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Rathbun, R.





SPINACIDÆ.

266. *Squalus acanthias* Linnæus.*Squalus americanus* (Storer) Gill.

19275.	Wood's Holl, Massachusetts.	19921.	Eastport, Maine.
19276.	" "	19923.	" "
19277.	" "	21855.	George's Bank.
19278.	" "	22316.	Gloucester, Massachusetts.
19279.	" "	22660.	" "

267. *Centroscyllium Fabricii* (Rhdt.) Müll. & Henle.

21622.	Lat. 42° 40' N., Lon. 63° 50' W., 250 fths.	23065.	Banquereau.
21686.	George's Bank.	23066.	"
21836.	Off Gloucester, Massachusetts.	23067.	Lat. 44° 20' N., Lon. 57° 57' W.
22281.	" "	24257.	Lat. 43° 25' N., Lon. 60° W., 250 fathoms.
22637.	Le Have Bank.	24300.	Lat. 42° 37' N., Lon. 62° 55' W., 200 fathoms.
22743.	Lat. 43° 56' N., Lon. 59° 04' W.	24392.	" " "
22744.	Banquereau.	24705.	Lat. 43° 27' N., Lon. 51° 47' W., 200 fathoms.
22749.	Sable Island Bank.	24706.	" " "
22878.	Lat. 44° 33' N., Lon. 53° 48' W.	25105.	Grand Banks.
22879.	Lat. 44° 23' N., Lon. 53° 25' W., 200 fths.	25106.	"
22880.	Lat. 44° 38' N., Lon. 57° 09' W., 200 fths.	25111.	Lat. 42° 46' N., Lon. 65° 18' W., 200 fathoms.

268. *Centroscymnus cœlolepis* Bocage & Capello.

21621.	Lat. 42° 40' N., Lon. 63° 50' W., 260 fths.	23064.	Banquereau.
21833.	Grand Banks.	24295.	Lat. 43° 25' N., Lon. 60° W., 180 fathoms.
21835.	"	24298.	Lat. 42° 15' N., Lon. 58° 52' W., 250 fathoms.
21905.	Banquereau.	24299.	Lat. 42° 37' N., Lon. 62° 55' W., 200 fathoms.
22282.	"	24711.	Lat. 44° N., Lon. 52° 50' W., 250 fathoms.
22668.	Grand Banks, 200 fathoms.		

MYXINIDÆ.

269. *Myxine glutinosa* Linnæus.

21679.	Le Have Bank.	23087.	Lat. 44° 18' N., Lon. 58° 24' W., 150 fathoms.
22894.	Lat. 44° 45' N., Lon. 53° 54' W., 400 fths.	23088.	Grand Banks.
22895.	Lat. 45° 03' N., Lon. 54° 30' W., 85 fths.	23089.	Lat. 44° 17' N., Lon. 58° 10' W., 120 fathoms.
22896.	Grand Banks.	23090.	" " "
22897.	"	24204.	Grand Banks.
23085.	Eastern part of George's Bank, 46 fths.	24367.	Banquereau.
23086.	" " "	24725.	Lat. 44° 30' N., Lon. 58° 07' W., 200 fathoms.

WASHINGTON, May 1, 1880.

THE LITTORAL MARINE FAUNA OF PROVINCETOWN, CAPE COD, MASSACHUSETTS.

By RICHARD RATHBUN.

The species enumerated in the following list were, unless otherwise stated, all collected by the United States Fish Commission during the summer of 1879. As the list, however, represents only a few days' collecting, at intervals when the steamer was not available for dredging purposes, it must be considered as far from complete, especially as regards the smaller forms, while no attempt has been made to include the groups of Entomostraca, Foraminifera, &c. Considering the fact that very little has yet been published concerning the shore animals of this region, I feel justified in offering the list in its present imperfect form in

order to supply more definite information as to the so-called boundary line separating the Northern and Southern New England fauna.

Rock exposures are entirely wanting about the outer extremity of Cape Cod, and the sandy areas which compose the most of that region are generally of so pure a character as to offer little inducement to animal life in the way of food. The littoral fauna of Provincetown and vicinity is therefore less rich in species than a more diverse region would be. Nevertheless a more diligent search than has hitherto been instituted would undoubtedly result in the finding of many species additional to those given below. Prof. H. E. Webster, who spent the entire summer of 1879 in collecting and studying especially the shore annelids about Provincetown, obtained many new forms not included in this list.

The localities examined in 1879 were about as follows: The inner beach of the cape in front of the town of Provincetown, from the dike on the south to Wood End on the north and from high-water to low-water mark, including the eel-grass areas lying directly off the beach and the broad sand-flats in front of and behind it; the inner beach at Long Point; the piles of the wharves, especially those at the ends of the long steamboat and railroad wharves; and the outer beaches at Wood End, Race Point, &c. A few interesting species obtained at Wellfleet by Professor Webster are included in the list, and I am also indebted to him for material from about Provincetown. The identifications of species are only partly mine. Prof. A. E. Verrill furnishes the lists of worms and Nudibranchs; Prof. S. I. Smith has kindly identified the Amphipods and more difficult Decapods; and Mr. Sanderson Smith the more critical species of Mollusks. Mr. O. Harger has also examined the Isopods. In addition to the species contained in the list, a species of *Chironomus* in the larval stage was found abundantly on the shore, and one or more species of mites were common among Hydroids. Of the one hundred and fifty-seven species included in the list, all but twenty-one were previously known to range both to the north and south of Cape Cod. Of the species whose range has been extended, thirteen belong properly to the fauna of Southern New England and seven to that of Northern New England. The southern species are as follows: *Pallene empusa*, *Pinnixa chætopterana*, *Gebia affinis*, *Mæra levis*, *Microdeutopus grandimanus*, *Amphithoë longimana*, *Chelura terebrans*, *Caprella geometrica*, *Leptochelia algicola*, *Sigalion arenicola*, *Sthenelais picta*, *Anthostoma robustum*, and *Leptosynapta roseola*. The northern species are: *Leptochelia cæca*, *Praxilla zonalis*, *Tetrastemma vermiculus*, *Planocera elliptica*, *Embletonia fuscata*, *Stiliger fuscata*, and *Edwardsia sulcata*. The only new littoral species discovered by the Commission, so far as the collections have been worked up, is *Edwardsia pallida*.

Excepting in a few necessary instances the synonymy of the species has been omitted, but references have been given in nearly all cases to American publications in which the synonymy and range of the several species and other information concerning them are discussed.

NEW HAVEN, CONN., April 8, 1880.

PYCNOGONIDA.

Pallene empusa Wilson, Trans. Conn. Acad. Arts and Sciences, vol. v, p. 9, pl. iii, figs. 2a to 2g, 1878.—*Phoxichilidium maxillare* Smith, Inv. of Vineyard Sound, p. 544, 1874 (non Stimpson).

Found amongst the eel-grass, low water to $\frac{1}{2}$ fathom. Former localities: Vineyard Sound (U. S. F. C., 1871) and Noank, Conn. (U. S. F. C., 1874).

MEROSTOMATA.

Limulus Polyphemus Latreille. Smith, Inv. V. S., p. 580, 1874.

Very common along the entire inner shore of the cape, in the vicinity of Provincetown. The living specimens were usually encountered partly buried in the sand, near low-water mark. They sometimes attain a very large size in this region, but the majority of the specimens seen were from small to medium size and females. All the larger specimens collected were males. The cast skins or exuviae were sometimes so abundant that they nearly made up the little ridge of *débris* running along the upper part of the beaches.

Two specimens, both females, were obtained in the act of molting; one was living, the other dead. In the case of the latter the operation of throwing off the old skin had advanced considerably, allowing us to measure accurately the increase in the size of the carapax for the past year. Of the exuvia, the greatest width of the carapax was 57^{mm}; length of carapax along the median line, 35^{mm}; distance between the tips of the spines surmounting the compound eyes, 31.5^{mm}; length of compound eye, 3.5^{mm}. The carapax of the newly expanded animal had a width of 67^{mm}; length, 45^{mm}; distance between the spines of compound eyes, 43^{mm}; length of compound eye, 5^{mm}. The living specimen had only broken slightly through the outer skin, so that but one measurement could be made without destroying it. The width of the old carapax was 124^{mm}, of the new 141^{mm}; but as the latter had suffered contraction in alcohol, it must have been larger originally.

DECAPODA.

Gelasimus pugnax Smith, Trans. Conn. Acad., vol. ii, p. 131, 1870; *ibid.*, vol. v, p. 33, 1879; Inv. V. S., p. 545, 1874.

Very abundant on the salt marshes and upper part of the beaches, between the town and Wood End Light. Also found at the same place by Prof. S. I. Smith and Mr. O. Harger, in 1872.

Gelasimus pugilator Latreille. Smith, Trans. Conn. Acad., vol. ii, p. 136, 1870; *ibid.*, vol. v, p. 33, 1879; Inv. V. S., p. 545, 1874.

A few specimens only of this species have been noticed from Provincetown; they were found on the beach near the dike in 1872, by Smith and Harger.

Pinnixa chætopterana Stimp., Ann. Lyc. N. H., New York, vol. vii, p. 235, 1860.

Wellfleet, 1879; collected by Prof. H. E. Webster, who found it in great abundance in the tubes of *Amphitrite ornata*, on the flats near the town.

Platyonichus ocellatus Latr. Smith, Inv. V. S., p. 547, 1874; Trans. Conn. Acad., vol. v, p. 33, 1879.

Extremely abundant everywhere along the inner shore, in the vicinity of Provincetown, at low water and deeper. Large numbers were observed to be molting during August and the last of July, and fresh exuviae were very common all through the latter half of the summer. One small specimen obtained while molting, and preserved in alcohol, afforded the following measurements: length of carapax in the exuvia, 35^{mm}; width, 42^{mm}; length of freshly expanded carapax, partly contracted in alcohol, 38^{mm}; width, 47^{mm}. The largest specimen taken on the shore measured: length of carapax, 71^{mm}; width, 86^{mm}. On August 16, and during one or more succeeding days, the young were seen swimming at the surface in countless numbers, but how far from the shore they extended was not determined; they were very plentiful about the end of the long steamboat wharf. They varied in length of carapax from about 11^{mm} to 16^{mm}. September 3 they were again abundant, but less so than on the former occasion, and they remained nearer the shore, or at least closer to the bottom. At this time they were from 18^{mm} to 23^{mm} long.

Carcinus mænas (Linné) Leach. Smith, Trans. Conn. Acad., vol. v, p. 34, 1879.—*C. granulatus* Smith, Inv. V. S., p. 547, 1874.

Collected by Smith and Harger, 1872.

Panopeus depressus Smith, Proc. Bos. Soc. N. H., vol. xii, p. 283, 1859; Inv. V. S., p. 547, 1874; Trans. Conn. Acad., vol. v, p. 37, 1879.

Collected by Smith and Harger, 1872.

Panopeus Sayi Smith, Proc. Bos. Soc. N. H., vol. xii, p. 284, 1859; Inv. V. S., p. 547, 1874; Trans. Conn. Acad., vol. v, p. 37, 1879.

Found abundantly in the eel-grass off the dike, and also collected by Smith and Harger, 1872.

Cancer irroratus Say. Smith, Trans. Conn. Acad., vol. v, p. 38, 1879.

Common; shore, at low water.

Libinia emarginata Leach. Smith, Trans. Conn. Acad., vol. v, p. 45, 1879.—*L. canaliculata* Smith, Inv. V. S., p. 548, 1874.

Very abundant at low water, Provincetown; several very large males were also obtained from Wellfleet Harbor, the largest measuring: length of carapax, 113^{mm}; width, excluding spines, 103^{mm}.

Eupagurus longicarpus (Say) Stimp. Smith, Inv. V. S., p. 549, 1874; Trans. Conn. Acad., vol. v, p. 47, 1879.

Very abundant.

Gebia affinis Say. Smith, Inv. V. S., p. 549, 1874.

This species was not collected at Provincetown, but was obtained from the flats at Wellfleet by Prof. H. E. Webster, in 1879, and seems to be abundant there. This is the first time it has been recorded from the north side of Cape Cod.

Crangon vulgaris Fabr. Smith, Inv. V. S., p. 550, 1874; Trans. Conn. Acad., vol. v, p. 55, 1879.

Very common along the shore.

Palæmonetes vulgaris (Say) Stimp. Smith, Inv. V. S., p. 550, 1874; Trans. Conn. Acad., vol. v, p. 88, 1879.

Only a very few specimens of this species were collected, although it was diligently sought for. These were found in the eel-grass in front of the town and off the dike.

SCHIZOPODA.

Mysis stenolepis Smith, Inv. V. S., p. 551, 1874; Trans. Conn. Acad., vol. v, p. 103, 1879.

A few specimens only were collected; they were from the eel-grass in front of the town.

AMPHIPODA.

Orchestia agilis Smith, Inv. V. S., p. 555, 1874.

Very abundant on the beaches, under dead sea-weeds, etc.

Talorchestia longicornis (Say) Smith, Inv. V. S., p. 556, 1874.

Very abundant on both the outer and inner beaches, burrowing deeply into the sand, about high-tide level.

Talorchestia megalopthalma (Bate) Smith, Inv. V. S., p. 556, 1874.

Associated with the preceding.

Hyale littoralis (Stimp.) Smith, Inv. V. S., p. 556, 1874.

Collected in 1879; and also in 1872, by Smith and Harger.

Calliopius læviusculus (Kroy.) Boeck. Smith, Inv. V. S., p. 557, 1874.

Found upon the beach at Long Point among stranded sea-weeds.

Gammarus locusta (Linné) Fabr., Systema Entomologia, 1775. Gould, Inv. Mass., ed. I, p. 334, 1841. Smith, Bull. U. S. Nat. Mus., No. 15, p. 139, 1879.—*G. ornatus* Edwards, Ann. des Sci. Nat., tome xx, p. 367, 1830; Hist. Nat. des Crust., tome iii, p. 47, 1840. Smith, Inv. V. S., p. 557, 1874.

Only a few specimens of small size were obtained from the eel-grass in various places. The scarcity of this species at Provincetown is probably due to the absence of rocks and of much rock-weed, which together form its favorite grounds. A comparison of European with American specimens has enabled Professor Smith to establish the identity of *G. ornatus* and *G. locusta*.

Gammarus annulatus Smith, Inv. V. S., p. 557, 1874.

Shore and flats at low water, and eel-grass; abundant.

Gammarus mucronatus Say, Journ. Phila. Acad., vol. i, p. 376, 1818. Smith, Inv. V. S., p. 559, 1874.

Shore and flats at low water; very abundant.

Mœra levis Smith, Inv. V. S., p. 559, 1874.

In the eel-grass off the dike. Not hitherto recorded from north of Vineyard Sound.

Microdeutopus grandimanus Smith.—*Autonoë grandimana* Bruz., Skand. Amphip. Gamm., p. 26, 1859.—*Microdeutopus minax* Smith, Inv. V. S., p. 562, 1874.

On the shore at low water, in the eel-grass off the dike, and among the sea-weeds on the piles of the wharves. Formerly known on the American coast only from Vineyard and Long Island Sounds.

Amphithoë longimana Smith, Inv. V. S., p. 563, 1874.

Found at low water and in the eel-grass in one-half fathom. Previously known only from south of Cape Cod.

Corophium cylindricum (Say) Smith, Inv. V. S., p. 566, 1874.

Eel-grass, one-half fathom.

Chelura terebrans Philippi. Smith, Proc. U. S. Nat. Mus., vol. ii, p. 232, 1879.

Abundant in old submerged piles of wharves, associated with *Limnoria lignorum* and *Teredo navalis*. First recorded from America in the paper of Professor Smith referred to above, but previously found by him at Wood's Holl in 1875.

Caprella geometrica Say, Journ. Acad. Nat. Sci., Phila., vol. i, p. 390, 1818. Smith, Inv. V. S., p. 567, pl. v, fig. 20, 1874.

In the eel-grass, one-half fathom, and also obtained from floating sea-weeds in Provincetown Harbor. Hitherto recorded from south of Cape Cod only, but discovered by the Fish Commission at Quahog Bay, Maine, in 1873.

ISOPODA.

Jæra albifrons Leach. Harger, Proc. U. S. Nat. Mus., vol. ii, p. 158, 1879.—*Jæra copiosa* Stimpson, Mar. Inv. Grand Manan, p. 40, 1853. Harger, Inv. V. S., p. 571, 1874.

Very abundant on the shore between tides, under loose stones and other objects; and also in the eel-grass in very shallow water.

Chiridotea cœca (Say) Harger, Am. Journ. Sci., III, vol. xv, p. 374, 1878.

Shore, low water; only a few specimens collected.

Idotea irrorata (Say) Edwards. Harger, Inv. V. S., p. 569, 1874; Proc. U. S. Nat. Mus., vol. ii, p. 160, 1879.—*Idotea tricuspidata* Desm., Dict. des Sci. Nat., tome xxviii, p. 373, 1823.

Very abundant on the shore, on piles of wharves, in the eel-grass, and swimming at the surface amongst floating sea-weeds.

Idotea phosphorea Harger, Inv. V. S., p. 569, 1874.

Occasionally found swimming at the surface in Provincetown Harbor, and also upon the beach, with stranded sea-weeds.

Epelys trilobus (Say) Smith, Inv. V. S., p. 571, pl. vi, fig. 28, 1874. Harger, Proc. U. S. Nat. Mus., vol. ii, p. 160, 1879.

Moderately abundant; shore, between tides, and in the eel-grass, one-half fathom; only specimens of small to medium size were met with.

Sphæroma quadridentatum Say. Harger, Proc. U. S. Nat. Mus., vol. ii, p. 161, 1879.

Abundant, but only specimens of small size were obtained; low water and between tides on the shore and flats, and upon eel-grass, in one-half fathom.

Limnoria lignorum (Rathke) White. Harger, Proc. U. S. Nat. Mus., vol. ii, p. 161, 1879.

In piles of old wharves, in company with *Leptochelia algicola* and *Chelura terebrans*.

Leptochelia algicola Harger, Proc. U. S. Nat. Mus., vol. ii, p. 162, 1879.—*Paratanais algicola* Harger, Am. Journ. Sci., III, vol. xv, p. 377, 1878.

Very abundant at low water, on eel-grass, in one-half fathom, and in old piles, associated with *Limnoria lignorum* and *Chelura*.

Leptochelia cœca Harger, Proc. U. S. Nat. Mus., vol. ii, p. 164, 1879.

A single specimen only of this species was recognized among the shore collections.

CIRRIPEDIA.

Balanus balancides (Linné) Stimp., Mar. Inv. of Grand Manan, p. 39, 1853. Smith, Inv. V. S., p. 579, 1874.

Common on piles of wharves, on shells, stones, and wood on the beaches, and occasionally found on floating fucus. On the piles it was usually of small size, but on stones lying on the beaches it often exceeded half an inch in diameter.

Lepas fascicularis Ellis and Sol. Smith, Inv. V. S., p. 579, 1874.

On floating fucus in the harbor.

ANNELIDA.

Lepidonotus squamatus Leach. Verrill, Invertebrate Animals of Vineyard Sound, p. 581, pl. 10, figs. 40, 41, 1874.

On the piles of wharves.

Harmothoe imbricata Malmg. Ver., Inv. V. S., p. 582, 1874.

Piles of wharves.

Sigalion arenicola Ver., Proc. U. S. Nat. Mus., vol. ii, p. 167, 1879.

Shore, in sand, at low water.

Sthenelais picta Ver., Inv. V. S., p. 582, 1874; Proc. U. S. Nat. Mus., vol. ii, p. 167, 1879.

Shore, in sand, at low water.

Nephtys ciliata Rathke. Ver., Inv. V. S., p. 583, 1874.

Shore, in sand.

Phyllodoce catenula Ver., Inv. V. S., p. 587, 1874.

Piles of wharves.

Eulalia pistacia Ver., Inv. V. S., p. 584, 1874.

Piles of wharves.

Autolytus cornutus A. Ag., Jour. Bos. Soc. N. H., p. 392, 1863. Ver., Inv. V. S., p. 590, pl. 13, figs. 65, 66, 1874.

Piles of wharves, and among eel-grass near the beach.

Nereis limbata Ehlers. Ver., Inv. V. S., p. 590, pl. 11, fig. 51, 1874.

Shore, in sand, and among eel-grass.

Nereis virens Sars. Ver., Inv. V. S., p. 590, pl. 11, figs. 47-50, 1874.

Shore, in sand.

Lumbrinereis fragilis A. and E. Ver., Inv. V. S., p. 594, 1874 (*Lumbriconereis*).

Shore, in sand.

Lumbrinereis tenuis Ver., Check List, p. 8, 1879; Inv. V. S., p. 594, 1874 (*Lumbriconereis*).

Shore, in sand.

Arabella opalina Ver., Check List, p. 8, 1879; Inv. V. S., p. 594, pl. 13, figs. 69, 70, 1874 (*Lumbriconereis*).

Shore, in sand.

Goniada gracilis Ver., Proc. U. S. Nat. Mus., vol. ii, p. 174, 1879.—*Eone gracilis* Ver., Inv. V. S., p. 596, 1874.

Shore, in sand.

Rhynchobolus dibranchiatus Ver., Inv. V. S., p. 596, pl. 10, figs. 43, 44, 1874.

Shore, in sand.

Anthostoma fragile Ver., Inv. V. S., p. 598, 1874.

Shore, in sand.

Anthostoma robustum Ver., Inv. V. S., p. 597, pl. 14, fig. 76, 1874.

Shore, in sand.

Scolecoplepis viridis Ver., Inv. V. S., p. 600, 1874.

Shore, in sand.

Polydora ciliatum Clapar. (?) Ver., Inv. V. S., p. 603, pl. 14, fig. 78, 1874.

Shore, in sand.

Cirratulus grandis Ver., Inv. V. S., p. 606, pl. 15, figs. 80, 81, 1874.

Shore, in sand.

Notomastus luridus Ver., Inv. V. S., p. 610, 1874.

Shore, in sand.

Notomastus filiformis Ver., Inv. V. S., p. 611, 1874.

Shore, in sand.

Praxilla zonalis Ver., Proc. Am. Ass. Adv. Sci., 1873, p. 384.

Shore, in sand.

Clymenella torquata Ver., Inv. V. S., p. 608, pl. 14, figs. 71-73, 1874.

Shore, in sand.

Cistenides Gouldii Ver., Inv. V. S., p. 612, pl. 17, figs. 87, 87a, 1874.

Shore, in sand.

Nicolea simplex Ver., Inv. V. S., p. 613, 1874.

Piles of wharf, and eel-grass.

Scionopsis palmata Ver., Inv. V. S., p. 614, 1874.

Piles of wharf.

Polycirrus eximius Ver., Inv. V. S., p. 616, pl. 16, fig. 85, 1874.

Shore, in sand, and piles of wharf.

Fabricia stellaris Blainv.—*Fabricia Leidyi* Ver., Inv. V. S., p. 619, 1874.

Piles of wharf.

Hydroides dianthus Ver., Check List, p. 11, 1879; Inv. V. S., p. 620, 1874 (*Serpula*).

On piles of wharves, and incrusting living and dead shells of *Pecten irradians*, *Ensatella americana*, *Littorina littorea*, *Anomia glabra*, &c.; also on fucus and other objects; especially abundant in the vicinity of the dike.

Spirorbis borealis Daud. Ver., Inv. V. S., p. 621, 1874.

On fucus growing on the piles and floating at the surface; abundant.

Clitellio irrorata Ver., Inv. V. S., p. 622, 1874.

Shore, in sand, near high-water mark.

Halodrillus littoralis Ver., Inv. V. S., p. 623, 1874.

On the beach, under dead sea-weeds near high-water mark.

GEPHYREA.

Phascolosoma Gouldii Dies. Ver., Inv. V. S., p. 627, pl. 18, fig. 93, 1874.

Shore, in sand.

ENTEROPNEUSTA.

Balanoglossus aurantiacus Ver., Inv. V. S., p. 627, 1874.

Shore, in sand.

NEMERTINA.

Tetrastemma dorsalis M'Int. Ver., Am. Journ. Sci., vol. x, p. 40, 1875.

Piles of wharves.

Tetrastemma vermiculus Ehr. (?) Ver., Proc. U. S. Nat. Mus., p. 184, 1879.

Piles of wharves.

Linus viridis Ver., Am. Journ. Sci., vol. x, p. 40, 1875; Inv. V. S., p. 628, 1874 (*Nemerites*).

Piles of wharves.

Cerebratulus ingens (Leidy) Ver., Check List, p. 12, 1879; Inv. V. S., p. 630, 1874 (*Meckelia*).

Shore, in sand.

Cerebratulus roseus (Leidy) Ver., Check List, p. 12, 1879; Inv. V. S., p. 630, 1874 (*Meckelia*).

Shore, in sand.

TURBELLARIA.*

Planocera elliptica Gir., Proc. Bos. Soc. Nat. Hist., p. 251, 1850.

Piles of wharves, and on the shore under bits of wood, &c.

Bdelloura candida Gir. Ver., Inv. V. S., p. 634, 1874.

Parasitic on *Limulus Polyphemus*.

CEPHALOPODA.

Ommastrephes illecebrosa (Les.) Ver., Inv. V. S., p. 634, 1874.—*O. sagittatus* Binney, in Gould, Inv. Mass., ed. II, p. 510, 1870.

This species is caught in Provincetown Harbor during the summer and early fall in considerable numbers, to use for bait, and is often stranded upon the beaches at low tide. Prof. S. I. Smith and Mr. Oscar Harger, while at Provincetown in 1872, noticed large numbers of this squid about the docks, killing and eating young mackerel. Their observations on the habits and appearance of the creature made at that time are given in the report of the United States Fish Commission for 1871-'72, pp. 441, 442, 1874.

Loligo Pealei Les. Binney, in Gould, Inv. Mass., II, p. 514, 1870. Ver., Inv. V. S., p. 635, 1874.

This species was not encountered at Provincetown by the Fish Commission, but it is represented in the collection of Mr. J. H. Blake, of that place, by two pens taken from specimens caught in the harbor, in July, 1879. It is not abundant north of Cape Cod, although several specimens were procured at Annisquam, on the north side of Cape Ann, by Professor Hyatt, in 1878, and it has also been previously noticed from Massachusetts Bay.

GASTEROPODA.

Ptyanassa obsoleta (Say) Stimp. Ver., Inv. V. S., p. 641, 1874. Gould, Inv. Mass., II, p. 362, 1870 (*Nassa*).

Very common on many of the inner beaches, and extending up to high-tide level. It is especially abundant in places where the brackish water from ponds runs down the face of the beach as it is left uncovered by the tide.

* About six species of *Rhabdocala* were collected, but they have not been determined.

Purpura lapillus (Linné) Lam. Gould, Inv. Mass., II, p. 360, 1870. Ver., Inv. V. S., p. 642, 1874.

Shore, rare.

Anachis avara (Say) Perkins. Ver., Inv. V. S., p. 643, 1874. Gould, Inv. Mass., I, p. 313, 1841; II, p. 356, 1870 (*Columbella*).

Rare; only a single specimen was found by the writer, but others have collected it at Provincetown.

Astyris lunata (Say) Dall. Ver., Inv. V. S., p. 645, 1874.—*Columbella lunata* Gould, Inv. Mass., II, p. 359, 1870.

Abundant in the eel-grass in front of the town and off the dike.

Lunatia heros (Say) Adams. Gould, Inv. Mass., II, p. 338, 1870. Ver., Inv. V. S., p. 646, 1874.

Very common along the entire inner shore, and often picked up dead on the outer beaches.

Neverita duplicata (Say) Stimp. Gould, Inv. Mass., II, p. 345, 1870. Ver., Inv. V. S., p. 646, 1874.

Abundant, associated with *Lunatia heros*.

Littorinella minuta (Totten) Stimp. Ver., Inv. V. S., p. 653, 1874. Gould, Inv. Mass., II, p. 298, 1870 (*Rissoa*).

Common, shore at low water.

Skenea planorbis (Fabr.) Forbes and Hanley. Gould, Inv. Mass., II, p. 296, 1870. Ver., Inv. V. S., p. 655, 1874.

Common on the shore, with *Tottenia gemma*, *Littorinella minuta*, &c., and also on the piles of wharves.

Littorina littorea (Linné) Johnston. Gould, Inv. Mass., II, p. 308, 1870.

Very abundant on the shore, on piles of wharves, and on eel-grass which is more or less exposed at low tide. Just off the dike it occurs on the eel-grass in countless numbers, and, in common with all the other species of shells in that vicinity, is frequently covered with the white calcareous tubes of *Hydroïdes dianthus*.

Littorina rudis (Maton) Gould, Inv. Mass., I, p. 257, 1841; II, p. 304, 1870. Ver., Inv. V. S., p. 651, 1874.—*L. tenebrosa* Gould, Inv. Mass., I, p. 259; II, p. 306.

This is an exceedingly common species on the shore.

Littorina palliata (Say) Gould, Inv. Mass., I, p. 260, 1841; II, p. 309, 1870. Ver., Inv. V. S., p. 652, 1874.

Common on the shore and on piles of wharves among sea-weeds.

Lacuna vineta (Mont.) Turton. Gould, Inv. Mass., II, p. 302, 1870. Ver., Inv. V. S., p. 652, 1874.

On the eel-grass, shallow water; not found in much abundance.

Bittium nigrum (Totten) Stimp. Gould, Inv. Mass., II, p. 321, 1870. Ver., Inv. V. S., p. 648, 1874.

Very abundant amongst the eel-grass, in shallow water in front of the town, and off the dike, and also on the beaches, where it often occurs in immense numbers.

Crepidula fornicata (Linné) Lamarck. Gould, Inv. Mass., II, p. 271, 1870. Ver., Inv. V. S., p. 649, 1874.

Common, especially in the vicinity of the dike, on shells of *Pecten* and *Ensatella*.

Crepidula plana Say. Gould, Inv. Mass., II, p. 272, 1870. Ver., Inv. V. S., p. 650, 1874.

Common off the dike, and also found elsewhere.

Crepidula convexa Say. Gould, Inv. Mass., II, p. 273, 1870. Ver., Inv. V. S., p. 650, 1874.

Abundant off the dike, adhering to the surfaces of living and dead shells, to *Limulus*, and other objects.

Acmæa testudinalis (Müller) Forbes and Hanley. Ver., Inv. V. S., p. 661, 1874. Gould, Inv. Mass., II, p. 267, 1870 (*Tectura*).

Rare, shore; variety *alveus* also found.

Odostomia bisuturalis (Say) Gould, Inv. Mass., II, p. 327, 1870. Ver., Inv. V. S., p. 656, 1874.

Not uncommon; eel-grass off the dike, and elsewhere.

Odostomia trifida (Totten) Gould, Inv. Mass., I, p. 274, 1841; II, p. 328, 1870. Ver., Inv. V. S., p. 656, 1874.

Associated with the last, and about equally common.

Odostomia dealbata Stimp. Gould, Inv. Mass., II, p. 327, 1870. Ver., Inv. V. S., p. 656, 1874.

A single specimen only was obtained from the eel-grass off the dike.

Melampus lineatus Say, Am. Conch., p. 85, 1822.—*Melampus bidentatus* Say. Gould, Inv. Mass., II, p. 467, 1870. Ver., Inv. V. S., p. 662, 1874 (*non* Mont.).

Abundant, shore, between tides.

Onchidoris, sp.

An undetermined species of this genus was obtained from sea-weeds on the inner beach at Long Point.

Tergipes despectus Ald. and Han. Ver., Inv. V. S., p. 667, 1874.—*Æolis* (*Tergipes*) *despecta* Gould, Inv. Mass., II, p. 248, 1870.

From hydroids, on piles of wharves, and sea-weeds of beach.

Embletonia fuscata Gould, Inv. Mass., II, p. 251, 1870.

Found among the filamentous green algæ in little rills of water on the beaches and sand-flats.

Stiliger fuscata Bergh. Ver., Prelim. Check List, p. 23, 1879.—*Calliopæa* (?) *fuscata* Gould, Inv. Mass., II, p. 250, 1870.

Associated with *Embletonia fuscata*.

LAMELLIBRANCHIATA.

Teredo navalis Linné. Gould, Inv. Mass., II, p. 28, 1870. Ver., Inv. V. S., p. 669, 1874.

Very abundant in the piles at the outer end of steamboat wharf, and in other situations. A few years ago about forty feet of the above-mentioned wharf was so weakened by the borings of this shell-fish that it completely gave way under the weight of a ship's load of merchandise stored upon it.

Teredo megotara Hanley. Gould, Inv. Mass., II, p. 30, 1870. Ver., Inv. V. S., p. 670, 1874.

At Provincetown, in cedar buoys (Gould).

Teredo dilatata Stimp. Gould, Inv. Mass., II, p. 32, 1870. Ver., Inv. V. S., p. 670, 1874.

From pine buoy attached to lobster pots, at Provincetown (Gould).

Ensatella americana (Gould) Ver., Am. Journ. Sci., vol. iii, pp. 212, 284, 1872; Inv. V. S., p. 674, 1874.—*Solen americanus* Gould, Inv. Mass., II, p. 42, 1870.

Many dead adult shells and living young were collected on the sand-flats at low water.

Mya arenaria Linné. Gould, Inv. Mass., II, p. 55, 1870. Ver., Inv. V. S., p. 672, 1874.

Very abundant on the shores and flats; especially so on the broad flats between the town and Wood End Light House, where, in the clean sands, the shells are often of a nearly pure white.

Lyonsia hyalina Con. Gould, Inv. Mass., II, p. 64, 1870. Ver., Inv. V. S., p. 672, 1874.

Quite common at low water on the inner shore at Provincetown, and in the inlet behind Race Point Light House. It was also picked up in extreme abundance on the outer beach at Race Point.

Cochlodesma Leanum (Say) Couth. Gould, Inv. Mass., II, p. 68, 1870. Ver., Inv. V. S., p. 673, 1874.

Dead shells in fresh condition were collected on the outer beach at Race Point, but not on the inner.

Spisula solidissima (Dillw.) Gray.—*Mactra solidissima* Gould, Inv. Mass., II, p. 73, 1870. Ver., Inv. V. S., p. 680, 1874.

Living young and adult dead shells were frequently found on the shore at low water.

Ceronia arcata (Con.) Adams. Gould, Inv. Mass., II, p. 80, 1870. Ver., Inv. V. S., p. 679, 1874.

Many living specimens were obtained by Prof. H. E. Webster in the inlet behind Race Point Light House and on the outer beach near the same place; not known from the inner shore.

Cumingia tellinoides Con. Gould, Inv. Mass., II, p. 79, 1870. Ver., Inv. V. S., p. 679, 1874.

Not found by the Fish Commission, but several dead shells were collected on the inner beaches by Mr. J. H. Blake, of Cambridge, and Dr. Crocker, of Provincetown.

Angulus tener (Say) Adams. Ver., Inv. V. S., p. 677, 1874. Gould, Inv. Mass., II, p. 97, 1870 (*Tellina*).

Abundant on the shore, low water.

Venus mercenaria Linné. Gould, Inv. Mass., II, p. 133, 1870. Ver., Inv. V. S., p. 681, 1874.

Rare on the beaches at Provincetown, but very common farther south on the inner shores of the cape, especially in the neighborhood of Wellfleet, where they attain a large size and have the purple coloration of the interior of the shell more than usually intense and widespread.

Tottenia gemma (Totten) Perkins. Ver., Inv. V. S., p. 682, 1874.

Very abundant on the beaches in company with *Skenea planorbis* and *Littorinella minuta*, and also found amongst the eel-grass. The small dark-colored shells of this species are frequently scattered over the white beaches in the greatest profusion, appearing like coarse grains of black sand. But, being lighter than the sand, they are readily blown along by the wind until they collect in large numbers in the lee of any prominence that may present itself, and in the furrows of the beaches. In such places as these several handfuls of pure shells, with little admixture of sand, may often be scooped up. The first specimens of this species obtained by General Totten, its earliest describer, were from the beach at Provincetown.

Lævicardium Mortoni (Con.) Perkins. Ver., Inv. V. S., p. 683, 1874. Gould, Inv. Mass., II, p. 143, 1870 (*Liocardium*).

Low water, rare.

Cryptodon Gouldii (Phil.) Adams. Gould, Inv. Mass., II, p. 100, 1870. Ver., Inv. V. S., p. 686, 1874.

Dead shells frequently found along the beaches; probably lives in shallow water close to the shore, but not dredged in Cape Cod Bay in less than thirteen fathoms, at which depth it was very abundant.

Solemya velum Say. Gould, Inv. Mass., II, p. 48, 1870.—*Solenomya velum* Ver., Inv. V. S., p. 688, 1874.

A few dead valves only were picked up on the inner beaches.

Astarte castanea Say. Gould, Inv. Mass., II, p. 117, 1870. Ver., Inv. V. S., p. 685, 1874.

Found abundantly in Provincetown Harbor, west and north of the light-house, at low-water mark (Gould). Although searched for at this locality in 1879, no specimens were discovered; a very low tide is probably required to uncover them. Mr. J. H. Blake says they are also common low down on the inner shore, near Wood End Light.

Argina pexata (Say) Gray. Ver., Inv. V. S., p. 692, 1874. Gould, Inv. Mass., II, p. 147, 1870 (*Arca*).

Collected on the beach at Provincetown (S. I. Smith, 1872).

Mytilus edulis Linné. Gould, Inv. Mass., II, p. 183, 1870. Ver., Inv. V. S., p. 692, 1874.

Very abundant, shore, piles of wharves, attached to floating fucus, &c.

Modiola plicatula Lam. Gould, Inv. Mass., II, p. 188, 1870. Ver., Inv. V. S., p. 693, 1874.

Very abundant on the flats near high-water mark.

Crenella glandula (Totten) Adams. Gould, Inv. Mass., II, p. 194, 1870. Ver., Inv. V. S., p. 695, 1874.

A few fresh, but not living, shells were obtained from the beaches at low water. Provincetown, at low water (Stimpson, Shells of N. England). This species was first known to Totten, its describer, from Provincetown.

Pecten irradians Lam. Gould, Inv. Mass., II, p. 199, 1870. Ver., Inv. V. S., p. 695, 1874.

This species was formerly very abundant in front of the town, in the patches of eel-grass just below ordinary low-tide level, but at present the full-grown shells are rarely found there. They are, however, still very plentiful off the dike in similar situations. The adult shells rest on the ground amongst the eel-grass, which at low water becomes thickly matted above them, generally quite concealing them. Young shells usually adhere to the eel-grass by their byssus.

Anomia glabra Ver., Am. Journ. Sci., vol. iii, p. 213, 1872; Inv. V. S., p. 696, 1874.—*A. ephippium, electrica, squamula*, Gould (*non* Linné).

Abundant on the flats in front of the dike, but generally of small size, attached to dead shells of *Pecten irradians*, *Ensatella americana*, &c.

TUNICATA.

Molgula manhattensis Ver., Am. Journ. Sci., vol. i, p. 54, 1871; Inv. V. S., p. 699, 1874.

Abundant near high-tide level, amongst the grass in the pools left on the shore at low tide; attached to eel-grass and to floating sea-weeds. Also thrown up in immense numbers on the outer beach at Race Point during heavy storms.

Botryllus Gouldii Ver., Am. Journ. Sci., vol. i, p. 211, 1871; Inv. V. S., p. 702, 1874.

Growing on eel-grass in shallow water and on floating sea-weeds, &c.

BRYOZOA.

Crisia eburnea Lamour. Ver., Inv. V. S., p. 707, 1874.

Very abundant on fucus and eel-grass, often associated with *Bugula turrita*; on eel-grass everywhere in shallow water from the dike to Long Point, and on fucus growing on the piles and floating at the surface.

Tubulipora serpens (Linné) Flem., Brit. Anim., p. 529, t. Johnston, Hist. Brit. Zoöph., p. 275, 1847.—*T. flabellaris* Ver., Inv. V. S., p. 708, 1874.

Found very abundantly on the eel-grass in shallow water, forming small rounded clusters.

Flustrella hispida (Fabr.) Gray.—*Alcyonidium hispidum* Smitt. Ver., Inv. V. S., p. 708, 1874.

Incrusting floating fucus in the harbor, and probably also occurring on the sea-weeds of the piles.

Vesicularia, sp.

One or two small specimens of a *Vesicularia* with creeping stem, possibly *V. uva* Smitt, were found upon fucus growing upon the piles.

Bugula turrita (Desor) Ver., Inv. V. S., p. 712, pl. xxxiv, figs. 258, 259, 1874.

Very abundant on piles of wharves, eel-grass in shallow water, and on floating fucus; associated with *Crisia eburnea*.

Electra pilosa (Linné) Fisch., t. Ver., Preliminary Check List Mar. Inv. Atl. Coast, p. 29, 1879.—*Membranipora pilosa* Farre, Phil. Trans., p. 412, 1837. Ver., Inv. V. S., p. 712, 1874.

Incrusting fucus, laminaria, eel-grass, &c, floating in the harbor, and stranded on the beaches.

Cribrellina puncturata Smitt, Floridan Bryozoa, part II, p. 24, 1873.—*Escharipora punctata* Smitt, Öfvers. af K. Vetens.-Akad. Förh., 1868, appendix, p. 4. Ver., Inv. V. S., p. 713, 1874.

On eel-grass, one-half fathom, rare.

Hippothoa hyalina (Linné) Smitt, Floridan Bryozoa, part II, p. 40, 1873.—*Mollia hyalina* Smitt, Öfvers. af K. Vetens.-Akad. Förh., 1868, appendix, p. 16. Ver., Inv. V. S., p. 713, 1874.

On floating fucus and eel-grass in the harbor, and on the beaches.

Lepralia americana Ver., Am. Journ. Sci., III, vol. ix, p. 415, pl. vii, figs. 4, 5, 1875.—*Lepralia Pallasiana* Ver. Inv. V. S., p. 713, 1874 (with query; *non* Busk).

Very common; incrusting fucus and other sea-weeds on the piles, and also growing on eel-grass in shallow water.

ECHINODERMATA.

Leptosynapta Girardii (Pourtales) Ver., Inv. V. S., p. 716, 1874.

This species is common everywhere about Provincetown, on the sandy beaches between low-tide and half-tide levels, but it is most abundant on the sandy flats about midway between the town and Wood End Light House, where large areas are left dry for a considerable time at low water. It also occurs in abundance on the sand-flats inside of Race Point Light House, on the outer shore.

Leptosynapta roseola Ver., Inv. V. S., p. 716, 1874.

Provincetown beach, and sheltered inlets back of Race Point, on the outer side of Cape Cod, buried in the sand at low water, and associated

with *L. Girardii*. Collected at the latter place by Prof. H. E. Webster and Mr. Benedict. Hitherto known only from New Haven, Conn., and Vineyard Sound (Verrill).

Asterias Forbesii (Desor) Ver., Am. Journ. Sci., vol. xi., p. 418, 1876; Proc. Bos. Soc. Nat. Hist., vol. x, p. 345, 1866; Inv. V. S., p. 718, 1874.—*A. arenicola* Stimp., Proc. Bos. Soc. Nat. Hist., vol. viii, p. 268, 1862. Ver., *ibid.*, vol. x, p. 339, 1866; Inv. V. S., p. 718, 1874.—*Asteracanthion berylinus* Ag., A. Ag., Mem. Mus. Comp. Zoöl., vol. v, No. 1, p. 94, pl. ix, 1877.

Very abundant along the shore above and below low-water mark, and on piles of wharves, but always of comparatively small size. A comparison of the specimens from Provincetown with those obtained from Gloucester in 1878 shows more or less constant differences to exist between the two. In the former the spines are generally longer and more acute, sometimes even quite slender, and the pedicellariæ appear to be somewhat more numerous, and to vary greatly in their arrangement. These differences are, however, of very slight value in this exceedingly variable species.

Asterias vulgaris Stimp., MSS. Packard, Can. Nat., Dec., 1863. Ver., Proc. Bos. Soc. Nat. Hist., vol. x, p. 347, 1866; Inv. V. S., p. 718, 1874.

Below low-water mark at the outer ends of the long wharves.

Amphipholis elegans Ljung. Ver., Inv. V. S., p. 720, 1874.—*Amphiura squamata* Lyman, Illust. Cat. Mus. Comp. Zoöl., No. I, p. 121, 1865 (*non Delle Chiaje*, t. Ljung.).

Only a few specimens of this Ophiuran were obtained; they were from the eel-grass in very shallow water.

ANTHOZOA.

Metridium marginatum M.-Edw. Ver., Inv. V. S., p. 738, 1874.

Common on the mooring posts in the harbor (J. H. Blake).

Edwardsia sulcata Ver., Mem. Bos. Soc. N. H., vol. i, No. I, p. 29, 1864.

Sand, at low water.

Edwardsia pallida Ver., Proc. U. S. Nat. Mus., vol. ii, p. 198, 1879.

In sand, at low water.

ACALEPHÆ.

Clytia Johnstoni (Alder) Hincks. Ver., Inv. V. S., p. 725, 1874.

On floating fucus thrown up on inner beach of Long Point.

Campanularia flexuosa Hincks. Ver., Inv. V. S., p. 726, 1874.

Abundant on fucus of piles of wharves, &c.

Obelia geniculata (Linné) Allman. Ver., Inv. V. S., p. 727, 1874.

On floating fucus stranded on Long Point beach, inner shore.

Obelia dichotoma (Linné) Hincks. Ver., Inv. V. S., p. 728, 1874.

Very abundant on eel-grass, one-half fathom.

Sertularia pumila Linné. Ver., Inv. V. S., p. 732, 1874.

Very common, and growing principally on fucus, on piles of wharves; also on floating fucus in the harbor. A very robust variety was collected from fucus stranded on the outer beach at Race Point.

**DESCRIPTION OF A NEW SPECIES OF RAY (*RAIA STELLULATA*)
FROM MONTEREY, CALIFORNIA.**

By DAVID S. JORDAN and CHARLES H. GILBERT.

Raia stellulata sp. nov.

Allied to *Raia radula* Delaroché. Disk much broader than long, anteriorly broadly arched, and convex, the tip of the snout very slightly exerted. Anterior margin of pectorals undulated, convex anteriorly, then concave. Length of snout from eyes a little more than twice the width of the interocular space, which is concave, less than the distance between the outer angles of the spiracles. Breadth of disk equal to the distance from the tip of the tail to the shoulder-girdle. Length of tail equal to the distance from its root to the middle of the interocular area.

Male everywhere above rough with stellate prickles, the base of the pectorals being almost smooth. Along the middle region of the back and the whole upper surface of the tail is a band of close-set, rather low prickles, with broad, very distinctly stellate bases. An elongate patch of stout, recurved spines on the anterior part of the pectorals, and farther back the usual series of claw-like spines found in the males of all species. Stout spines above the eye, a few in the middle of the shoulder, and along the middle line of the tail. Sides of the tail without large prickles. Lower side smooth, except around the mouth.

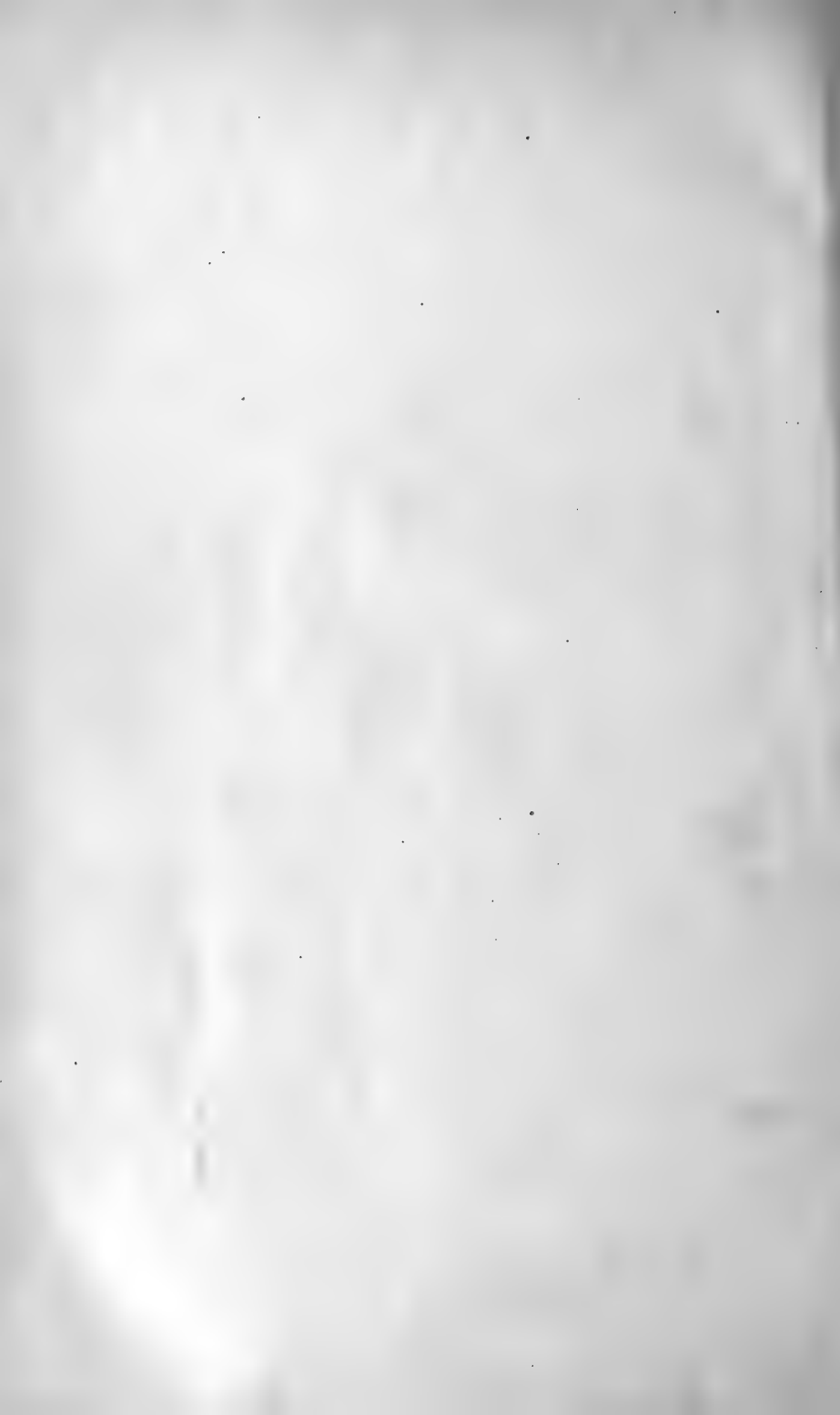
Female everywhere above rough with stellate prickles, the anterior region, middle of back, and upper surface of tail most so. A median row of strong spines on the tail above, and six on the scapular region. A series of strong spines over the eye. A lateral row of rather strong prickles on the tail. Body smooth below, except anteriorly.

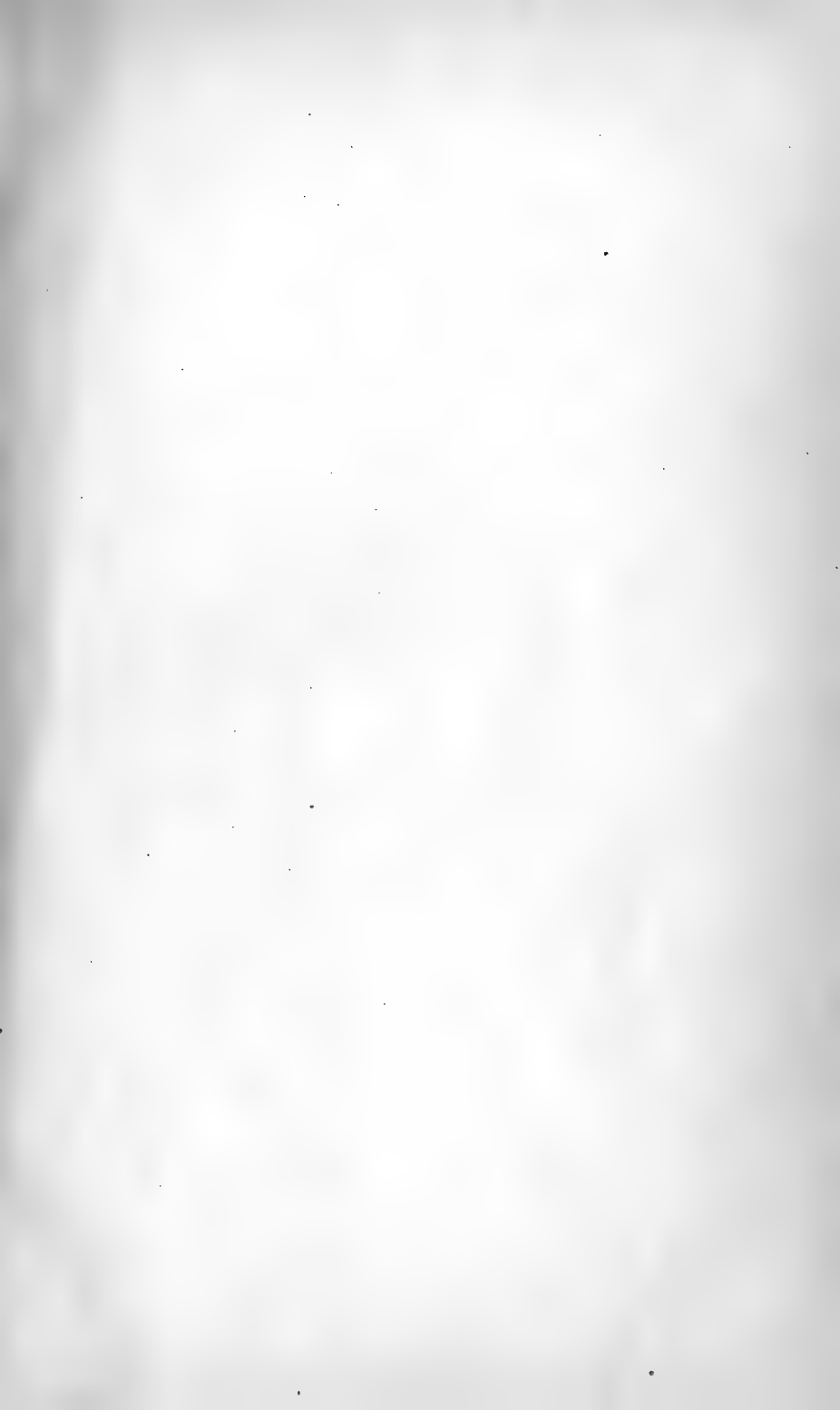
Tail flat below, with a conspicuous lateral fold. Dorsal fins low, their height equal to the interorbital space, separated by a space considerably shorter than their base. Caudal fin reduced to a very small fold, as in the "genus" *Uraptera*, to which this species would be referred in Müller & Henle's arrangement.

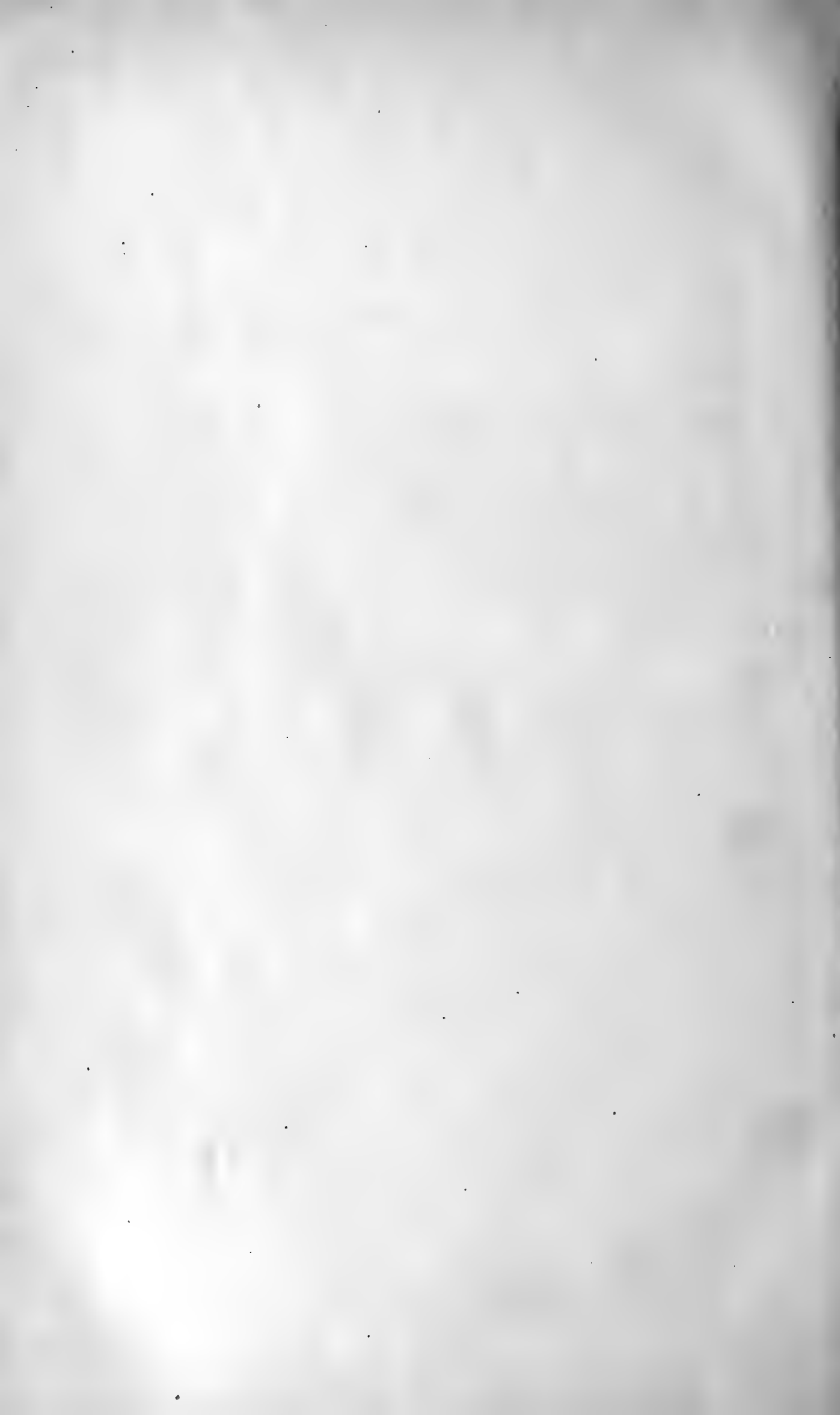
Mouth somewhat arched. Teeth not very sharp, tricuspid, about $\frac{35 \text{ to } 40}{35}$. Nasal flaps slightly fringed externally. Distance between nostrils about equal to the distance from them to the tip of the snout.

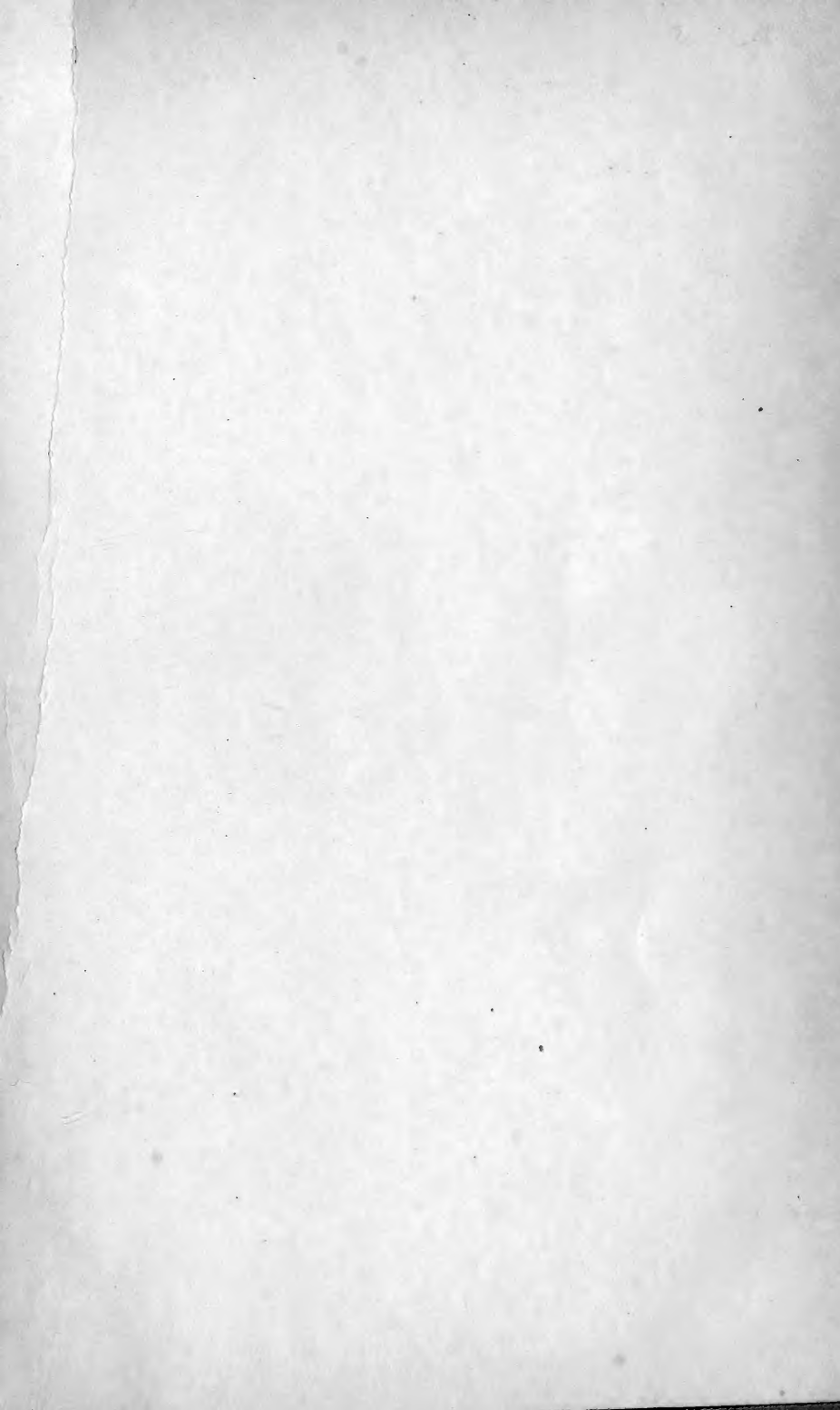
Color grayish-brown, everywhere mottled with light and dark colors, the markings sharp and distinct. Numerous black spots of all sizes, some of them ocellated. A black spot about as large as the eye at the

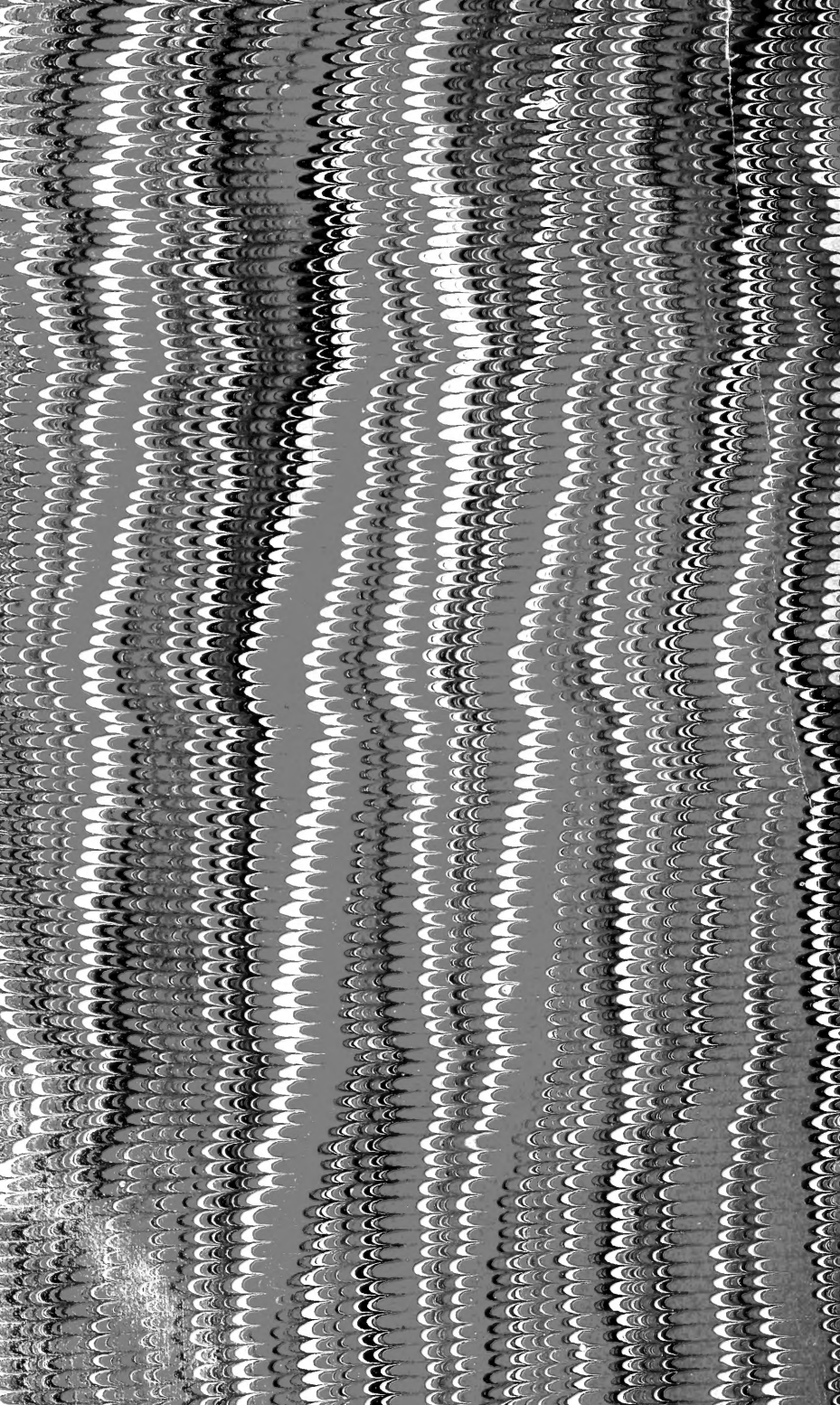


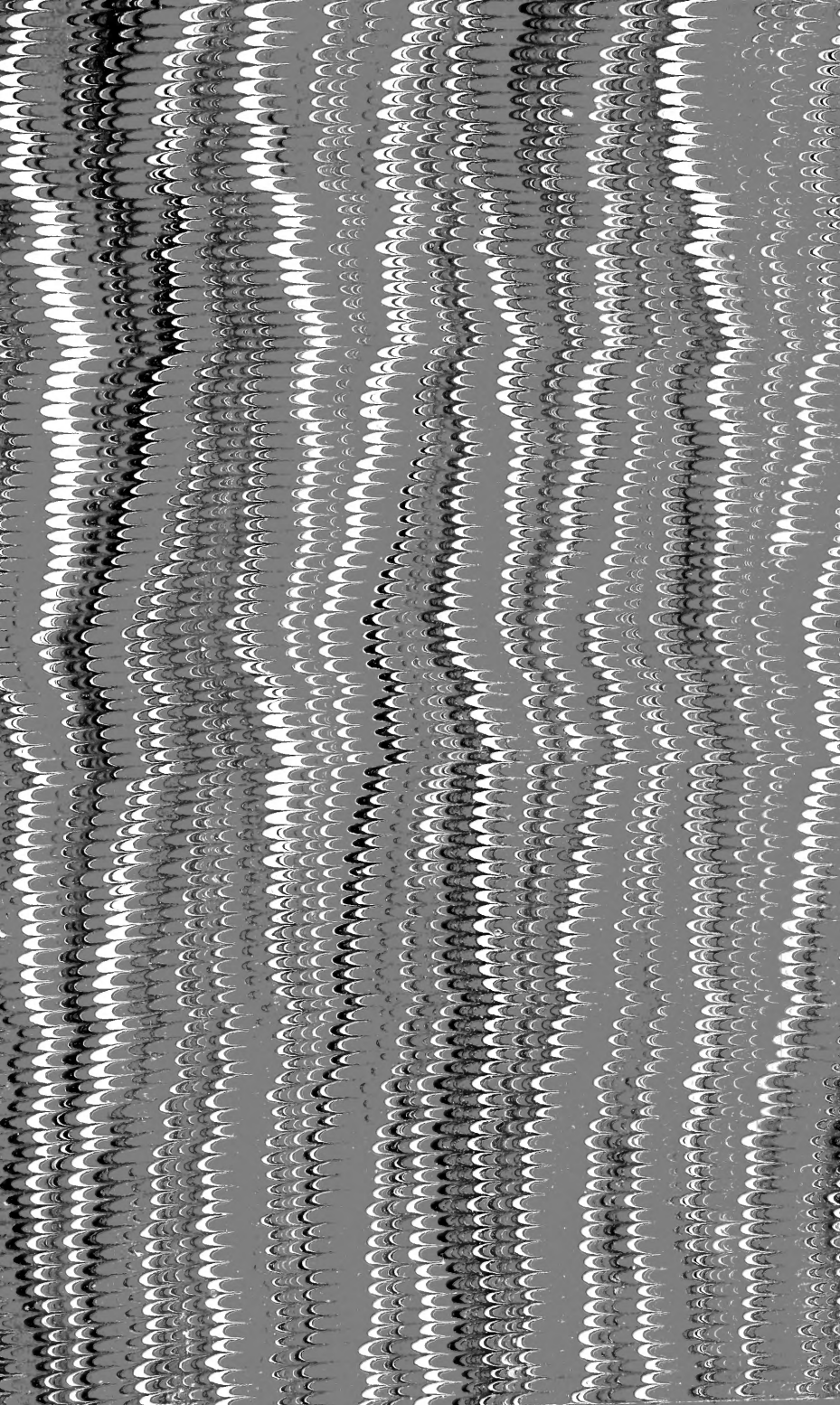












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