orthoptera. The wing seems to have been very delicate, and is a very difficult object. I have not seen the type of Fig. 6, and Fig. 5 (p. 41) is stated to be a composite drawing made up from both specimens. The "small fragment at the extremity of the anal vein and the cross vein," and "the larger apical piece with part of the lower margin," are drawn from the reverse. Both are to be seen in the obverse (type of Fig. 7), but not so distinctly. The whole wing is shown by numerous parallel and very close longitudinal lines to have been placed beneath or above some part of a plant; on account of these lines some parts of the venation are less distinguishable. What is more important is, that the wing of the opposite side is lying upon the one which is figured, not exactly in the same direction, but nearly so. Its hind margin is a little below the hind margin of the main wing. This fact is not mentioned by the author. The quadrangular part of the hind margin, enclosed in the figure by broken lines, belongs to the upper wing, of which the sectors are elevated; the corresponding sectors of the main wing are depressed. This fact once accepted, we find some small remains of the upper wing on the basal part of the main wing near the scapularis, where the fork (of the author) is to be seen. The difficulty increases on account of the cross veins of the marginal field (Fig. 5); one of them, about the middle of the wing, is very conspicuous, — I may say, considering the delicacy of the other parts of the venation, too conspicuous. Indeed, examined with the compound microscope, this vein projects outside the margin as much as a quarter of the breadth of the field. Therefore it does not belong to the wing. Several fainter cross veins — I have counted six — are therefore very doubtful, the more as some are only ~~to~~ be seen near the margin. A little before the end of the costal field the mediastina turns in a sudden curve to the scapularis. The transversal vein going from the same spot to the costalis is not straight, as represented in the figure, but waved, much finer, perhaps forked, with indications of similar veins near by. Shortly before its end the costalis seems to start externally in a very acute angle another vein. This doubtful vein may belong to another wing, or it may be a dilatation of the costalis, or it could represent very long cilia, of which indications seem to appear in other places. The fork, as it is called by the author, I believe to be represented only by a fragment of the wing, which lies above the main wing. The two veins nearer to the base (the external one believed to be the internal branch of the fork) belong to the main wing. The length of the main wing is about 15 mm., the breadth 5 mm., probably a little smaller than the dimensions given by the author (18 mm.). Formerly the insect was said to have an expanse of wings of two or two and a half inches. Of the basal part of the marginal field the marginal half seems to be broken off. I purposely say seems, because the slab shows here some indications of breaking; but the costalis can be followed around the curve and partly on the narrowed part of the field. There are here indications of a recurrent vein, which is common in some Hemerobidæ. A light impression around the wing on the slab suggests perhaps the presence of another wing, a little larger and bluntly pointed. If this should be the case, the main wing would represent a hind wing, and what is to be seen of the base speaks in favor of it. The venation of the base is much disturbed by the circular elevated lines formerly supposed to represent a stridulating organ; a view now formally retracted by the author. It might be, as he states, a malformation on the base of the wing, or produced by something lying underneath. Perhaps the circular lines are the margins of the telescoped segments of the abdomen, which, if present at all, must have been here. In this case the more crystallized parts of the stone are easily explained, as such occurrences are found commonly in the abdomen of Odonata and other insects from Solenhofen, and in the mouth parts of Eugereon

I am not able to classify the insect except that it belongs to the Neuroptera (sensu strictiori). There is nothing in the venation similar to Pseudoneuroptera. When the mediastina ends before the tip and is connected with the costalis and scapularis in Pseudoneuroptera, the upper connection is entirely different, and by a straight cross vein, which is not to be found here. Only some Pteronarcys belonging to the Perlidæ have a connection somewhat similar to that of the Xenoneura. What we see of the venation is more nearly allied to the Chauliodes type than to any other. The mediastinal field is somewhat related to Sialis, but more to some Mantispidæ, to the genera Trichoscelis and Symphrasis, namely, to the costal half of *S. varia.* The venation has no similarity to Coniopteryx, Raphidia, and Ephemera, and bridges in no way the gulf between the Neuroptera and Pseudoneuroptera, as stated by the author.

Dyscritus vetustus.

A very small fragment, said to belong to the hind margin of a wing, with two series of eight square-shaped cells between three veins, one of them branched at the base, is all that is preserved. It can belong to Orthoptera, to Pseudoneuroptera, or to Neuroptera, but it is too insignificant to be identified. Similar cells are found in Isophlebia.

The conclusions to be made from the results of my examination of the Devonian Insects are the following : —

1. The known fragments belong to five species.

Two are Odonata, belonging to the Pseudoneuroptera. The very imperfect fragments do not permit us to say more than that some characters are similarly represented in the gigantic species of the Solenhofen state, in Stenophlebia and in Isophlebia. These characters are the suddenly narrowed second cubital space in Platephemera, and the straight sector trigonuli inferior in Gerephemera, neither mentioned by the author.

The three other fragments belong to the Neuroptera, and probably all to the Sialina. One of them is more related to the Corydalis type, the two others to the Chauliodes type.

2. None of them have any relation to the Ephemeridæ, as is asserted by the author.

3. None of the Devonian Insects are of a synthetic type. Besides that such a type could hardly be derived from the wing only of living species, these specimens are too fragmentary for such conclusions.

4. The previous stages of all were probably aquatic.

5. No related species is known from the North American carboniferous strata. Probably all insects known from them are terrestrial. Till a more complete account is given of Euephemerites, it cannot be considered to be an insect wing.

6. Concerning the four families proposed by the author, one, the Atocina, is out of the question, because belonging to the Odonata. The other three are based upon extremely vague characters, which are not justly to be considered family characters at all.

The study of fossil insects, and especially the study of fragments of fossil insects, is doubtless extremely difficult. The most detailed knowledge of the living fauna is indispensable, and, as the specialist will inevitably find, the actual literature is entirely insufficient for the details needed for comparison, and a very complete collection, such as does not yet exist here for any group, is necessary in order to avoid grave errors.

But assuming that both are at hand, — a very detailed knowledge and a very complete collection, — it is obvious that at the present time both can exist only for some specialty, and not for the whole class of insects. Every attempt to go beyond those limits commonly entails errors in a geometrical progression. Undoubtedly the smallest fragment of an insect belonged to a species, to a genus, to a family. Nevertheless it cannot be an advantage to science, it cannot mark a progress for science, if such fragments are named and determined as a species, and as possibly belonging to such and such a genus and family. It is evident from the "insignificant fragment" of *Dyscritus vetustus*, discussed at length in page 22, that any scientific judgment, and therefore any scientific classification of it is impossible. It can belong to several different families, and it is quite as probable that it belongs to Platephemera, or to Gerephemera, or to some entirely different insect. The fragment is so insignificant, that, if the whole fauna of the Devonian Insects was known, it would be impossible to ascertain its place with certainty. Therefore such names are not only useless, but a hindrance to science. Ten years ago the Rev. Mr. Eaton, of Croydon, England, expressed the same opinion in strong terms; but Mr. Scudder (p. 11) objects to these strictures in the most emphatic manner, without giving any satisfactory reasons.

Palæontological works are and can only be studied and understood in our days by specialists, and for special groups. Others must take the conclusions for granted, which they are not able to control, for want of special knowledge. I must frankly declare that it is for the interest of science that such nomenclature should be discontinued, as it is sure to be with a little knowledge of facts.

CAMBRIDGE, March, 1881.

Additional Remarks upon a Fern in the same Slab with Platephemera.

Some doubt has been expressed as to the age of those insects by Dr. Geinitz (Sitz. ber. Isis, 1866, p. 22), who considered them as probably belonging to the Carboniferous formation from the fact that Platephemera is on the same slab with a fern characteristic of that formation, *Cyatheites* (*Pecopteris*) *plumosa*. Mr. Scudder (Geol. Mag., Vol. V. p. 174) says: "If, however, Dr. Geinitz's determination of this species were certainly correct, it would not invalidate the statements of geologists, who refer this deposit to Devonian, for several species of plants are stated to be common to this formation and to the Carboniferous."

This may be: nevertheless an important gap is still here to be filled. Mr. Scudder does not mention the occurrence of this plant together with Platephemera, nor is that done in the geological note (p. 40) by Prof. Dawson. Among the plants belonging to bed No. 7, no species of Pecopteris or Cyatheites is enumerated by Prof. Dawson. I cannot in the Canadian literature at my command find this fern quoted as occurring in the Devonian formation.

I applied to a prominent authority, Mr. Leo Lesquereux, for information, and had the following answer: "*Pecopteris* (*Cyatheites*) *plumosa* is a common species of our middle Carboniferous, found in the strata immediately above the millstone grit. As yet it has not been found in the subconglomerate, still less in the Devonian of the United States, which is separated from the conglomerate by the subcarboniferous or the Mauch Chunk red shale, very thick formations. This species is even described by White and Fontaine from the Permo-carboniferous. Some of Prof. Dawson's species from the Devonian in Canada are found in the true Carboniferous of the United States. We have no positive means of ascertaining the geological relation, as the identity of some of Prof. Dawson's species is as yet uncertain. This is about all I can say on the subject. For common species like *P. plumosa*, which is the equivalent of *P. dentata*, the geological distribution is generally well marked between the European and North American series. We have, however, some types, which are found here in the lower Carboniferous, even in the subconglomerate, while in Europe they have not been found until now at a lower stage than the Permian and the Trias. This difference, however, cannot be taken into account in comparing the plants of the United States Coal measures with those of Canada. From this you cannot derive any reliable conclusion. *Pecopteris plumosa* in the Devonian would appear to me quite an anomaly, but not more so than to see it in the lower Permian."

I suppose that everybody will agree that the plant in question should be studied and determined with the utmost care to avoid any further doubt concerning the age of those interesting insects.