THE CEPHALOPODS OF THE NORTH-EASTERN COAST OF AMERICA.

PART I.

The Gigantic Squids (Architeuthis) and their Allies; with observations on similar large species from foreign localities.

By A. E. VERRILL.

[From the Transactions of the Connecticut Academy of Sciences, Vol. V.]

New Haven, Conn., December, 1879–March, 1880.

F. C. 180.

REPORT

ON

THE CEPHALOPODS

OF THE

NORTHEASTERN COAST OF AMERICA.

BY

A. E. VERRILL.

[EXTRACTED FROM THE ANNUAL REPORT OF THE COMMISSIONER OF FISH AND FISHERIES FOR 1879.]

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1882.

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The Cephalopods of the North-eastern Coast of America.

By A. E. Verrill.

Part I.—The gigantic squids (*Architeuthis*) and their allies; with observations on similar large species from foreign localities.

The early literature of Natural History has, from very remote times, contained allusions to huge species of Cephalopods, often accompanied by more or less fabulous and usually exaggerated descriptions of the creatures.* In a few instances figures were attempted, which were largely indebted to the imagination of their authors for their more striking peculiarities.

In recent times many more accurate observers have confirmed the existence of such monsters, and several fragments have found their way into European museums.

To Professor Steenstrup and to Dr. Harting, however, belongs the credit of first describing and figuring, in a scientific manner, a sufficient number of specimens to give a fair idea of the real character and affinities of these colossal species. More particular accounts of the specimens described by these and other recent writers will be given farther on.

Special attention has only recently been called to the frequent occurrence of these 'big squids,' as our fishermen call them, in the waters of Newfoundland, and the adjacent coasts. The cod-fishermen, who visit the Grand Banks, appear, from their statements, to have been long familiar with them, and occasionally to have captured and used them for bait. The whalemen have also repeatedly stated that sperm whales feed upon huge squid, and that, when wounded, they

* The description of the "Poulpe" or devil-fish by Victor Hugo, in "The Toilers of the Sea," with which so many readers have recently become familiar, is quite as fabulous and unreal as any of the earlier accounts, and even more bizarre. His description represents no real animal whatever. He has attributed to the creature habits and anatomical structures that belong in part to the *polyps* and in part to the '*poulpe*' (Octopus). His description appears to have been derived from descriptions of these totally distinct groups of animals contained in some cyclopedia, which he has confounded and hopelessly mixed up.

often vomit large fragments of them in such a condition as to be recognizable.* The first reliable account, known to me, of specimens actually taken in American waters by our fishermen and whalemen was published by Dr. A. S. Packard, in 1873.† In that article Dr. Packard described a portion of a jaw from a large specimen (our No. 1) taken by the Gloucester fishermen on the Grand Banks, and a very large pair of jaws taken from the stomach of a sperm whale, (our No. 10). Soon after this, in 1873, a large living specimen was encountered by two fishermen in Conception Bay, and one of the tentacular-arms, which was secured, was preserved in the museum of St. John's, Newfoundland, by the Rev. Mr. Harvey and Mr. Alexander Murray, (our No. 2). Both these gentlemen wrote good and interesting accounts of this specimen, which were extensively copied in the magazines and newspapers, while a photograph of the arm itself was also secured and distributed.

This important addition to our knowledge of these creatures was followed, a few weeks later, by the capture of a nearly perfect specimen of the same species, near St. John's. Mr. Harvey and Mr. Murray likewise secured this specimen and published detailed accounts of it, which gave a more accurate idea of the character of the genus and species than any previous descriptions.

My own attention was specially directed to these large Cephalopods, at that time, on account of being so fortunate as to secure for study most of the preserved portions of all the specimens referred to above, with some additional ones, detailed below. For these very interesting specimens I am especially indebted to the zeal and kindness of the Rev. Mr. Harvey, and to Professor S. F. Baird. To Dr. A. S. Packard I am indebted for the use of the jaws of No. 10. Mr. Pourtales, of the Museum of Comparative Zoology, has also kindly sent the specimens belonging to that museum, and Mr. W. H. Dall has contributed his specimens and drawings of a species from Alaska. Special acknowledgments to others will be found in connection with the descriptions of the specimens.

Although I have, in several former papers,‡ given details of the

* See Maury's Sailing Directions; also articles by N. S Shaler, American Naturalist, vol. vii, p. 3, 1873; by Dr. Packard, op. cit., p. 90; and by Mr. W. H. Dall, op. cit., p. 484.

† American Naturalist, vol. vii, p. 91, February, 1873.

‡ American Jour. Science, vol. vii, p. 158, Feb., 1874; vol. ix, pp. 123, 177, Plates II–V, 1875; vol. x, p. 213, Sept., 1875; vol. xii, p. 236, 1876; vol. xiv, p. 425, Nov., 1877. American Naturalist, vol. viii, p. 167, 1874; vol. ix, pp. 21, 78, Jan. and Feb., 1875.

time and place of occurrence of fourteen of the specimens enumerated below, it seems desirable to bring together, at this time, accounts of all these, as well as of several additional specimens, in order that the various descriptions and measurements may be more readily compared, and also that some errors in the former accounts may be corrected and new information added. To facilitate the comparison of the general accounts of the twenty examples that I am now able to enumerate from our coast, I have given, by themselves, the statements of the time and place of their occurrence, with such general descriptions and measurements of each, as are most available, reserving the more detailed special descriptions of the preserved specimens for the systematic part of this article.

This seemed the more desirable because the information concerning many of the specimens is so scanty as to render it impossible to refer them, with certainty, to either of the species now recognized or named. It is probable, however, that only three distinct forms exist among the large Newfoundland specimens of *Architeuthis*, and two of these may be merely the males and females of one species. One of the principal differences usually indicated by the measurements is in respect to the size and length of the shorter arms, one form having them comparatively stout, often "thicker than a man's thigh," while the other form has them long and slender, (usually three to five inches in diameter, with a length of six to eleven feet). In case these differences prove to be sexual, those with stout arms will probably be the females, judging from analogy with the small squids nearest related.* The two specimens, of which I have seen the arms, both have them long and slender, but in one the arms are much longer in proportion to the body than in the other, and there are marked differences in the denticulation of the suckers of the short arms. These differences appear to indicate two species.

A few words of explanation may be desirable in regard to the relative value of the measurements usually given, and also with reference

* By examinations of very numerous specimens of the common squids, *Ommastrephes illecebrosa* and *Loligo Pealii*, I have satisfied myself that the females of both differ from the males by having the head, the siphon, the arms, and the suckers relatively larger and stronger than in the males. In comparing specimens of the two sexes having the body and fins of the same length, this difference is very evident. The large suckers of the tentacular arms show this increased size in a very marked degree. The short arms show a greater increase in diameter than in length. In my former article, by an unfortunate error, the increase in size of these parts was inadvertently said to be in the male. In these common squids I have found scarcely any variation in the relative size and form of the caudal fins, when adult.

to the parts most useful to preserve when, as will usually happen, the whole cannot be saved. The measurements of the soft external parts of Cephalopods are, for the most part, only approximate, and they are not all of equal value, for some parts are more changeable in size and shape than others. The long, contractile tentacular-arms, especially, are liable to great variation in length according to their state of contraction or extension, and therefore their relative length is of little or no value in discriminating species. Unfortunately this, either by itself or combined with the length of the 'body' as total length, is often the principal one given. The circumference of the body varies, likewise, according to its state of contraction or relaxation, and the 'breadth' of the body, when such soft creatures are stranded on the shore, will depend much upon the extent to which it is collapsed and flattened from its proper cylindrical form, and is of less value than the circumference. Measurements of the length of the body to the mantle edge, and to the base of the arms; length and circumference of the various pairs of short arms; of the length and circumference of the head; size of the eyes; length and breadth of the tail-fin; size of the largest suckers on the different arms; and size of the 'club' of the long arms, are all very useful and valuable. The shape of the tail-fin should be carefully noted, also the presence or absence of eye-lids, and of a sinus or groove at the front edge of eye-lids. The size and shape of the thin internal 'bone' or 'pen' is particularly desirable. Usually it will not be possible to preserve the pen in any satisfactory shape by drying, for it cracks in pieces and curls up. It may be preserved packed in salt, in brine, or in alcohol. The same is true of the beak. The horny rims of the suckers can usually be dried, but are better by far in alcohol or brine. The parts most useful for preservation in alcohol or salt, in cases when only a portion can be saved, are the long tentacular-arms, especially their terminal 'clubs' with the suckers in place; the short arms, with their suckers; of these the left arm of the lower, or ventral, pair will probably be the most valuable, being probably the one that will show the sexual distinction, by the alteration of its suckers toward the tip or in some other part; the lateral arms next to the ventral are next in importance; the caudal fin, and if possible the entire head, should be preserved; also the 'pen,' if possible. In cases where the head cannot be saved entire, even with the arms removed, the beak and tongue, and other fleshy parts in and behind the beak, should be carefully preserved, as nearly entire as possible, either in strong brine or alcohol.

General account of the several specimens, and of their occurrence.

No. 1.—Grand Banks specimen, 1871. (*Architeuthis princeps.*)

PLATE XVIII, FIGURE 3.

This specimen was found floating at the surface, on the Grand Banks of Newfoundland, in October, 1871, by Captain Campbell, of the schooner "B. D. Haskins," of Gloucester, Mass. It was taken on board and part of it used for bait.* Dr. A. S. Packard has given, in the American Naturalist, vol. vii, p. 91, Feb., 1873, the facts that have been published in regard to the history of this individual. But its jaws were sent to the Smithsonian Institution, and were sent to me by Professor Baird to be described and figured. The horny jaw or beak from this specimen is thick and strong, nearly black; it is acute at the apex, with a decided notch or angle on the inside, about ·75 of an inch from the point, and beyond the notch is a large prominent angular lobe. The body of the specimen from which this jaw was taken is stated to have measured 15 feet in length and 4 feet 8 inches in circumference. The arms were mutilated, but the portions remaining were estimated to be 9 or 10 feet long, and 22 inches in circumference, two being shorter than the rest. It was estimated to weigh 2000 pounds.

No. 2.—Conception Bay specimen, 1873. (*A. Harveyi ?.*)

A large individual attacked two men, who were in a small boat, in Conception Bay, October 27, 1873. Two of the arms, which it threw across the boat, were cut off with a hatchet, and brought ashore. Full accounts of this adventure, written by Rev. M. Harvey, have been published in many of the magazines and newspapers.† A portion of one of these arms, measuring 19 feet in length, was preserved by Rev. M. Harvey and Mr. Alexander Murray for the museum at

* I have been informed by many other fishermen that these 'big squids,' as they call them, are occasionally taken on the Grand Banks and used for bait. Others state that they have seen them in that region, without being able to capture them. Nearly all the specimens hitherto taken appear to have been more or less disabled when first observed, otherwise they probably would not appear at the surface in the day-time. From the fact that they have mostly come ashore in the night, I infer that they inhabit chiefly the very deep and cold fiords of Newfoundland and come up to the surface only in the night.

† See Amer. Jour. Science, vol. vii, p. 158, 1874; and American Naturalist, vol. viii, No. 2, p. 120, Feb.. 1874, in a letter from Mr. Alexander Murray. Also, Proc. Zool. Soc. Lond., p. 178, 1874. Proc. Boston Soc. Nat. Hist., xvi, p. 161, 1873.

St. John's, Newfoundland. It was photographed, and cuts copied from the photograph were published in some of the English magazines.* Before it was secured for preservation it had been considerably injured, many of the larger suckers having been torn off or mutilated. Owing to this fact they were originally described by Mr. Harvey as destitute of marginal denticulations, but he subsequently reëxamined the specimen, at my request, and informed me that they were all originally denticulated. Of this specimen I have seen only the photograph and some of the smaller suckers. This fragment represents the distal half of one of the long tentacular-arms, with its expanded terminal portion or "club," originally covered with cup-shaped suckers, about 24 of which, forming two central rows, are very large, the largest being 1·25 inches in diameter; others, alternating with these along each margin, are smaller, with the edge supported by a serrated ring. The tip of the arm is covered with numerous smaller suckers, in four rows. The part of the arm preserved measured, when fresh, 19 feet in length, and 3·5 inches in circumference, but wider, "like an oar," and 6 inches in circumference, near the end, where the suckers are situated.

It is stated that six feet of this arm had been destroyed before it was preserved, and the captors estimated that they left from six to ten feet attached to the creature, which would make the total length between 31 and 35 feet. According to Mr. Murray, the portion preserved measured but 17 feet in length, when he examined it, Oct. 31, 1873, after it had been a few days in strong brine. The other arm was destroyed and no description was made; but the portion secured was estimated by the fishermen to have been 6 feet long and 10 inches in diameter; it was evidently one of the eight shorter sessile arms, and its size was probably overestimated. The fishermen estimated the body of this individual to have been about 60 feet in length and 5 feet in diameter; but if the proportions be about the same as in the specimens since captured, (No. 5 and No. 14), as I believe, then the body could not have been more than about 10 feet long, and 2·5 feet in diameter, and the long arms should have been about 32 feet in length.† Allowing two feet for the head, the total length would, therefore, be about 44 feet.

* See Annals and Magazine of Natural History, IV, xiii, p. 68, Jan., 1874; and "The Field," Dec. 13, 1873. The central line of this photograph is reduced four and a quarter times, while the front part is reduced about four times.

† Doubtless these long arms are very contractile, and changeable in length, like those of the ordinary squids.

No. 3.—Coombs' Cove specimen, 1872. (*A. Harveyi?*, ♀.)

Another specimen (No. 3), probably considerably larger than the last, was captured at Coombs' Cove, Fortune Bay, Newfoundland. The following account has been taken from a newspaper article of which I do not know the precise date,* forwarded to me by Professor Baird, together with a letter, dated June 15, 1873, from the Hon. T. R. Bennett, of English Harbor, N. F., who states that he wrote the article, and that the measurements were made by him, and are perfectly reliable.†

"Three days ago, there was quite a large squid run almost ashore at Coombs' Cove, and some of the inhabitants secured it. The body measured 10 feet in length and was nearly as large round as a hogshead. One arm was about the size of a man's wrist, and measured 42 feet in length; the other arms were only 6 feet in length, but about 9 inches in diameter, very stout and strong. The skin and flesh were 2·25 inches thick, and reddish inside as well as out. The suction cups were all clustered together, near the extremity of the long arm, and each cup was surrounded by a serrated edge, almost like the teeth of a hand-saw. I presume it made use of this arm for a cable, and the cups for anchors, when it wanted to come to, as well as to secure its prey, for this individual, finding a heavy sea was driving it ashore, tail first, seized hold of a rock and moored itself quite safely until the men pulled it on shore."

Mr. Bennett, in a memorandum subsequently given to Mr. Sanderson Smith, and communicated to me by him, states that both the tentacular-arms were present and that the shorter one was 41·5 feet in length. The large diameter of the short arms, compared with their length, and with that of the long arms, and their shortness compared with the length of the body, are points in which this specimen apparently differed essentially from those that have been preserved and are better known. It was probably a female. The total length, as I understand the measurements, was 52 feet.

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* The exact date of this capture I do not know, but it was probably in the autumn or winter of 1872.

† Through Mr. Sanderson Smith, who visited Mr. Bennett after the publication of my former articles, I learn that this specimen is the same as the one designated as No. 6 in my previous papers, and that the measurements of No. 6, as given to me by Mr. Harvey, are incorrect, owing to a mistake in supposing that 42 feet was the *total length*, instead of the length of the longer tentacular-arm.

No. 4.—Bonavista Bay specimen. (*A. Harveyi?*.)

PLATE XVI, FIGURES 5, 6.

A pair of jaws and two of the suckers from the tentacular-arms were forwarded to me by Professor Baird of the Smithsonian Institution. These were received from Rev. A. Munn, who writes that they were taken from a specimen that came ashore at Bonavista Bay, Newfoundland; that it measured thirty-two feet in length (probably the entire length, including the tentacular-arms); and about six feet in circumference. The jaws are large and broad, resembling those of No. 5, both in size and form, but much thinner than those of No. 1, and without the deep notch and angular lobe seen in that specimen. The suckers also agree with those of No. 5, but are a little smaller.

No. 5.—Logie Bay specimen, 1873. (*Architeuthis Harveyi*, type.)

PLATE XIII. PLATE XIV. PLATE XV, FIGURES 1, 2, 3. PLATE XVI, FIGURES 1 TO 4.

A complete specimen was captured in November, 1873, at Logie Bay, near St. John's, Newfoundland. It became entangled in herring-nets and was secured by the fishermen with some difficulty, and only after quite a struggle, during which its head was badly mutilated and severed from the body, and the eyes, most of the siphon-tube, and part of the front edge of the mantle were destroyed. It is probable that this was a smaller specimen of the same species as No. 2. Fortunately this specimen was secured by the Rev. M. Harvey of St. John's. After it had been photographed and measured, he attempted to preserve it entire in brine, but this was found to be ineffectual, and after decomposition had begun to destroy some of the most perishable parts, he took it from the brine and, dividing it into several portions, preserved such parts as were still undecomposed in strong alcohol. These various portions have all been examined by me and part of them are now in my possession, and with the photographs have enabled me to present a restoration, believed to be tolerably accurate, of the entire creature (plate XIV). In this figure the eyes, ears, siphon-tube and front edge of the mantle have been restored from a small squid (*Ommastrephes*). The other parts have been drawn directly from the photographs and specimens.* There were two photographs of the

* The figure was originally made, from the photographs only, by Mr. P. Rœtter, of the Museum of Comparative Zoology, but after the arrival of the specimens it had to be altered in many parts. These necessary changes were made by the writer, after a careful study of the parts preserved, in comparison with the photographs and original measurements. As published in my former papers, the eyes and back of the head of

specimen:* one showing the entire body, somewhat mutilated anteriorly; the other showing the head with the ten arms attached (plate XIII). The body or mantle of this specimen was about seven feet long, and between five and six feet in circumference; the relatively small caudal fin was arrow-shaped and twenty-two inches broad, but short, thick, and very pointed at the end; the two long tentacular-arms were twenty-four feet in length, and two and a half inches in circumference, except at the broader part near the end; the largest suckers, which form two regular alternating rows, of twelve each, were 1·25 inches in diameter, with serrated edges. There is also an outer row of much smaller suckers, alternating with the large ones, on each margin; the terminal part is thickly covered with small serrated suckers; and numerous small suckers and tubercles are crowded on that portion of the arms where the enlargement begins, before the commencement of the rows of large suckers. The arrangement of the suckers is nearly the same as on the long arm of No. 2, but in the latter the terminal portion of the arm, beyond the large suckers, as shown in the photographs, is not so long, tapering, and acute, but this may be due to the different conditions of the two specimens. The eight short arms were each six feet long; the two largest were ten inches in circumference at base; the others were 9, 8 and 7 inches. These short arms taper to slender acute tips, and each bears about 100 large, oblique suckers, with serrated margins.

The portions of the pen in my possession belong mostly to the two ends, with fragments from the middle region, so that although neither the actual length nor the greatest breadth can be given, we can yet judge very well what its general form and character must have been. It was a broad and thin structure, of a yellowish brown color, and translucent. Its anterior portion (plate XV, fig. 3) resembles that of *Loligo*, but its posterior termination is entirely different, for instead of having a regular lanceolate form, tapering to a point at

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the figure were restored as in *Loligo*. Subsequent studies and additional specimens show that this genus is closely allied to *Ommastrephes*. Therefore, the head would have been more correctly shown had it been restored with reference to that genus, which has been done in this paper. The most obvious difference is in the eyes, which have distinct lids and an anterior sinus.

* Cuts made from these photographs have been published in several magazines and newspapers, but they have been engraved with too little attention to details to be of much use in the discrimination of specific differences. I have, therefore, prepared new figures from these photographs with the greatest care possible. These figures are particularly valuable, as showing the arrangements of the suckers on the short arms.

the posterior end, as in *Loligo*, it expands and thins out toward the posterior end, which is very broadly rounded or irregularly truncate, fading out insensibly, both at the edges and end, into soft membrane. The anterior end, for about an inch and a half, was rapidly narrowed to a pen-like point, as in *Loligo;* from this portion backward the width gradually increases from 1·2 inches to 5 inches, at a point 25 inches from the end, where our specimen is broken off; at this place the marginal strips are wanting, but the width is 5 inches between the lateral midribs (*d*, *d''*), which were, perhaps, half an inch from the margin. Along the center of the shell, there is a strong, raised, rounded midrib, which fades out a short distance from the posterior end, but is very conspicuous in the middle and anterior sections. On each side of the midrib is a lateral rib of smaller size. These at first diverge rapidly from the central one, and then run along nearly parallel with the outer margin and about ·4 of an inch from it, but beyond 11 inches from the point the margins are torn off. Like the midrib the lateral ribs gradually fade out before reaching the posterior end; near the place where they finally disappear, they are about six inches apart.*

No. 6 (of former articles).—Same as No. 3.

No. 7.—Labrador specimen.

Dr. D. Honeyman, geologist, of Halifax, Nova Scotia, has published, in a Halifax paper, a statement made to him by a gentleman who claims to have been present at the capture of another specimen (No. 7) in the Straits of Belle Isle, at West St. Modent, on the Labrador side. "It was lying peacefully in the water when it was provoked by the push of an oar. It looked fierce and ejected much water from its funnel; it did not seem to consider it necessary to discharge its sepia, as mollusca of this kind generally do, in order to cover their escape." . . . . "The length of its longest arm was 37 feet; the length of the body 15 feet; whole length 52. The bill was very

* Mr. Harvey published popular accounts of this specimen and of the previously captured arm of the larger one (No. 2), in the Maritime Monthly Magazine of St. John, N. B., for March, 1874, and in several newspapers. Acknowledgments are also due to Mr. Alexander Murray, Provincial Geologist, who coöperated with Mr. Harvey in the examination and preservation of these specimens, and who has also written some of the accounts of them that have been published. See also the American Naturalist, vol. viii, p. 122, February, 1874; American Journal of Science, vol. vii, p. 460; Nature, vol. ix, p. 322, February 26, 1874; and Appleton's Journal, January 31, 1874; Forest and Stream, p. 356 (with figure), Jan., 1874.

large. The suckers of its arms or feet, by which it lays hold, about 2 inches in diameter. The monster was cut up, salted, and barreled for dog's meat." In this account the length given for the 'body' evidently includes the head also. This creature was probably disabled, and perhaps nearly dead, when discovered at the surface, and this seems to have been the case with most of the specimens hitherto seen living. Animals of this sort probably never float or lie quietly at the surface when in good health.

Nos. 8 and 9.—Lamaline specimens, 1870-71.

Mr. Harvey refers to a statement made to him by a clergyman, Rev. M. Gabriel, that two specimens (Nos. 8 and 9), measuring respectively 40 and 45 feet in total length, were cast ashore at Lamaline, on the southern coast of Newfoundland, in the winter of 1870–71.

No. 10.—Sperm Whale specimen. (*Architeuthis princeps.*)

PLATE XVIII, FIGURES 1, 2.

This specimen, consisting of both jaws, was presented to the Peabody Academy of Science, at Salem, Mass., by Captain N. E. Atwood, of Provincetown, Mass. It was taken from the stomach of a sperm whale, but the precise date and locality are not known. It was probably from the North Atlantic. The upper jaw was imperfectly figured by Dr. Packard in his article on this subject.* It is one of the largest jaws yet known, and belonged to an apparently undescribed species, which I named *Architeuthis princeps*, and described in my former papers, with figures of both jaws.

No. 11.—Second Bonavista Bay specimen, 1872.

The Rev. M. Harvey, in a letter to me, stated that a specimen was cast ashore at Bonavista Bay, December, 1872, and that his informant told him that the long arms measured 32 feet in length, and the short arms about 10 feet in length, and were "thicker than a man's thigh." The body was not measured, but he thinks it was about 14 feet long, and very stout, and that the largest suckers were 2·5 inches in diameter. The size of the suckers is probably exaggerated, and most likely the length of the body also. It is even possible that this was the same specimen from which the beak and suckers described as No. 4, from Bonavista Bay, were derived, for the date of capture of that specimen is unknown to me. The latter, however, was much smaller than the

* American Naturalist, vol. vii, p. 91, 1873.

above measurements, and it will, therefore, be desirable to give a special number (11) to the present one.

No. 12.—Harbor Grace specimen, 1874-75.

Another specimen, which we have designated as No. 12, was cast ashore in the winter of 1874–1875, near Harbor Grace, but was destroyed before its value became known, and no measurements were given.

No. 13.—Fortune Bay specimen, 1874.

PLATE XVII.

A specimen was cast ashore December, 1874, at Grand Bank, Fortune Bay, Newfoundland. As in the case of several of the previous specimens, I was indebted to the Rev. M. Harvey for early information concerning this one, and also for the jaws and one of the large suckers of the tentacular-arms, obtained through Mr. Simms, these being the only parts preserved. Although this specimen went ashore in December, Mr. Harvey did not hear of the event until March, owing to the unusual interruption of travel by the severity of the winter. He informed me that Mr. George Simms, Magistrate of Grand Bank, had stated in a letter to him that he examined the creature a few hours after it went ashore, but not before it had been mutilated by the removal of the tail by the fishermen, who finally cut it up as food for their numerous dogs; and that the long tentacular arms were 26 feet long and 16 inches in circumference; the short arms were about one-third as long as the long ones; the "back of the head or neck was 36 inches in circumference," (evidently meaning the head, behind the bases of the arms); the length of the body "from the junction to the tail" was 10 feet, (apparently meaning from the base of the arms to the origin of the caudal fins). He thought that the tail, which had been removed, was about one-third as long as the body, but this was probably overestimated. In No. 14 the tail, from its origin or base, was about one-fifth as long as the balance of the body and head. Applying the same proportions to No. 13, the head and body together would have been 12 feet. In a letter to me, dated Oct. 27, 1875, Mr. Simms confirmed the above measurements, but stated that the long arms had been detached, and that the bases of the arms measured as those of the tentacular-arms (they had previously been cut off about a foot from the head), were triangular in outline, the sides being respectively 5, 6, 5 inches in breadth, the longest or outer side being convex and the two lateral sides straight.

He moreover says that *all* the arms were covered with large suckers, *from the base outward.* Hence it is probable that he made a mistake as to these stumps, and that they really belonged to a pair of sessile arms. Probably the tentacular-arms, when extended, had been cut off so close to their contractile bases that their stumps had afterwards become contracted within their basal pouches, and were, therefore, overlooked. He adds that the body was three feet broad (doubtless it was much flattened from its natural form), and that the measurements were made while the body lay upon uneven ground, so that its exact length could not be easily ascertained, and that the caudal-fin had been cut off at its base. As the tail-fins of Nos. 5 and 14 were about one-fifth the length of the rest of the body and the head together, this specimen, if belonging to either of those species, should have been about 12 feet from the base of the arms to the tip of the tail.

The large sucker, in my possession, is one inch in diameter, across the denticulated rim, and in form and structure agrees closely with those described and figured by me from the tentacular-arms of Nos. 4, 5 and 14, (Plate XVI, figs. 3, 5, 6, and Plate XVII, figures 1, 1ª).

The jaws are still attached together, in their natural position, by the cartilages. They agree very closely in form with the large jaws of *Architeuthis princeps* V. (No. 10), figured on Plate XVIII, but they are about one-tenth smaller.

No. 14.—Catalina specimen, 1877. (*Architeuthis princeps.*)

PLATE XVII, FIGS. 1–5. PLATE XIX. PLATE XX.

A nearly perfect specimen of a large squid, was found cast ashore after a severe gale, at Catalina, Trinity Bay, Newfoundland, Sept. 24, 1877. It was living when found. It was exhibited for two or three days at St. John's, and subsequently was carried in brine to New York, where it was purchased by Reiche & Brother for the New York Aquarium. There I had an opportunity to examine it, very soon after its arrival.* I am also indebted to the proprietors of the aquarium for some of the loose suckers. Other suckers from this specimen were sent to me from Newfoundland, by the Rev. M. Harvey. Although

* See American Journal of Science and Arts, vol. xiv, p. 425, Nov., 1877. When examined by me it was loose in a tank of alcohol. Dr. J. B. Holder gave me valuable assistance in making this examination, and also made one of the drawings of the caudal fin. It was afterwards "prepared" for exhibition by a taxidermist, who misplaced the arms, siphon, and other parts, and inserted two large, round [illegible] eyes close together on the top of the head!

somewhat mutilated, and not in a very good state of preservation when received, it is of great interest, being, without doubt, the largest and best specimen ever preserved. The Catalina specimen, when fresh,* was 9·5 feet from tip of tail to base of arms; circumference of body, 7 feet; circumference of head, 4 feet; length of tentacular-arms, 30 feet; length of longest sessile arms (ventral ones), 11 feet; circumference at base, 17 inches; circumference of tentacular arms, 5 inches; at their expanded portion, 8 inches. Length of upper mandible, 5·25 inches; diameter of large suckers, 1 inch; diameter of eye-openings, 8 inches. The eyes were destroyed by the captors. It agrees in general appearance with *A. Harveyi* (No. 5), but the caudal fin is broader and somewhat less acutely pointed than in that species, as seen in No. 5; it was two feet and nine inches broad, when fresh, and broadly sagittate in form. The dried rims of the large suckers are white, with very acutely serrate margins; the small smooth-rimmed suckers, with their accompanying tubercles, are distantly scattered along most of the inner face of the tentacular arms, the last ones noticed being nineteen feet from the tips. The sessile arms present considerable disparity in length and size, the ventral ones being somewhat larger and longer than the others, which were, however, more or less mutilated when examined by me; the serrations are smaller on the inner edge than on the outer edge of the suckers. On the smaller suckers the inner edge is often without serrations.

No. 15.—Hammer Cove specimen, 1876.

In a letter from Rev. M. Harvey, dated Aug. 25, 1877, he states that a big squid was cast ashore Nov. 20, 1876, at Hammer Cove, on the southwest arm of Green Bay, in Notre Dame Bay, Newfoundland. When first discovered by his informant it had already been partially devoured by foxes and sea-birds. Of the body, a portion 5 feet long remained, with about 2 feet of the basal part of the arms. The head was 18 inches broad; tail, 18 inches broad; eye-sockets, 7 by 9 inches; stump of one of the arms, 2·5 inches in diameter.

The only portion secured was a piece of the 'pen' about 16 inches long, which was given to Mr. Harvey.

No. 16.—Lance Cove specimen, 1877. (*Architeuthis princeps ?*, ♀.)

In a letter dated Nov. 27, 1877, Mr. Harvey gives an account of another specimen which was stranded on the shore at Lance Cove,

* Measurements of the freshly caught specimen were made by the Rev. M. Harvey, at St. John's, and communicated to me.

Smith's Sound, Trinity Bay, about twenty miles farther up the bay than the locality of the Catalina Bay specimen (No. 14). He received his information from Mr. John Duffet, a resident of the locality, who was one of the persons who found it and measured it. His account is as follows: "On Nov. 21, 1877, early in the morning, a 'big squid' was seen on the beach, at Lance Cove, still alive and struggling desperately to escape. It had been borne in by a 'spring tide' and a high inshore wind. In its struggles to get off it ploughed up a trench or furrow about thirty feet long and of considerable depth by the stream of water that it ejected with great force from its siphon. When the tide receded it died. Mr. Duffet measured it carefully, and found that the body was nearly 11 feet long (probably including the head); the tentacular-arms, 33 feet long. He did not measure the short arms, but estimated them at 13 feet, and that they were much thicker than a man's thigh at their bases. The people cut the body open and it was left on the beach. It is an out-of-the-way place, and no one knew that it was of any value. Otherwise it could easily have been brought to St. John's, with only the eyes destroyed and the body opened." It was subsequently carried off by the tide, and no portion was secured.

This was considerably larger than the Catalina specimen.

The great thickness of the short arms of this specimen, and of some of the others, indicates a species distinct from *A. Harveyi*, unless the sexes of that species differ more than is usual in this respect, among the smaller squids. The length of the sessile arms, if correctly stated, would indicate that this specimen belonged to *A. princeps*. In the female *Ommastrephes illecebrosa*, the common northern squid, the head is larger and the short arms are stouter and have larger suckers than in the male, of the same length.

No. 17.—Trinity Bay specimen, 1877.

Mr. Harvey also states that he had been informed by Mr. Duffet that another very large 'big squid' was cast ashore in October, 1877, about five miles farther up Trinity Bay than the last. It was cut up and used for manure. No portions are known to have been preserved, and no measurements were given.

No. 18.—Thimble Tickle specimen, 1878.

The capture of this specimen has been graphically described by Mr. Harvey, in a letter to the Boston Traveller, of Jan. 30, 1879.

"On the 2d day of November last, Stephen Sherring, a fisherman

residing in Thimble Tickle, not far from the locality where the other devil-fish [No. 19], was cast ashore, was out in a boat with two other men; not far from the shore they observed some bulky object, and, supposing it might be part of a wreck, they rowed toward it, and, to their horror, found themselves close to a huge fish, having large glassy eyes, which was making desperate efforts to escape, and churning the water into foam by the motion of its immense arms and tail. It was aground and the tide was ebbing. From the funnel at the back of its head it was ejecting large volumes of water, this being its method of moving backward, the force of the stream, by the reaction of the surrounding medium, driving it in the required direction. At times the water from the siphon was black as ink."

"Finding the monster partially disabled, the fishermen plucked up courage and ventured near enough to throw the grapnel of their boat, the sharp flukes of which, having barbed points, sunk into the soft body. To the grapnel they had attached a stout rope which they had carried ashore and tied to a tree, so as to prevent the fish from going out with the tide. It was a happy thought, for the devil-fish found himself effectually moored to the shore. His struggles were terrific as he flung his ten arms about in dying agony. The fishermen took care to keep a respectful distance from the long tentacles, which ever and anon darted out like great tongues from the central mass. At length it became exhausted, and as the water receded it expired.

"The fishermen, alas! knowing no better, proceeded to convert it into dog's meat. It was a splendid specimen—the largest yet taken—the body measuring 20 feet from the beak to the extremity of the tail. It was thus exactly double the size of the New York specimen, and five feet longer than the one taken by Budgell. The circumference of the body is not stated, but one of the arms measured 35 feet. This must have been a tentacle."

No. 19.—Three Arms specimen, 1878. (*Architeuthis princeps ?.*)

Mr. Harvey has also given an account of this specimen, in the same letter to the Boston Traveller, referred to under No. 18. This one was found cast ashore after a heavy gale of wind, Dec. 2, 1878, by Mr. William Budgell, a fisherman residing at a place called Three Arms. It was dead when found, and was cut up and used for dog meat. Mr. Harvey's account is as follows:

"My informant, a very intelligent person, who was on a visit in that quarter on business, arrived at Budgell's house soon after he

had brought it home in a mutilated state, and carefully measured some portions with his own hand. He found that the body measured 15 feet from the beak to the end of the tail, which is five feet longer than the New York specimen. The circumference of the body at its thickest part was 12 feet. He found only one of the short arms perfect, which was 16 feet in length, being five feet longer than a similar arm of the New York specimen, and he describes it as "thicker than a man's thigh." The statement that the sessile arms were longer than the head and body together, indicates that this was a specimen of *A. princeps*, like No. 14, but larger.

No. 20.—Banquereau specimen, 1878. (*Architeuthis megaptera* V. ?.)

This consists of the terminal part of a tentacular arm, which was taken by Capt. J. W. Collins and crew, of the schooner "Marion," from the stomach of a large and voracious fish (*Alepidosaurus ferox*) together with the only specimen hitherto discovered of the remarkable squid, *Histioteuthis Collinsii* V. The fish was taken on a halibut trawl-line, N. lat. 42° 49′; W. long. 62° 57′, off Nova Scotia, 1879. This fragment, after preservation in strong alcohol, now measures 18 inches in length. It includes all the terminal club, and a portion of the naked arm below it. The club is narrow, measuring but ·75 inch across its front side, while the naked arm is 1·25 broad, and rather flat, where cut off. From the commencement of the large suckers to the tip, it measures 9·25 inches. It had lost most of its suckers, so that it cannot be identified with certainty. Part of the large suckers and some of the marginal ones still remain, though the horny rings are gone; diameter of large suckers, ·50 inch; of marginal ones, about ·12. The suckers have the same form and arrangement as in the larger specimens of *Architeuthis*. It may, perhaps, belong to *Architeuthis megaptera*, or to a young *A. Harveyi*.

No. 21.—Cape Sable specimen. (*Architeuthis megaptera* V.)

PLATE XXI.

This specimen was found thrown on the shore near Cape Sable, N. S., after a very severe gale, several years ago. It is preserved in alcohol, entire, and in good condition, in the Provincial Museum at Halifax, where it is well exhibited in a large glass jar. It is the type specimen of *Architeuthis megaptera*, described by me, Sept., 1878.* It is a comparatively small species, its total length being but 43

* American Journal of Science, xvi, p. 207, 1878.

inches; its head and body together, 19 inches; body alone, 14 inches; its tentacular-arms, 22 and 24 inches; short arms, from 6·5 to 8·5 inches; tail-fin, 13·5 inches broad and 6 long.

This species differs widely from all the others in the relatively enormous size and breadth of its caudal fin, which is nearly as broad as the body is long, and more than twice as broad as long. It will form the type of a new generic group.

No. 22.—Brigus specimen, 1879.

Mr. Harvey states that portions of another large squid were cast ashore near Brigus, Conception Bay, in October, 1879.

Two of the short arms, each measuring eight feet in length, were found with other mutilated parts, after a storm.

No. 23.—James's Cove specimen, 1879.

From Mr. Harvey I have also very recently received an account of another specimen, which was captured entire about the first of November last, at James's Cove, Bonavista Bay, N. F. It seems to have been a fine and complete specimen, about the size of the Catalina Bay specimen (No. 14). Unfortunately the fishermen, as usual, indulged immediately in their propensity to cut and destroy, and it is doubtful if any portion was preserved. The account referred to was published in the *Morning Chronicle*, of St. John's, N. F., Dec. 9, 1879, and was credited to the *Harbor Grace Standard*. The author of the article is not given. The following extract contains all that is essential: "A friend at Musgrave Town sends us the following particulars relative to the capture of a big squid at James's Cove, Goose Bay, about a month ago. Our correspondent says: Mr. Thos. Moores and several others saw something moving about in the water, not far from the stage. Getting into a punt they went alongside, when they were surprised to see a monstrous squid. One of the men struck at it with an oar, and it immediately struck for the shore, and went quite upon the beach. The men then succeeded in getting a rope around it, and hauled it quite ashore. It measured 38 feet altogether. The body was about 9 feet in length, and two of its tentacles or horns were 29 feet each. There were several other smaller horns, but they were not so long. The body was about 6 feet in circumference. When I saw it, it was in the water, and was very much disfigured, as one of the men had thoughtlessly cut off the two longest tentacles, and had ripped the body partly open, thereby completely spoiling the appearance of the creature. The foregoing particulars I obtained from Mr. Moores."