

FROM NATURAL PHILOSOPHY TO
NATURAL SCIENCE: A CASE-
STUDY OF THE GIANT SQUID

CENTRE FOR NEWFOUNDLAND STUDIES

**TOTAL OF 10 PAGES ONLY
MAY BE XEROXED**

(Without Author's Permission)

ALISON J. EARLE



100306





National Library of Canada

Cataloguing Branch
Canadian Theses Division

Ottawa, Canada
K1A 0N4

Bibliothèque nationale du Canada

Direction du catalogage
Division des thèses canadiennes

NOTICE

The quality of this microfiche is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us a poor photocopy.

Previously copyrighted materials (journal articles, published tests, etc.) are not filmed.

Reproduction in full or in part of this film is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30. Please read the authorization forms which accompany this thesis.

**THIS DISSERTATION
HAS BEEN MICROFILMED
EXACTLY AS RECEIVED**

AVIS

La qualité de cette microfiche dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de mauvaise qualité.

Les documents qui font déjà l'objet d'un droit d'auteur (articles de revue, examens publiés, etc.) ne sont pas microfilmés.

La reproduction, même partielle, de ce microfilm est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30. Veuillez prendre connaissance des formules d'autorisation qui accompagnent cette thèse.

**LA THÈSE A ÉTÉ
MICROFILMÉE TELLE QUE
NOUS L'AVONS REÇUE**

FROM NATURAL PHILOSOPHY TO NATURAL SCIENCE:

A CASE-STUDY OF THE GIANT SQUID.

by



Allison J. Earle

A Thesis submitted in Partial Fulfillment of the
Requirements for the Degree of Master of Arts,

Department of History,

Memorial University of Newfoundland.

July, 1977.

ABSTRACT

The middle years of the nineteenth century were critical ones in the study of the cephalopods when so many of the oceanic species were being discovered and described for the first time. Naturalists frequently discussed the correct classification of these new species, and one that elicited not only scientific but also popular interest, was the study of the species of giant cephalopods.

The early debates on the possible existence of giant squids, and then on their taxonomy can be divided into three main periods. The first was the pre-scientific period, intimately involved with the literary tradition that supported the existence of giant cephalopods or sea monsters. The second period is contained within the years 1847 to 1873, and is here recognized as the start of scientific research on giant squids. In 1847 a Danish zoologist, Japetus Steenstrup, began a serious investigation which resulted in 1856 in his describing the giant squids within a new genus which he called Architeuthis. His work was not generally known, and there was only limited research done in the years between 1856 and 1873. In the latter year the Rev. Moses Harvey of St. John's, Newfoundland, obtained a complete specimen, and this new evidence greatly enhanced the hitherto

limited research carried out on giant squids. The publicity he generated brought the giant squids to the attention of layman and scientist alike, and initiated study of these hitherto elusive creatures.

The people involved in this study of the giant squid also present a chance to study the very changes that were being made in the nature of biological study. While the middle years of the nineteenth century were critical ones in the study of the cephalopods, they were also critical in the style of investigation of biology. Harvey and Steenstrup represented the transition from the amateur to the professional scientist; the two still co-existed, but the amateur was ceasing to be an instigator of scientific achievements and becoming a mere collector for the professional.

ACKNOWLEDGEMENTS

I am deeply indebted to my supervisor, Dr. S. Pierson, for his encouragement, guidance, and advice in the preparation of this dissertation, and to Dr. F.A. Aldrich, Dean of Graduate Studies in the Memorial University of Newfoundland, for much information and assistance on all matters connected with Architeuthis.

TABLE OF CONTENTS

	Page
Chapter I	1
Chapter II	22
Chapter III	50
Conclusion	90
Appendix 1 - Schematic Diagram of a Squid	96
Appendix 2 - The Family <u>Architeuthidae</u>	97
Appendix 3 - Steenstrup's Works	98
Bibliography	99

CHAPTER I

The existence, or non-existence, of monsters, whether terrestrial or aquatic, has been a theme which has occupied the mind of mankind from the earliest times onward.¹ One need only glance at the Homeric tale of the epic return of Ulysses from Troy, or, in a later age, of the miraculous voyage of Brendan² to the Isles of the Blessed, to see how the wonderful and the monstrous occupied the minds of both writer and reader.³ In our own age speculation on the Loch Ness monster and on U.F.O.'s appear regularly, if not frequently, in the popular press. One such monster that

¹Folklorists have long been interested in reports of terrestrial and sea monsters and have recorded instances of their appearances in cultures in many areas around the world. The sources are both old traditional tales and modern accounts, an example of the latter being the yeti and Loch Ness monster. See Fletcher S. Bassett, Legends and Superstitions of the Sea and of Sailors, In all Lands and at all Times (Chicago and New York: Belford Clarke and Co. 1885) and David Cohen, A Modern Look at Monsters (New York: Dodd Mead and Co. 1970).

²For the voyage of Brendan (ca 484-ca 577) see Navigatio Sancti Brendani Abbatis, edited by Carl Selmer (South Bend, Indiana: University of Notre Dame Publications, 1969, "University of Notre Dame Publications in Medieval Studies", vol. XVI).

³Maps of the 15th-18th centuries show the seas and foreign lands populated with the most incredible "beasties". See R.A. Skelton, Decorative Printed Maps of the 15th-18th Centuries (London: Staple Press, 1952).

has persisted in our own legends is of a huge, many armed creature of cephalopodic form, the Kraken.

Literary traditions which tend to support our belief in the existence of giant cephalopods can be traced back as far as Homer. With a little imagination, we might, perhaps, see in Scylla a much exaggerated and mythologized representation of a giant octopus. Here is the description from Bk. XII of the Odyssey:

But half-way up the crag there is a misty cavern... It is the home of Scylla, the creature with the dreadful bark. It is true that her yelp is no louder than a new born pup's, but she is a horrible monster nevertheless, and one whom nobody could look at with delight. She has twelve feet, all dangling in the air, and six long necks, each ending in a grisly head with triple rows of teeth, set thick and close, and darkly menacing death. Up to her middle she is sunk in the depths of the cave, but her heads protrude from the fearful abyss, and thus she fishes from her own abode, scouting around the rock for any dolphin or swordfish she may catch.⁴

Admittedly one must use some imagination to see Scylla as a giant octopus, but there are certain similarities. For instance, it has been observed that some cephalopods do make a crying sound, caused by the exhalation of air through the siphon. And the octopus is a cave dweller, really a very passive animal, which lies in wait to ambush unsuspecting prey; then its tentacles issue forth, each seemingly guided by an intelligence of its own, to trap the unfortunate victim.

⁴ Homer, The Odyssey, Translated by E.V. Rieu (Penguin Books, 1946), p. 191.

Aristotle in his Historia Animalium carefully distinguished between the octopus, the sepia and the squid, and his remarks on some of their characteristics have again shown him to be both a sophisticated and accurate observer.⁵ He was the first, for example, to describe the hectocotylized arm of the cephalopods, and to regard it (at least in one passage) as an external male genital organ which is introduced into the funnel of the female. It was not until the nineteenth century that this phenomenon was again understood by modern zoologists.⁶

In his discussion of the squid he made reference to two distinct varieties: "the squid, both large and small, have a pair of tentacles in addition to their eight feet."⁷ (We say the 'arms' of a cephalopod. Aristotle more correctly called them feet, 'poda', hence the name cephalopoda - head-footed.) The larger squids he referred to as 'TEUTHOS', the smaller as 'TEUTHIS'. However, while Teuthos was considerably larger than Teuthis, it did not approach the

⁵ See Aristotle, Historia Animalium, translated by A.L. Peck (London: William Heinemann Ltd., 1969), Book IV, Chap. I. An excellent guide to Aristotle's researches in marine biology and their modern equivalents is W. d'Arcy Thompson, A Glossary of Greek Fishes (London: Oxford University Press, 1957).

⁶ See Aristotle, op. cit. Book IV, Chap. I (524a). In other passages, Aristotle is not quite so certain that this arm is associated with copulation. For a useful discussion of this question, see pp. 6-7 fn. b. of A.L. Peck's translation. See also F.J. Cole, A History of Comparative Anatomy (London: MacMillan and Co. Ltd., 1944), pp. 28-33.

⁷ Aristotle, op. cit. Book IV, Chap. I.

4
dimensions of the giant squid. Teuthos was perhaps seven or eight feet in length, while Architeuthis, the giant squid, averages about thirty feet.

According to Aristotle teuthos, though rarer than teuthis, the common squid, was reasonably well known to fishermen and mariners. Teuthos cannot be confused with the 'true' giant squids. Aristotle made no direct reference to really gigantic squids, but he did mention that fishermen had seen animals in the sea "like beams of wood, black, round and the same thickness throughout their length; and other creatures similar to shields, red in colour with close packed fins."⁸ Some popular writers have suggested that such creatures might be references to giant squids.⁹ However, the Architeuthids, while found in most of the world's oceans, have not been reported from the Mediterranean, and the likelihood of the creatures described above being giant squids is extremely limited.

A geographically more plausible account of a possible giant squid may be witnessed in an account found in Pliny's Natural History. He also devoted some time to the discussion

⁸ Aristotle, Historia Animalium (p. 59) 523b. 15ff.

⁹ For example, Bernard Heuvelmans; In the Wake of the Sea-Serpent (London: Rupert-Davis, 1968).

of the cephalopods, and while most of it is very similar to Aristotle's presentation, he also included accounts of a monstrous cephalopod.

In a section on remarkable aquatic animals he mentioned that the largest animal in the Gulf of Cadiz was the 'arbor' or 'tree-polypus', "which spreads out such vast branches that it is believed never to have entered the Straits of Gibraltar because of this."¹⁰ Pliny did not include it in his chapter on the cephalopods, an indication that he did not conceive it to be one. But he did devote a section of his general chapter on the cephalopods to an account of a giant polypus.¹¹ Whether or not this 'giant polypus' can be regarded as anything more than just an old wives' tale it must, nevertheless, be included as forming an important part of the literary tradition surrounding these creatures, for in this tale the author specifically designated it to be a giant cephalopod. It is usual for modern authors to interpret such sea monsters as being representatives of giant squids, e.g. the Kraken stories. In Pliny's account no interpretation is necessary, the identity of the creature is not in doubt.

¹⁰ Arbor - The fabulous polypus, which was fancied to have arms like a tree. (Oxford English Dictionary)

¹¹ Polype - Zoology, properly an animal having many feet, or foot-like processes, a cephalopod. Late use (1742) various animals of low organization living in a colony - polype, single individual of a zooid or colony. Ibid.

Pliny, like Aristotle, gave a general account of the three classes of the cephalopods: octopus, sepia and squid (polypus, sepia and loligo). He discussed each group separately, and under the section on the polyps he mentioned a report from the Spanish colony of Baetica, written by one Trebius Niger. It concerned the exploits of a 'giant polypus' which had been in the habit of leaving the sea and stealing the fishermen's salt fish. One night it had been surprised in the middle of its foray by the village dogs, whose barking raised the guards. Needless to say, they were astonished by the dogs' unusual captive: its strangeness, its immense size, and the terrible smell it emitted. After putting up a tremendous struggle the strange apparition was finally subdued by the men. They then proceeded to sever its head from its body. This portion alone was reported to be as large as a ninety gallon cask, the arms (Pliny called them beards) were thirty feet long, and so thick a man could hardly embrace them. Trebius Niger, who called this creature a polype, added that sepia and loligo of a similar size had occasionally been driven ashore.¹²

It is interesting to examine in greater detail this account with a view to analysing the creature represented.

¹² Pliny, Natural History, transl. by H. Rackman (London: William Heinemann Ltd., 1940), Book IX, Chap. xlvii, p. 225.

While such accounts are generally exaggerated, nevertheless, they often contain some elements of truth. For example, Trebius said the creature was in the habit of leaving the sea and moving overland. While it is an exaggeration to say the 'polypes' are capable of moving any great distance overland they are capable of some travel out of water.¹³

When surrounded by the dogs the creature was reported to have scourged them with the "ends of his tentacles and struck them with his longer arms".¹⁴ The translation 'longer arms' would indicate a sepia or squid rather than an octopus (the arms of the latter being of equal lengths). However, the translation here is inaccurate; robustioribus bracchis should not be translated 'longer arms'. Robustus means firm or solid or strong. There is nothing that implies length or longer. A much earlier translation of Pliny (1634) by Philemon Holland said "he drave away the dogs, otherwhiles with the ends of his stronger

¹³W. D'Arcy Thompson, A Glossary of Greek Fishes, p. 207, mentions their ability to leave the sea. He also recounts tales which credit them with stealing grapes or olives. These stories possibly originated in the fact that the eggs of the octopus resemble bunches of grapes or olives lying under the water.

¹⁴Pliny, Natural History, p. 225.

clawes like arms he rapped and knocked them."¹⁵

Whether squid or octopus, the message is clear, the creature could manipulate its arms out of water. It is possible for an octopus or squid to briefly flail its arms about even while stranded.

Finally, there is even a description of the suckers, "with suckers or cups like basins".¹⁶ Such a description sounds very like the suckers of a squid.

The people of the coast would have been familiar with the smaller varieties of cephalopods, but at first glance the local people did not recognize the creature. "Who would have recognized it in such circumstances?"¹⁷ While the account is rather marvelous, the description could conceivably be that of the stranding of a giant cephalopod, which while alive moved its tentacles and when dead and decaying emitted a terrible smell. One further word to help establish the possible reality of this account. The old Roman province of Baetica was that region of southern Spain lying between Portugal and the Straits of Gibraltar. From

¹⁵Philemon Holland, The Natural History of the World - commonly called the Natural History of Plinius Secundus. (London: Islip 1634), p. 251.

¹⁶Pliny, Natural History, p. 225.

¹⁷Ibid.

this region came the story of both the arbor and the giant polypus - perhaps they were one and the same creature. In more recent times giant squids have been reported from just south of this area in the Atlantic.¹⁸

In the case of the giant polypus one should hesitate, before rejecting the story outright as an old wives' tale, for however invented and exaggerated it may appear, one is permitted to presume at least some element of truth.

The Roman writer Aelian (2nd and 3rd century A.D.) recounted a story of giant polypus so similar to Pliny's account that a modern author would in a like case be charged with plagiarism. This monster was reported from the coast of Italy, the change of venue being the only marked difference in the stories. Aelian also diverged on a point of natural history and it is this that makes the account of interest. Pliny and Aristotle had maintained that the life expectancy of the cephalopods was about two years. Aelian attributed to them a much longer life span. To account for the size of this "monstrous octopus" he said, "Octopus naturally with the lapse of time attain to enormous proportions, and approach the crustaceans and are actually

¹⁸The Aleccion incident, off Teneriffe. H. Crosse and P. Fischer, "Nouveaux Documents sur les Céphalopodes gigantesques," Journal de Conchyliologie, 1862, p. 132 - hereafter cited as Crosse et Fischer, "Nouveaux Documents." See below, p. 45.

activities of a certain monstrous fish:

Their forms are horrible, their heads square, all set with prickles and they have sharp and long horns round about like a tree uprooted.²⁴

Magnus' use of the image of a tree uprooted could possibly come from Pliny's arbor, for Magnus was certainly familiar with the writings of Pliny, and quotes liberally from him.

Like Pliny, Magnus relied on second-hand information for his story of the monstrous fish. The engraving of the beast which accompanied his text does not itself resemble a cephalopod, but one might deduce from the written description that the tale was indeed the result of a boat's encounter with a giant of the species.

Guillaume Rondelet in his Histoire des Poissons, published in 1558, described a monster taken off Norway:

In our time there has been caught in Norway after a great tempest, an ocean monster, to which all who saw it incontinently affixed the name of monk; for it had a man's face, rude and ungraceful, with a bald, shining head; on the shoulders, something like a monk's hood: Long winglets, instead of arms; the extremity of the body terminated in a tail.²⁵

²⁴ Olaus Magnus, Historia de gentibus septentrionalibus (Rome, 1555), Book XXI, Chap. V [De Piscibus Monstro.]

²⁵ Quoted in Fletcher S. Bassett, op. cit., p. 206, with diagram.

the great size of an individual could be attributed to its age. Some considered this to be the case with the giant cephalopods. As sightings of these animals were rare it was assumed that they were aged individuals of known existing species.²²

The literature so far has been classical. The references have come, for the most part, from Mediterranean sources. As has been mentioned earlier the known representatives of the genus Architeuthis²³ have been reported from most of the world's oceans, but not in modern times from the Mediterranean. In post-classical times possible and verified sightings of giant squids have come from the North Atlantic off the coasts of Scandinavia, Ireland and Newfoundland, and also from the Pacific off Japan and New Zealand.

The world of Renaissance man was still populated with a host of strange monsters and devils, some of which have since been interpreted as representatives of giant cephalopods. One such account can be found in the work of Olaus Magnus, Historia de gentibus septentrionalibus, published in 1555. He recounts a mariner's tale of the

²²H. Crosse and P. Fischer, "Nouveaux Documents sur les Céphalopodes gigantesques," p. 139.

²³Architeuthis, name given to the genus of the giant squids, from the Greek Archos - ruler, and teuthis - squid.

reckoned as such."¹⁹

This concept of growth, that a cephalopod, or indeed any other animal, could go on growing throughout its lifetime, was one which not infrequently occupied the discussions of later biologists, especially in the nineteenth century.

"Why", asked Herbert Spencer, "should not all organisms, when supplied with sufficient materials, continue to grow as long as they live?"²⁰

Before the laws of genetics were understood scientists could explain the limits of growth only in terms of the restrictions imposed by their physical surroundings, for instance gravitational forces or their own metabolic rates. However, while such theories could explain the growth patterns of warm blooded terrestrial animals they could not explain the limits to growth in cold blooded aquatic animals. In their case the effects of gravity and heating did not hinder unlimited growth as they did for terrestrial animals. There seemed no logical reason why they should not continue to grow.²¹ Great age could be accompanied by great size; or

¹⁹ Aelian, On the Characteristics of Animals, transl. by A.F. Scholfield (London: William Heinemann Ltd., 1959), Vol. III, Bk. XIII, Chap. VI.

²⁰ Herbert Spencer, Principles of Biology (New York: Appleton and Co. 1896), Vol. I, Pt. II, p. 121. [First published in 1864]. He thought it was conceivable that some aquatic animals could continue to grow as long as they lived.

²¹ Ibid., p. 123. See also W. D'Arcy Thompson, On Growth and Form (Cambridge University Press, 1968), Vol. I.

Another account of the creature was given by the historian of Christian III of Denmark and Norway in his Annals published in 1588.²⁶ According to him, in the year 1545 a monstrous fish with the form of a monk was caught in a fishing net in the Kattegat. When taken from the water it made a crying sound like the cries of an infant, and it lived in the net for two days before dying.²⁷

Both Magnus's account and the story of the Sea-monk (monachus marinus) have since been interpreted as early encounters with a giant cephalopod.²⁸ However, a much more definite account of the stranding of a giant squid is to be found in a series of letters written in Ireland in 1673.²⁹

²⁶Reference to Rondelet and the account by Christian III's historian appear in an article by Paul Gervais, "Remarques au sujet des Grandes Céphalopodes décabranchides, constituant le genre Architeuthis", Journal de Zoologie, Vol. V, 1875, pp. 88-92. Gervais, in turn, took his information from an article published by J.J. Steenstrup, "Om den i Kong Christian III's Tid i Øresundet fangne Havmand". Dansk Maanedsskrift, 1855, pp. 63-96.

²⁷Ibid.

²⁸Agnete Volsøe, Jørgen Knudsen and William Rees, The Cephalopod Papers of Japetus Steenstrup (Copenhagen: Danish Science Press, 1962), p. 155. Hereafter cited as The Cephalopod Papers. (See further Fn. 31 of Chapter II of this study.)

²⁹A.G. More, "Notice of a Gigantic Cephalopod which was stranded at Dingle in Kerry two hundred years ago." Zoologist, Vol. 10, No. 118, July 1875, pp. 4526-32. The author was the Assistant Naturalist in the Museum of the Royal Dublin Society. The Library of the Society contained a collection of rare tracts which had been gathered by a London bookseller, Thomas Thorpe. Among the articles was a curious record of the

They are full of news concerning the great "fish" caught at Dingle-I-cosh, Co. Kerry, late in the year 1673.

The creature was discovered by one James Stewart while out riding along the sea-shore. Since the letters, and broadsheet, which was published to announce the exhibition of the 'beast' in Dublin, all give remarkably similar accounts, the descriptions can be assumed to be reasonably accurate.

One Mr. James Stewart whom I know, was a trader of long standing, travelling on the Sea-side at a place in the west of Ireland called Dingle-I-cosh, saw a great fish come swimming on the top of the water, towards the shore, he marked it and made towards it, and laid hold on the Horns, and the Crowns on the Horns had like to taken his fingers off;³⁰ it had two heads, one great one, and a small one coming out of that; on the great head stood ten horns, two were nine and eleven foot apiece: the wreathed horns were full of Crowns, many hundreds of them, about the bigness of a cloak button, and like teeth under the crowns.³¹

(2) ...the mantel was all red on the outside, it was five inches thick, and white underneath; my man took a draught of the picture which I have

occurrence of a large cuttle fish in 1673. There were four letters written by the inhabitants of the area at the time of the stranding; the first three and a description were printed together on a broadsheet in London, and the fourth letter was found in manuscript, and entitled "A Letter from a very Sober person in Dublin, 27th December 1673".

³⁰ The horns refer to the arms, while the crowns were the denticulated suckers of the giant squid.

³¹ Letter from Thomas Hooke of Dublin to Mr. John Wickins, London, Dec. 13, 1673.

enclosed, he said it was as big as any horse,
it had no legs.³²

The remains were put on show in Dublin so that
"all persons who desire to be further satisfied may see
the said little head and two of the Horns with the
Coronets thereon."³³

The Irish letters are the only early references
found to the stranding of a giant cephalopod in the
British Isles. Philemon Holland in his translation of
Pliny's Natural History made lengthy marginal comments, and
when translating sections of Pliny he was in the habit of
making observations on similar phenomena found in Britain;
but when translating the section on giant cephalopods he
made no reference to having heard of any similar unusual
type of monster stranded on an English coast.

There is, however, another seventeenth-century refer-
ence, this one from the coast of Iceland. This account was
found in the annals of Björne á Skardsa for the year 1639. It

³² Thomas Hooke to John Wickins, Dec. 23, 1673.

³³ Broadsheet announcing the exhibition of the
creature in Dublin. All the passages to which Notes 31
to 33 refer may be found in A.G. More, art. cit.

details the stranding of a peculiar sea monster at Thingoresand; a second reference to a similar happening was found in a governor's report for 1791. This concerned a large creature washed ashore at Arnarnaesvik in November or December of 1790. Both these Icelandic reports were included in the Cephalopod Papers of Japetus Steenstrup, and as they will be dealt with later in greater depth a full description of these Icelandic cephalopods will be left until that time.

One of the popular names given to the giant squid was 'Kraken';³⁴ the first to record this name was Erik Pontoppidan in his Natural History of Norway, published in London in 1755.³⁵

I am now come to the third and incontestibly the largest sea monster in the world ... its back, or upper part, which seems to be in appearance about an English mile and a half in circumference³⁶ (some say more, but I chuse the least for greater certainty) looks at first like a number of small

³⁴Kraken, from the Norwegian Krake - a stunted tree or a tree uprooted. Once again the tree image persists.

³⁵Erik Pontoppidan, Det forste Forsag paa Norges Naturlige Historie (Copenhagen, 1752-1753).

³⁶One could explain this enormous size if, instead of one creature, there were several. Squids are gregarious and sometimes group together in schools. However, as so little is really known about the Architeuthids this cannot necessarily be ascribed to them.

islands, surrounded with something that floats and fluctuates like sea-weeds ... at least several bright points or horns appear, which grow thicker and thicker the higher they rise above the surface of the water.³⁷

Having described the creature Pontoppidan tried to postulate just what kind of animal it was. Remarkably, considering its enormous size, he supposed that it could be reckoned as being of the 'Polype' or Star-fish kind.

It seems the parts seen rising at its pleasure and are called arms, are probably tentacular or feeling instruments. With these they move themselves, and likewise gather in their food.³⁸

Pontoppidan thought that Olaus Magnus' monstrous fish and Pliny's arbor agreed with his description of the Kraken. The description of the arbor confirmed his supposition that the animal belonged to the polype or star-fish kind. He even went so far as to suggest that small polypes, which he called Medusa's Heads, were perhaps the young of the Sea Krake. However, while he used the arbor story, he made no reference to Pliny's giant polypus as being a possible Krake. This is unusual on two counts, firstly because he thought the Krake was of a polypus-type, and secondly because in his narrative of other literature on the Krake, he included an

³⁷ Ibid., Pt. 11, Section XI, p. 210.

³⁸ Ibid., p. 212.

account of a creature stranded in the parish of Alstahoug in 1680. Pontoppidan thought it likely that it was a Krake, "perhaps a young and foolish one."³⁹ The animal described bore a closer resemblance to the giant polype than to the arbor.

Pontoppidan concluded his chapter on the Krake with these remarks:

We learn from all this, that the Polype or Starfish, have amongst their various species, some that are much larger than others; and according to all appearances even the very largest inhabitants of the ocean. If the axiom be true, that greatness or littleness makes no change in the species, then this Krake must be of the polypus kind, notwithstanding its enormous size.⁴⁰

The last sentence of this quote is of interest, being directly related to the question of growth discussed earlier in this chapter. It has been difficult to locate the source of the axiom, but it is possible to link it to the ideas of Linnaeus. He had published his work on classification shortly before Pontoppidan completed his Natural History, and it has been suggested that Linnaeus based his taxonomic system on Aristotelian logic.⁴¹ This being the case, then

³⁹ Ibid., p. 216.

⁴⁰ Ibid., p. 217.

⁴¹ A. J. Cain, "Logic and Memory in Linnaeus' System of Taxonomy", Proceedings of the Linnaean Society, London, Vol. 168-169, 1957-1958, pp. 144-163.

logically greatness or littleness need not change the essential nature of the animal, as they are merely changes of degree and not of kind. This, then, in association with the theory of continuous growth could suggest that a giant squid, for example, was just a large, aged representative of a known species and not a representative of a new distinct one.

It must be noted that it was Pontoppidan's choice of the word 'species' that opens this debate. He used the word much more loosely than a modern biologist would, more in our sense of class or group. A discussion of greatness or littleness within a class is completely different from within a species.

Whatever his intentions he had linked the Kraken with the polyps or cephalopods and northern naturalists were much more willing to accept the existence of a giant cephalopod-like creature than their southern counterparts.

However, in the early years of the 1800's a French zoologist, Pierre Denys de Montford, who spent years studying the cephalopods, cited numerous incidents of encounters between men and large cephalopods in his book Histoire générale et particulière des Mollusques. (Paris, 1801). The exploits of his "poulpe colossale" were so imaginative that serious scientists discounted any connection there might be between fact and fancy. De Montford was

later described as an imitator of Pontoppidan, and his writings dismissed.⁴²

Stories about giant cephalopods persisted, and although the more orthodox naturalists remained skeptical as to their reality, a few continued to try to prove their existence.

In 1841 at a meeting of the British Association for the Advancement of Science, Colonel Hamilton Smith, F.R.S., presented a paper entitled "Colossal Sepiadae". Unfortunately the paper was not published, but a brief mention was made of it in the Report of the Association.⁴³ Apparently the author had detailed what was known at that time of the existence in the oceans of animals of enormous size belonging to the class of cephalopods, and he had collected sufficient evidence to convince himself of their existence. He offered as proof illustrations of a beak and other parts of an enormous "sepia" preserved in the Museum of Haarlem.⁴⁴

⁴² Crosse and Fischer, "Nouveaux Documents ...", p. 129.

⁴³ Report of the British Association for the Advancement of Science, 1841.

⁴⁴ This is Teyler's Museum. Unfortunately the present state of the Museum's records makes it impossible to learn anything about the specimen's history. (Personal communication).

While such evidences did exist,⁴⁵ the giant cephalopods were to remain classed with the sea-serpent and mermaid until the middle decade of the nineteenth century. At that time a Danish zoologist, Japetus Steenstrup, commenced a serious study of them.

⁴⁵In an article by W. Saville Kent, "Note on a Gigantic Cephalopod from Conception Bay, Newfoundland", Proceedings of the Zoological Society, London, March 1874, p. 175, he mentioned that in the collection of the British Museum there was preserved an arm of a gigantic cephalopod. No one knew when the museum had acquired it or from where it had come; no study was made of it until 1874 and at that time it had been in the museum for a considerable number of years.

CHAPTER II

Steenstrup made the most valuable contributions to the study of the giant squids in the nineteenth century. It was he who took the old stories and unravelled fact from fiction; he who took the Kraken out of the world of fantasy and introduced it to the nineteenth century as an object for legitimate scientific enquiry.

It is perhaps a matter of scientific and geographic coincidence that Steenstrup's interest was first aroused in these curious phenomena, for he had the good (or bad) fortune to have been born and bred in a country in which the legendary evidence of colossal cephalopods proliferated.

Johannes Japetus Smith Steenstrup was born in Aalborg, Denmark,¹ March 8, 1813, the son of a country parson, and died at Copenhagen, June 20, 1897. In 1832 he entered the University of Copenhagen to study medicine. While there he also attended lectures in geology, botany, archaeology and zoology, and although he never completed his

¹Some place his place of birth in Vang, Norway, e.g. Anonymous, 'In Memoriam', Edinburgh Field Naturalist and Microscopical Society, Transactions, Vol. 3, 1898. But Aalborg is cited as his birthplace by most writers and is the most likely spot.

university degree he went on to do research in all these areas.. As with many naturalists of his day his interests and researches were eclectic. Today when specialization makes this kind of diversification impossible we find it surprising that the nineteenth century naturalist could work so well in such a variety of areas.

For many years Steenstrup was the central figure in Danish zoology.. His career started in 1839 when he was sent by the Danish government to Iceland with the chemist Schytte to do work on fossil plants and volcanic formations.² On his return from Iceland in 1841 he was appointed lecturer in Botany and Geology at the Seeland Academy of Soroe, and it was while there that he contributed his famous essays on 'The Alternation of Generations'³ and 'Hermaphroditism in Nature'

²Why the Danish government financed this expedition was not made clear by any of the sources. However, according to Torben Wolff, Danish Expeditions on the Seven Seas (Copenhagen: Rhodos, 1967), p. 14, Danish governments had long supported such expeditions, starting with the 1791 'Arabian Journey'; an expedition to Arabia to study its natural history. Subsequent governments continued to support later ventures.

³Alternation of generations is a modification of 'normal' reproduction. Usually parents produce offspring that resemble themselves; however, in some plants and animals only first and third generations resemble one another and there is an intermediate asexual generation. This intermediate stage is sexually produced by the first generation and in turn produces the third generation asexually.

by which he gained an international reputation.⁴

In 1845 at the age of thirty-two he was appointed Professor of Zoology at the University of Copenhagen. At about the same time he became the de facto leader of the Danish Natural History Society; both positions he held for over forty years, making him the central figure in Danish zoology. His influence in this area encompassed a considerable part of the nineteenth century, a crucial time in the coming of age of the biological sciences.

The study of marine biology increasingly absorbed Steenstrup's researches. In this he was following a Danish tradition. Indeed, the Danes were for a long time the leaders in the study of marine biology and oceanography, with a history of research going back to the eighteenth century.⁵

⁴ Steenstrup did not discover alternation of generations; indeed, Pierre Lyonet had observed and described the process in the aphids during the eighteenth century. But for some reason the information appears to have been neglected, and nineteenth century scientists gave credit for the discovery to Ludovici de Chamisso and Michael Sars. Steenstrup is remembered for having written the definitive book on the subject, Om Forplantning Og Vdvikling Gjennem Vexlende Generationsraekker, En Saerregen Form For Opfostringen I De Lave Dyreklasser, (Copenhagen, 1842). See Louis Agassiz, Essay on Classification (Cambridge, Mass.: Belknap Press of Harvard University Press, 1962, pp. 91-94 (Alternate Generations)). The Essay was first published in 1857.

⁵ For a brief account of this tradition see R. Sparck, 'Brief Survey of the History of Danish Zoology', Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening, Bd. 115 and Torben Wolff, Danish Expeditions to the Seven Seas (Copenhagen: Rhodos, 1967).

Steenstrup took the initiative to make extensive collections of pelagic animals, persuading ship masters in the merchant marine and navy to use their leisure hours, and such times when their ships lay becalmed, to make notes and systematic observations of interesting marine fauna. Through their efforts many species from the open seas were studied for the first time, and the University of Copenhagen's Zoological Museum amassed one of the best collections of sea life in Europe.⁶

Of the collections brought back Steenstrup concerned himself mostly with parasitic crustaceans and the cephalopods. He wrote no less than thirty-one papers on the latter, and in 1962 twenty-four of them were translated into English for the first time.⁷

⁶The greatest achievement in the realm of marine research was accomplished by the British Challenger Expedition with its circumnavigation of the globe, 1872-1876. But in writing up the report on the Cephalopods, use had to be made of the extensive Danish collection to assist in the identification of the specimens. The Report of the Scientific Findings of the H.M.S. Challenger (London: 1886), Report on the Cephalopoda by J. Hoyle, vol. 16.

⁷The Cephalopod Papers of Japetus Steenstrup.

The study of the cephalopods was at this time still in its infancy. Steenstrup was one of the pioneers in the study of this class of molluscs during the middle years of the nineteenth century.⁸ In a letter to Addison Verrill⁹ of Yale College Steenstrup remarked, "I certainly do take great interest in all Cephalopods, this very difficult class of animals which during so many years has occupied my studies, and of which I have collected so many materials in order to study them in a more scientific way than generally has been the case."¹⁰

Steenstrup and Verrill were at this time (1860's) probably the best known zoologists working on the cephalopods. There were others, notably Richard Owen¹¹

⁸ Of the seven recognized families of the Decapoda (ten armed cephalopods) Steenstrup was credited with the naming of all seven, and of the forty-six known genera he had named twelve.

⁹ Addison Emery Verrill (1839-1927) was an American zoologist. He studied under Louis Agassiz at Harvard and was appointed Professor of Zoology at Yale College in 1864, a post he held until 1907. He was an Associate Editor of the American Journal of Science, 1869-1920. For a full account of his life and work see Wesley R. Coe, 'Addison Emery Verrill and his Contributions to Zoology', American Journal of Science, Fifth Series, Vol. XIII, May 1927, pp. 377-387.

¹⁰ J.J. Steenstrup to A.E. Verrill; Sept. 4, 1875. Steenstrup Collection, Det Kongelige Bibliotek, Copenhagen.

¹¹ Sir Richard Owen (1804-1892). One of the most prominent English naturalists of the nineteenth century, best known for his works on comparative anatomy and for his opposition to Charles Darwin's theory of evolution. The Dictionary of National Biography (London: Oxford University Press, 1917), Article by William Hunt.

and the Frenchmen, Verany,¹² D'Orbigny¹³ and Férussac,¹⁴ but Steenstrup was the outstanding expert on the cephalopods, and he probably had greater insights into cephalopod anatomy and its bearing on classification than his contemporaries.¹⁵

Steenstrup's interest in the case of the giant squids had initially been aroused by two old accounts of sea monsters washed ashore on the coast of Iceland in 1639 and 1790. The 1639 report Steenstrup had found in the Annalar Björns á Skardsa (Annals of Bjorne of Skardsa).¹⁶ The second,

¹²Jean Baptiste Verany, nineteenth century French naturalist. No biographical information could be found on him.

¹³Alcide Dessalines D'Orbigny, French naturalist, 1802-1857. He was Professor of Paleontology at the Musée National d'Histoire Naturelle. He was the first to propose subdivision of geological formations into stages of deposit. He collaborated with Férussac in the writing of Histoire naturelle générale et particulière des Céphalopodes acétabulifères vivants et fossiles (Paris 1832).

¹⁴André Etienne Just Paschal Joseph François d'Andebart, Baron de Férussac (no dates). Nineteenth century French naturalist who collaborated with D'Orbigny in the writing of the Histoire naturelle générale et particulière des Céphalopodes (Paris 1832).

¹⁵For example his paper on 'The Interrelations of the Ommastrephes-like Cephalopods. An Orientation', Overs. Danske Vidensk. Selsk. Forh. (1880-1881) is an impressive examination of the anatomy and taxonomy of the Ommastrephids. Further, Steenstrup comprehended and used the 'type-species', a concept which is the keystone of modern taxonomy. For a description see G.G. Simpson, Principles of Animal Taxonomy (New York: Columbia University Press, 1961).

¹⁶The Cephalopod Papers, p. 225. The annalist lived from 1574-1645 and thus he was alive when the creature was washed up.

in the diaries of the Icelandic naturalist Svein Paulsson¹⁷ who explored Iceland in 1791-1793.

Steenstrup discussed both accounts in a paper¹⁸ he presented to a meeting of Scandinavian naturalists held in Gotheborg in 1849. He prefaced his remarks with a brief statement to the effect that the great size attributed to these animals in ancient times was not necessarily incorrect but merely reflected the poor knowledge 'modern' naturalists had of some more recent forms.

As these accounts formed the basis of Steenstrup's interest in the giant squid they will be presented in the form Steenstrup used in his 1849 paper.

The 1639 account detailed the stranding of a peculiar sea-monster at Thingoresand, Iceland. The

¹⁷ Svein Paulsson (sometimes spelt Svend Poulsen) explored Iceland for the Naturhistorieselskabet (Natural History Society). His complete diaries were presented to the library of the Islands literære Selskab (The Literature Society of Iceland) in Copenhagen by a friend of Steenstrup, Jon Hallgrimson. The Cephalopod Papers, p. 276.

¹⁸ J.J. Steenstrup, 'Meddelelse om tvende kjaempestore Blaeksprutter opdrevne 1639 og 1790 ved Islands Kyst' ('Note on Two Giant Cephalopods drifted ashore in 1639 and 1790 on the coast of Iceland') Forhandlingen vid det Skandinaviske Naturforskare och Lakare hallna Mote i Gotheborg. (Proceedings of the Scandinavian Naturalists and Physicians at the Meeting held in Gotheborg) Møde V, 1849: 950-957, The Cephalopod Papers, pp. 9-13.

description was of a creature whose body (without tentacles) was roughly the size and circumference of a man's:

It had seven tails, and each of these measured approximately two ells [about seven and a half feet]. These tails were densely covered with a kind of button and the buttons looked as if there was an eye-ball with an eye-lid. On this sea monster there was in addition a single tail which had grown out above those seven tails; it was extremely long (twenty-five to thirty feet); no bone or cartilage were found in its body but the whole to the touch and sight was like the soft belly of the female lump fish. No trace was seen of the head, except the one aperture or two which were found behind the tails at a short distance from them.¹⁹

Two eighteenth-century travellers to Iceland, Eggert Olafsen and Bjorne Povelsen upon seeing this statement in the old chronicles, suggested that the annalist had inverted the animal and called tails what in reality were tentacles emanating from the head; since only seven arms and one tentacle were recorded they surmised that the eighth arm and second tentacle had been destroyed.²⁰ It is obvious that they believed that the existence of giant cephalopods was possible.

¹⁹ The Cephalopod Papers, pp. 9-10. (Translated from the Icelandic text of the Annalar Björns á Skárðsa). The Cephalopod Papers, p. 10, has part of the original Icelandic text reprinted.

²⁰ Ibid., p. 10. Steenstrup had read both the annalist's account and Olafsen and Povelsen's comments. Apparently they wrote an account of their travels to Iceland some time in the eighteenth century before 1792, for Paulsson mentions them in his 1791 diary.

Svein Paulsson in his diary for February 1792 referred to a letter he had received from the Prefect of the Northern County of Iceland. The governor, C. Thoravensen, wished to inform Paulsson of some remarkable natural history phenomena that had occurred in his district.

The letter, dated Modrevalløkloster, December 29, 1791, contained the following:

In November or December last winter (1790) a creature drifted ashore in Arnarnaesvik, here in the parish, which people called Kolkrabbe [cuttlefish] as according to them it completely resembled the animal called by that name in all features except the unusual size, since the longest tentacula were more than three fathoms [eighteen feet long]; but the body right from the head was three and a half fathoms [twenty-one feet] long and so thick that a full grown man could hardly embrace it with his arms. The man who had most to do with it only remembered the tentacula were four in number and a total of ten arms in all - just the number ascribed to that species of Sepia. This animal had no bones except the well known one in the back.²¹

Paulsson was familiar with the writings of Olafsen and Povelsen, and presumed this animal was the same as the one they had found described by Bjorne's annalist. He concluded his entry with, "Would not the Kolkrabbe deserve a closer examination than has hitherto been made?"²² Fifty years later Steenstrup was sufficiently impressed by both

²¹Ibid., p. 11 (Paulsson's diary, Feb. 1792, pp. 76-77).

²²Ibid.

accounts to think that they confirmed the theory that some cephalopods did attain huge proportions.

Although the descriptions were vague, like the Irish accounts they were quite clearly recognizable creatures, as opposed to the exaggerated reports presented by Pontoppidan. Steenstrup tried to distinguish enough characteristics to determine to what genus they might possibly belong. Both statements confirmed the old tales that cephalopods could attain great size. From the description both were teuthids - the octopods have eight even-sized tentacles, whereas both accounts mentioned at least one of the appendages as being longer than the others.

The account of the 1639 specimen mentioned that "no cartilage or bones were in its body" and the 1790 account said, "this animal had no bones except the well known one in the back". Now the cephalopods are invertebrates, that is, they have no back bone, but, unlike the other molluscs, they wear their shell internally. The shell of the decapods and octopods has been so changed that it remains only in a much modified form. Of the decapods, the sepia have the largest remaining 'shell'. It is a broad plate-like structure familiar to many people as the 'cuttle' placed in bird cages. The squids have a very much narrower shell called the 'gladius' or 'pen', so named for its sword or old-fashioned pen shape. In the octopus the shell has virtually disappeared, accounting

However, there is one clearly recognizable physical difference between the two families, the eyes. The squids have been divided into two broad groups on the basis of the eye structure, those with myopsid eyes and those with oigopsid eyes. In the former the eyes are covered with a membrane and therefore not in immediate contact with the sea-water; in the latter there is no such membrane and the eye is open. This difference is readily apparent, the oigopsid eye being quite startling in appearance because of its close similarity to the structure of the human eye. The eye was one feature on which witnesses invariably commented.²⁴

The size and appearance of the eye would certainly have arrested the attention of even a casual observer, but in the 1639 report no mention was made of them. Steenstrup considered this silence indicated that the myopsid eyes had escaped notice,²⁵ and that the creature was probably a

²⁴Moses Harvey, 'A Monster of the Deep - Sixty feet in Length - The Kraken or Devil-Fish Seen at Last'. The Royal Gazette and Newfoundland Advertiser, Dec. 9, 1873. Reprinted from the Boston Traveller. Of the eyes Harvey said: "From among the folds a huge beak, and a pair of ghastly green eyes, staring and prominent."

²⁵The Cephalopod Papers, p. 274. It must be mentioned here that whenever giant squids have been stranded the delicate eyes have usually been mutilated or have been completely destroyed.

for the limp, sack-like appearance of its body. The description of the extended tentacles eliminated the possibility of the creatures' being octopus. They were, therefore, either squid or sepia. The 1639 specimen, however, contained "no bones". Although the broad shell of the sepia could not easily have been overlooked, the gladius of the squids is much more flexible and in some species not readily apparent at all. If the gladius were a soft and flexible one, or the animal had been mutilated about the back, the 'shell' could have escaped notice. The creature was almost certainly a squid.

From the general description, and allowing for the possibility of a flexible gladius, Steenstrup thought the Thingoresand creature belonged to the Family Loligidae. The description could also have fitted the closely related Ommastrephidae, but they have a stiff, dark brown, horny ridged gladius which would not have escaped scrutiny. The interpretation of the animal as an elongate Loligo or Ommastrephes is likely from the relative body measurements given:²³

Thingoresand	Body with head	6 feet
	Short arms	3 feet
	Long arms (tentacles)	16-18 feet
	Circumference of body	3-4 feet
Arnarnvaesvik (1790)	Body with head	14 feet
	Long arms	12 feet
	Circumference of body	6 feet

²³ Ibid.; pp. 274-275.

Loligid, since the Ommastrephids are oigopsid.

However, when Steenstrup examined the 1790 reports he found certain discrepancies which called his Loligo classification into doubt. The Arnarnaesvik villagers had specifically referred to the creature as Kolkrabbe. Upon investigation he found that Kolkrabbe was not used just to describe a common squid, but specifically Ommastrephes todarus (Rafinesque). Steenstrup had thought originally that Kolkrabbe referred to Sepia officinalis, for Eg. Olafsen had characterized it as, "Sepia tentaculis decem, corporis parte posteriore crasso, pone acuminato."²⁶ The last two words "pone acuminato" mean pointed behind, which does not describe the very rounded body of the sepia.

When Steenstrup questioned northern people about their kolkrabbe they described an Ommastrephes-like squid, and when shown pictures of elongate squids and asked to choose the one having the closest resemblance to kolkrabbe they chose the oigopsid Ommastrephes.

The 1790 report had said that the monster had resembled kolkrabbe in all features except size, and had mentioned its "usual dorsal bone". As the creature was now identified as an Ommastrephid Steenstrup saw that the phrase had probably referred to the dark horny gladius of the

²⁶ The Cephalopod Papers, p. 277.

Ommastrephids, not, as he had thought, to the cuttlebone of the sepias.

The information contained in the old reports was very limited, but judicious examination had shown that the two specimens could have belonged to two different families, Loligo (1639) and Ommastrephes (1790). The limited information could really lead no further, and Steenstrup was obliged to wait several years for additional evidence of the giant cephalopods.

Steenstrup had tried to recognize the families to which the specimens might have belonged from broad general agreements of body shape; but at no time did he suggest that they were the exaggerated forms of known existing species.

Finally, in January 1854 he received more tangible evidence of the giant squids, and this time the source was much closer to hand. The clergyman²⁷ of the small village of Aalbaek in the Kattegat sent him the jaws of a cephalopod that had been washed ashore in December, 1853; the jaws were remarkable for their enormous size. They were to provide the first direct evidence for the study of giant squids by a scientist.

²⁷ It is interesting, though not really surprising, that local clergyman and physicians were to play an important part in obtaining specimens of stranded cephalopods. The local fishermen saw the stranded carcasses as an enormous supply of fish bait; the clergyman, an educated man, probably with an amateur's interest in natural history, appreciated the carcasses for their scientific value. Steenstrup himself, as we have noted above (p. 22), was the son of a clergyman.

Unfortunately, Steenstrup's attempts to obtain detailed descriptions of the animal were severely hindered. In a rather grimly amusing example of the scientist's total dedication to his subject exclusive of the wider implications, he later wrote:

When approaching the different persons who had seen the stranded animal or parts of it, I received only sparse information. Most unfortunately, the animal washed ashore at a time when cholera devastated the district and therefore only slight attention was paid to such an event.²⁸

The descriptions that he did manage to obtain showed that the animal agreed with earlier reports in regard to the huge size and general outline of the body. This indicated that they must belong to the same main group of cephalopods. The jaws he had obtained showed something new; they hinted at a new genus.

He compared the jaws from the giant squid with those of several related types in the hope that he could match them, but found that they appeared to belong to an undescribed new genus. But once again the evidence was not substantial enough to call for a definite classification.²⁹

Further work was again halted because of lack of new evidence. Then, in 1855, Captain Hygom, one of the mariners Steenstrup had interested in marine studies, brought home

²⁸Ibid., p. 268.

²⁹Ibid., p. 18.

Details of his classification, along with plates illustrating the specimens were published in 1856-1857, in an article "Particulars about the Giant Cuttlefishes of the Atlantic Ocean".³² His major work on the Architeuthids, "Spolia Atlantica, Architeuthus"³³ was not published at this time, although the early portions of it were ready for publication. It was intended for publication in the Memoirs of the Copenhagen Academy, 1856,³⁴ but due to the author's ill health it had to be withdrawn from the press. Printing was resumed in December, 1857, but for some reason this portion was not released. The complete work, which included Steenstrup's later researches on the giant squids was not published until 1898, the year after Steenstrup's death.

By 1856, although it could hardly be said that there was an abundance of material on the giant squids, there was

³²J.J. Steenstrup, 'Oplysningen om Atlanterhavets kilossale Blæksprutter,' Forh. skand. naturf. 7 Mote, 1856: 182-185 [Cephalopod Papers, pp. 17-19.]

³³J.J. Steenstrup, "Spolia Atlantica", Kobenh. Dansk. Vid. Selsk, Skr., 4, 1856-1859, 1898 (pp. 409-454).

³⁴George W. Tryon, Manual of Conchology (Philadelphia: 1879), Vol. 1, p. 183.

the parts of a giant cephalopod which had been found floating in the sea off Bermuda. The parts consisted of the arms, suckers and gladius of a squid. Finally, Steenstrup felt justified to institute the new generic title, Architeuthus,³⁰ to distinguish the giant squids from other genera. Captain Hygom's specimen he called Architeuthus dux; the 1853 Aalbaek specimen he now called Architeuthus monachus.³¹ He did not attempt to place either the 1639 or the 1790 specimens within either of the two species, nor even within the genus; both he left unclassified.

³⁰ Steenstrup, we may note, wrote Architeuthus, not Architeuthis, and had sound reason for so doing. Aristotle made a clear distinction between τεuthis, (teuthis) and τεuthus, (teuthus), reserving the latter term for a larger variety of squid.

Steenstrup chose to use Teuthus as the second component of his compound Architeuthus, and as we may see from his comment in the Cephalopod Papers, p. 107 (footnote), became justly irate when zoologists refused to follow his terminology. But even if he had not used the distinction of Aristotle, his annoyance could still be justified since, following taxonomic custom, no other scholar has any right to change in any way the designation given species by its discoverer. In short, the customary, modern spelling of Architeuthis is both discourteous and inaccurate.

³¹ The Cephalopod Papers, p. 18. Steenstrup named the species after the monachus marinus - "On the supposition that the cuttlefish washed ashore in 1853 was identical [i.e. a giant squid] with that caught in 1546-1550 which at that time had been called monachus marinus, the sea-monk." It was Steenstrup's way of linking the old stories to the new scientific names, rather a good touch.

sufficient for Steenstrup, a leading authority on the cephalopods, to describe them in a new genus. Steenstrup's articles on the subject were published in Danish, and translations appear to have been limited.³⁵ It is, therefore, not surprising that knowledge of the Architeuthus classification was also restricted. It was not until 1873 when two specimens were taken off Newfoundland that interest in the giant squids was really aroused and sufficient information on them permitted more detailed study. Prior to this time most of the information on the giant squids was limited to brief references in Steenstrup's correspondence. His paper, although not widely known or read, established his priority in naming the new genus, but did little to disseminate knowledge of them.³⁶

Steenstrup had established the existence of giant squids, certainly no zoologist who had seen or heard of his evidences would have disputed that, but they queried his

³⁵ The only reference to a translation of Steenstrup's paper on the giant squids was in an article by Pieter Harting "Descriptions de Quelques Fragments de Deux Céphalopodes Gigantesques", Afdeeling Natuurkunde, Vol. 9, 1861, p. 10. The translation was into German by a Mr. H. Zeiss in the journal Die Natur, 1858. No further reference was given, nor could anything further be discovered.

³⁶ Derek Price claims that writing scientific papers is a means of settling priority claims, not necessarily a means of distributing information. "Scientists have shown a strong urge to write papers but only a relatively mild one to read them." Big Science, Little Science (New York: Columbia University Press, 1963), p. 70.

right to institute a new genus on the basis of his limited evidence alone. The Architeuthus classification was criticized by some zoologists until the 1880's.³⁷ Outside Scandinavia his work was publicized in four ways: (1) through his own correspondence; (2) through an article published by Pieter Harting in Afdeeling Natuurkunde; (3) through a French commentary on his work by Crosse³⁸ and Fischer³⁹ in the Journal de Conchyliologie; and (4) through a brief mention in Gwynn Jeffrey's British Conchology, 1869.

³⁷ George W. Tryon, Manual of Conchology (Philadelphia: 1879), p. 183. "So vague have been the views regarding this genus among those who have described the species that I prefer for the present to treat them all as one section of Ommastrephes."

³⁸ Joseph Charles (Hippolyte) Crosse, b. 1827 d. 1898. French naturalist. At his death his biographer wrote, "No man of his time has done more, few have done so much, to promote the study of the mollusca." He and Fischer were the editors of the Journal de Conchyliologie for many years and contributed numerous papers on the mollusca to it. For a complete biography see, Rev. A.H. Cooke "In Memoriam - M. Crosse." Nautilus, 12, 1898-1899, pp. 204-106.

³⁹ Dr. Paul Henri Fischer, French naturalist, b. 1835 d. 1893. Trained in medicine, he nevertheless became an assistant at the Museum of Natural History of Paris, and was a well known zoologist and paleontologist. For a complete biography, see, Edmond Bordage, "Scientific News", American Naturalist, 28, 1894, pp. 287-289.

In a letter to Spencer F. Baird⁴⁰ of the Smithsonian Institution, Washington, Steenstrup made an early reference to his work on the giant squids. The letter, written in July 1857, concerned the exchange of specimens between Steenstrup's museum and the Smithsonian. Steenstrup promised to forward his "figures of the gigantic cephalopods from the Atlantic Ocean of which the one, twelve feet long, from Alabama [sic] , I shall not fail to send as soon as they are published."⁴¹ Though it does not appear that the figures ever arrived, American zoologists were at least familiar with Steenstrup's interest in giant cephalopods.

In 1871 when Alpheus S. Packard⁴² acquired the jaws of a giant squid that had been found on the Grand Banks, he contacted Steenstrup for help in identifying the creature to

⁴⁰ Spencer Fullerton Baird (1823-1887) American zoologist and scientific administrator. He was the Assistant Secretary of the Smithsonian Institution under Joseph Henry, succeeding him as Secretary in 1878. Dictionary of Scientific Biography, ed., Charles Gillespie (New York: Charles Scribner's Sons, 1973), article by Dean C. Allard.

⁴¹ Steenstrup to Baird, Copenhagen, June 1857. Steenstrup Papers.

⁴² Alpheus Spring Packard (1839-1905), American zoologist, entomologist and geologist. He was the Director of the Peabody Academy, 1867-1878, and Editor-in-Chief of the American Naturalist. Who's Who In Science, From Antiquity to the Present (Marquis Who's Who Incorporation, Hannibal, Missouri: West Publishing Co., 1968), no individual authors given.

which they belonged. He knew little of the nature of Steenstrup's investigations apart from the fact that they were on giant squids. He thought his specimen might have belonged to the Ommastrephids. He made no mention of Architeuthus, so presumably he did not know of the classification.

Steenstrup sent him a full account of his research and also the diagrams of the jaw of A. monachus. Packard published the information in an article published in the American Naturalist in February, 1873. The article, "Colossal Cuttlefish", was the first comprehensive account, in English, of Steenstrup's classification of Architeuthus. As a result of this article North American zoologists had a much greater knowledge of the giant cephalopods than the majority of their European counterparts.

However, not all European zoologists were unaware of Steenstrup's work. One in particular, the Dutch zoologist, Pieter Harting,⁴³ did some research on the subject shortly after Steenstrup. While director of the Museum of Natural History at the University of Utrecht, Harting had discovered

⁴³ Pieter Harting (1812-1885) Dutch zoologist and microscopist. He was professor of zoology at the University of Utrecht. A popularizer of scientific subjects, he was one of the founders of the Album der Natur, a periodical dedicated to the popularization of scientific research. For a complete biography see the Dictionary of Scientific Biography, ed. by Charles Gillespie (New York: Charles Scribner's Sons, 1973), article by J.G. van Cittert-Eymers.

the buccal mass and some suckers of a giant cephalopod preserved in the Museum's collection.

Harting briefly described the specimen at a meeting of the Koninklijke Akademie van Wetenschappen, Letterkunde, en Schoone Kunsten (Royal Academy of Science, Literature, and Fine Art) in Amsterdam on June 26, 1858.⁴⁴ His original studies indicated that the preserved parts resembled the Loligids and Ommastrephids.⁴⁵ Having read a translation of Steenstrup's article on giant cephalopods he contacted him, and opened correspondence on the subject. Steenstrup fully described his Architeuthus dux and sent Harting sketches of its beak to enable him to make a comparison with his specimen. The two were found to match.

Harting could see that the beak in his possession matched the one Steenstrup had said belonged to his A. dux, but he had doubts whether a positive classification of the giant squids could be made until a more complete specimen was studied. He thought it possible that Architeuthis dux (he changed from the Architeuthus spelling) was the adult form of Ommastrephis todarus (D'Orbigny). The fact that the former was taken in the Atlantic and the latter was a Mediterranean species bothered him not at all, for "many other

⁴⁴ Pieter Harting, 'Descriptions de Quelques Fragments de Deux Cephalopodes Gigantesques,' K. Akademie van Wetenschappen, Afdeling Natuurkunde, Verhandelingen Vol. 9, 1861, p. 1.

⁴⁵ The same conclusions Steenstrup had reached with his preliminary observations.

cephalopods are common to both oceans".⁴⁶ The only way that Architeuthis dux could be proven to be different from O. todarus (D'Orb.) would be upon examination of an entire tentacular arm of a specimen of Steenstrup's A. dux. O. todarus (D'Orb.) is easily distinguished since the suckers cover the whole length of the tentacular arm (in other species of Ommastrephes the suckers are restricted to the end of the club.)

Harting was justified in expressing doubt at Steenstrup's right to name a new genus on the basis of the scanty material he had examined. Yet Steenstrup was ultimately proved correct. When an entire tentacular arm of A. dux was examined the suckers were limited to the club. A. dux was not just the "adult" form of O. todarus (D'Orb.).

While Harting gave Steenstrup credit for having accomplished the most valuable work to date in the study of the giant cephalopods, he still criticized his classification. The problem rested with the specimens themselves. While they provided more than sufficient evidence to prove the existence of giant squids, they provided a rather scanty basis for a classification.

⁴⁶Pieter Harting, *ibid.*, p. 13.

A brief account of Steenstrup's work had appeared in a French magazine in 1862,⁴⁷ but it was so brief it just obscured the issue. The article had been inspired by the 'Alepton Incident'. In November, 1861, a French gunboat, the Alepton, while forty miles off Teneriffe had come across a giant cephalopod floating at the surface. Hoping to capture the creature, the crew had tied a noose around the body, but it had managed to escape leaving only its severed tail behind. This trophy was presented to the French consul at Teneriffe who was also an amateur naturalist. He reported it to the French Academy, but while they had been amazed at its size, the members refused to make any comments on it, or attempt a classification.⁴⁸

Crosse and Fischer, wishing to discuss the affair, introduced their article with a brief résumé of the previous sightings of giant cephalopods. They proceeded rapidly through the writings of Pliny, Pontoppidan, de Montford, Steenstrup et al. Steenstrup's researches were dealt with in two paragraphs which gave a garbled version of his

⁴⁷Crosse et Fischer, "Nouveaux Documents ...", Journal de Conchyliologie, Vol. X, 1862, pp. 129-140.

⁴⁸Ibid., pp. 137-138.

classification of A. dux and A. monachus. They claimed that the latter was instituted for the 1639 and 1790 specimens, while A. dux was for the animal stranded in Jutland in 1853: both claims were wrong.

For the fragments of the giant squid taken by the crew of the Alecton, Crosse and Fischer proposed the name Loligo bouyeri, Loligo because their limited information had suggested a Loliginidae form and bouyeri in honour of the commander of the Alecton, Lieutenant Bouyer.

The authors concluded the article with a discussion of the "important question which dominates the history of the giant cephalopods - how long do these molluscs go on growing? Was their growth limited like that of the higher vertebrates, or unlimited like that of the fish?"⁴⁹ Once again it was being intimated that there were ancient, giant individual representatives of known species. Harting had suggested that A. dux was the large, fully grown form of Ommastrephes todarus (D'Orb.), he had called it the adult form. Steenstrup took the position that the specimens he had examined represented no known species, and were representatives of a giant species of squid, and as such to be classified within a separate genus.

⁴⁹Ibid., p. 139.

Crosse and Fischer favoured the first hypothesis, but abstained from drawing further conclusions as they considered that more research was necessary first. They finished their article with a plea for other zoologists to continue on the subject of the correct classification for the giant cephalopods.⁵⁰

A.S. Packard's article in the American Naturalist⁵¹ on giant squids had offered a much more favorable account of Steenstrup's work and American zoologists, like A.E. Verrill, Spencer F. Baird, and the Canadian, Sir J.W. Dawson,⁵² although newly introduced to the subject, accepted the Architeuthis⁵³ classification. As mentioned earlier, Packard's original enquiries on the subject show that he knew remarkably little about giant squids. Steenstrup had

⁵⁰ Ibid., p. 140.

⁵¹ A.S. Packard, "Colossal Cuttlefish," American Naturalist, Vol. VIII, February 1873, p. 94.

⁵² Sir John William Dawson, b. Pictou, Nova Scotia 1820, d. Montreal 1899. He was Professor of Geology and later principal of McGill College from 1855-1893. He was the first president of the Royal Society of Canada, and was knighted in 1884. For a complete biography see Charles F. O'Brien, Sir J. William Dawson, A Life in Science and Religion (Philadelphia: American Philosophical Society, 1971).

⁵³ Architeuthis is the accepted spelling, but when I refer to Steenstrup's work I will, as he continued to do, use the Architeuthus spelling.

sent him the proofs of his article on Architeuthus and in 1872 Packard while on a visit to Europe had met Steenstrup and viewed his collection. The result was the article on Colossal Cuttlefish published in 1873.

Up until this time the number of sightings of giant squids, and more importantly, the number of specimens taken for study, had been very limited. Then during the decade of the 1870's they appeared in abundance off the coast of Newfoundland and for the first time made possible a thorough study. Probably as a result of Packard's article, Steenstrup's classification was used by American zoologists to describe the North American specimens. Before this zoologists had acknowledged Steenstrup's proofs for the existence of giant squids, but they had not accepted his classification. In 1880 Steenstrup wrote that in the beginning he had great difficulty in making zoologists believe in the occurrence of giant cephalopods.⁵⁴

A contemporary writer writing on the existence of giant squids said:

It appears that the numerous tales and traditions that have been current from the earliest times concerning the existence of colossal species of

⁵⁴The Cephalopod Papers, p. 55.

this race, though in some cases exaggerated, had a background work of fact and can no longer be passed over as the mere fabrications of a disordered mind, as we have hitherto inclined to accept them.⁵⁵

⁵⁵ Quoted by Moses Harvey in "Gigantic Cuttlefish at Catalina", Boston Traveller, Oct. 10, 1877. He is quoting, to use his own words, "one of the most eminent of English geologists" on the existence of giant cephalopods. Unfortunately for us, he did not elaborate on the author's identity or the occasion of the statement.

CHAPTER III

While there appears to have been very little additional work done on the giant squids following Steenstrup's classification, the dearth of specimens rather than a lack of interest or belief in their existence, could account for this state of affairs. Steenstrup in establishing the existence of giant squids had shown that their appearances were not just "unique phenomena, but something more common, something which has happened at least once in every century."¹ Once a century hardly implied an abundance of specimens available for study. In trying to locate their natural habitat Steenstrup speculated that it was probably in the open Atlantic far from European shores. Those which accidentally strayed into unfamiliar surroundings could not resist the action of the waves and were stranded.²

Sightings and strandings were, and are, rare; hence, it is easy to understand why zoologists did not show a more active interest in Steenstrup's studies. Nevertheless, at a

¹The Cephalopod Papers, p. 259 (my emphasis).

²Ibid.

time when the study of the pelagic species of cephalopods was still in its infancy, it is surprising that the giant species did not arouse more interest than they apparently did. 1

Sightings of giant squids happened unexpectedly and in such instances it was unlikely that trained scientists would be among the observers. An observer was much more likely to be a fisherman more interested in the amount of bait the creature represented than in its scientific value. Steenstrup, by chance, happened to live in a part of the world where such sightings did occur if not frequently at least occasionally. Some, like the two Icelandic specimens of 1639 and 1790, were recorded, while in other cases interested local inhabitants alerted Steenstrup of a stranding, or mariners brought him unusual oceanic specimens. For all his information he was forced to rely on casual observers. The specimen from Aalbaek in 1853 was reported by the local physician, and the local clergyman gave him valuable assistance in carrying on his research. In small villages the only people likely to have a good education were the clergyman, the doctor and the teacher.³ This was the pattern

³In Scandinavia doctors and naturalists co-operated closely with one another. At least, one would assume this from the meetings they held. Proceedings of the Scandinavian Naturalists and Physicians held at Gotheborg, Møde V, 1849, pp. 950-957.

on both sides of the Atlantic.

When A.S. Packard first contacted Steenstrup for information on giant squids very little contact had been had with those on the North American side of the Atlantic. As the preceding chapters have shown, there were a number of known sightings of giant squids on the northern coasts of Europe, but none had been reported on North American shores. Then in the decade of the 1870's over twenty strandings and sightings of giant squids were reported from the coast around Newfoundland. (The beak in Packard's possession had been taken by fishermen on the Grand Banks.) Had it not been for the efforts of two residents of the island, the Rev. Moses Harvey and Alexander Murray, the stranded squids would have been used for fish bait, with no one but the villagers aware of their existence; a unique opportunity to study the giant squids would have been lost.

The coast of Newfoundland, like that of Ireland, Iceland and Scandinavia is very isolated, with the population thinly spread out in a number of remote outports. These people were the most likely to observe giant squids. Reports show that fishermen have "often" discovered the remains of giant squids.⁴ Since the 1870's it has been

⁴In 1873 the Rev. Mr. Gabriel told Moses Harvey of two stranded giant squids he had seen in 1870. They had washed ashore at Lamaline, a community on the South coast of Newfoundland. The specimens he estimated measured between

determined that sightings and strandings of giant squids occur with greater frequency in Newfoundland waters than elsewhere in the world.

Dr. Frederick A. Aldrich of Memorial University, an authority on Architeuthis, thinks that there is a pattern in the Newfoundland sightings. As so very little is known to this day of the habits and habitat of the giant squid, the establishment of such a pattern, and the causes of it, would aid in the understanding of these elusive creatures.

Basing his theory on the recorded sightings since the 1870's Dr. Aldrich predicted that the giant squids should reappear around the island in the 1960's. This proved correct with eight strandings recorded, and Dr. Aldrich concluded that giant squids are to be found off the coast of Newfoundland during one decade in every three. He proposed that changes in the Labrador current could account for the

40 and 50 feet, and had been used as fish bait (Boston Traveller, Nov. 1873). Moses Harvey also reported two giant squids that had been stranded at Cupids and Hearts Content in 1886, he only learned of them after they had been cut up for bait. Similarly with one ~~that~~ was stranded at Island Cove in 1890. (Clippings found in one of Moses Harvey's scrapbooks, Newfoundland Public Archives, PG/A/17.) A more recent story comes from Point Leamington, Notre Dame Bay. A former resident told me of a stranded specimen she saw as a child (1950's). All the local inhabitants thought they had seen something completely unique, one of a kind. They had not been aware of the existence of giant squids, and it did not occur to anyone that the event should be reported.

Newfoundland translocation.⁵ However, the theory is yet to be proven, and the incidents of strandings in 1886 and 1890 could be used to dispute the cyclical theory. Apart from the 1870's, and possibly the 1960's, there have not been a sufficient number of sightings in other decades to warrant the conclusion.⁶

The only pre-1870 account recorded of a giant squid off the coast of Newfoundland can be found in the Labrador Journal of Capt. Cartwright, an eighteenth century explorer-fisherman on the Labrador coast. The entry for May 27, 1785 included the following account:

At ten this morning (off the Newfoundland coast) saw something in the water. It proved to be a large squid which measured seven feet exclusive of the head, when gutted it filled a port barrel, such animals seldom exceed six or eight inches, yet I am told, they sometimes grow to a most enormous size, even that of a large whale.⁷

⁵ Frederick A. Aldrich, "The Distribution of Giant Squids (Cephalopoda, Architeuthidae) in the North Atlantic and Particularly about the shores of Newfoundland," *Sarsia*, Vol. 34: 394-398. For an additional discussion of why they should be found off Newfoundland see G.C. Robson, "On *Architeuthis Clarkei*, a new species of Giant Squid, with observations on the Genus," *Journal of Zoology*, No. 3, May 1933, pp. 681-697. He suggests that in the North Atlantic, *Architeuthis* finds its optimum conditions in temperate waters off the U.S. coast. As the deeper layers of the north-east going current are chilled, the squids get into difficulties owing to the rapid gradient from warm to cold waters off the Grand Banks.

⁶ Dr. Clyde Roper of the Dept. of Invertebrate Zoology, Smithsonian Institution, Washington, does not believe that the cycle has been established yet (personal communication).

⁷ E.W. Townsend, ed., Captain Cartwright and His Labrador Journal (Boston: Dana and Co. 1911).

This account can be made to fit into the thirty year cycle. It also expresses the belief, this time in lay terms, that size makes no difference to the species, and that squids just go on growing.

Whatever the reason, giant squids frequent Newfoundland waters, and their appearance in the 1870's was a dramatic episode in the unravelling of the mysteries surrounding them. Had it not been for Moses Harvey and Alexander Murray this opportunity might have escaped the attention of zoologists.

Moses Harvey (1820-1901) was the son of the Rev. James Harvey, minister of Redrock Church, Armagh, Northern Ireland. Harvey was educated at the Royal Academical Institute, Belfast, 1837-1840, but did not go on to attend university. His training was in Greek, Logic and Moral Philosophy.⁸ As there is no indication of his having studied natural philosophy, it must be assumed that he received no formal education in the natural or physical sciences. He was ordained a minister in 1844 and inducted into the John Street Presbyterian Church, Marysport, Cumberland, England. In 1852 he was called to St. John's, Newfoundland to be minister of St. Andrew's Free Presbyterian

⁸ Evening Telegram, St. John's, Sept. 5, 1901.
"Judge Daniel Prowse's Tribute".

Church. He remained as minister of the church until 1877 when he resigned to facilitate the union of the two Presbyterian churches in the city. The Church gave him a pension and he chose to remain in St. John's until his death on Sept. 3, 1901.⁹

Moses Harvey was a man of exceptional vitality and his interests led him beyond the bounds of his ministry and parish. He became a driving force in the rather limited intellectual life of nineteenth century St. John's.

St. John's in the middle of the last century was the bustling mercantile centre for the Newfoundland fish trade. At that time it had a population of no more than thirty thousand. While it was a busy port, the intellectual life of the city, like that of many cities in neighboring Canada, was confined mostly to the pursuit of local politics.

When Harvey arrived in St. John's in 1852 the town had a small library and reading room operated by the St. John's Literary Society which had been founded in 1823. There was a Mechanics Institute (founded in 1849) which featured an annual course of lectures and had started and

⁹W.M. Moncreiff, The History of the Presbyterian Church in Newfoundland, 1842-1967 (St. John's), n.p., n.d.

operated a small museum.¹⁰ In 1858 Harvey launched the Young Men's Literary and Scientific Institute, which also gave a series of lectures, more literary than scientific, and operated a library and reading room. Harvey was a tireless lecturer, often lecturing twice weekly in addition to his ministerial duties. Initially, his lectures were drawn mainly from Biblical themes, but over the years the range widened to include more secular topics.

In 1861 the existing literary societies amalgamated to form the St. John's Athenaeum, and once again Harvey was one of the driving forces behind the move.¹¹

'Athenaeum', was a general name given to Literary and Scientific Societies, Clubs, periodicals and buildings. They had had their origin in and belonged primarily to the nineteenth century, and had been established to provide a meeting place and forum for the cultural and social activities of a town's intelligentsia. Athenaeums were found in cities and towns in North America and Britain (Boston, Toronto, Halifax, Manchester, Glasgow and London - the London Athenaeum was slightly different in that it was designed to be an exclusive club; and still is).

¹⁰ Louise Whiteway, "The Athenaeum Movement: St. John's Athenaeum (1861-1898)", *Dalhousie Review*, Winter, 1970-71, p. 543 (hereafter referred to as "The Athenaeum Movement").

¹¹ *Newfoundlander*, St. John's, Nov. 5, 1875. Laying the corner stone for the Athenaeum building, Sir Hugh Hoyles said: "While many lent their aid, one gentleman stood prominently out, the Rev. Moses Harvey".

The St. John's Athenaeum showed broad resemblances to the others, so that while St. John's was isolated, its cultural life did not lag far behind that of many other North American cities. The object of the St. John's Athenaeum, as stated in its aims, was "the cultivation and diffusion of knowledge by the establishment and maintenance of a Library and Reading Room, providing for the delivery of popular lectures on Literary and Scientific subjects."¹²

The Athenaeum had inherited the museum from the Mechanics Institute, but, disposed of it in 1871. A fine Athenaeum Building was opened in 1879 and the institution flourished in the 1880's.¹³ Its library had a collection of 6000 books, "well selected volumes of history, science, art, travel, fiction and general literature," with 270 subscribers in the 1870's and 320 in the 1880's.¹⁴ The building and library were destroyed by fire in 1886, a blow

¹² Louise Whiteway, "The Athenaeum Movement," p. 542. Whiteway is quoting from some form of foundation charter of The Athenaeum, but omits any reference as to its precise identity.

¹³ Harvey was President of The Athenaeum from 1876 to 1880. In 1880 he established a daily telegraph service in the Reading Room which delivered a daily synopsis of foreign news from Halifax. All the local papers were indebted to it for their up-to-date news. Ibid., p. 542.

¹⁴ Ibid., pp. 545-546.

2

from which the Athenaeum never fully recovered. Popular lectures were no longer in vogue in the 1890's, and the winter of 1898 was the last season for the Athenaeum.

Apart from his duties as lecturer,¹⁵ Harvey also became a correspondent to several local and foreign newspapers and journals. The articles he wrote made him known throughout Newfoundland and indeed North America. He was the Newfoundland correspondent of several newspapers, singing the praises of his adopted country, prophesying the greatness it was about to achieve but never quite did.

In the Montreal Gazette, Aug. 11, 1899 he was praised by the editor for a quarter of a century's contributions to that paper; by his own estimation he wrote six hundred fortnightly letters to the Montreal Gazette alone:

I must have contributed the appalling quantity of 900 columns to the Gazette in 24 years. I wonder if any other correspondent in any other country could record such an output in one newspaper.¹⁶

Harvey was particularly fond of establishing records.

He even found time to help establish a newspaper in St. John's after his retirement, the Evening Mercury, of

¹⁵ All the local clergy were called upon to give lectures. Harvey was one of the most popular judging from the number he gave. The local newspapers listed every season's performers and his name was always prominent.

¹⁶ Montreal Gazette, Aug. 11, 1899.

which he was the editor for several years.

As editor he was not always a popular figure. He was accused of being a political puppet, and of betraying old friends when they suffered political reverses. One article likened him to the vicar of Bray, observing that "the Rev. Gentleman changes his coat with every successive administration provided the government retains possession of the cash box and the ability to pay."¹⁷ Another ascribed to him certain biting lines from Dryden's Absalom and Achitophel:

A man so various that he seemed to be
Not one, but all mankind's epitome,
Stiff in opinions, always in the wrong,
Was everything by starts and nothing long,
But in the course of one revolving moon,
Was chymist, fiddler, statesman and buffoon.¹⁸

The lot of an editor is obviously not always an easy one. Nevertheless, he was generally respected in the city as one of its cultural elite.¹⁹ The lectures had helped to

¹⁷ Evening Telegram, St. John's, Feb. 28, 1886.

¹⁸ Ibid., quoting Absalom and Achitophel, Part I, lines 545 ff. I am indebted to Professor G.M. Story for this identification.

¹⁹ In 1890 an assorted group of the St. John's citizenry petitioned McGill University to give Moses Harvey an honorary LL.D. Their letter praised him for his forty years of service to Newfoundland and "his distinguished name in Literature, Historical studies and Scientific pursuits". "He is held in high esteem by all who know him." Minutes of the Senate, McGill University, March 1890. He received the degree at the McGill convocation in 1891.

establish him as one of the leaders of St. John's intellectual life. He became an authority on literary, historical, religious and scientific subjects. As Judge Daniel Prowse observed, Harvey could not be described as an "original thinker", and it was all too often not so much a case of what he said but of the manner in which he said it.²⁰ There can be little doubt that he possessed a certain Victorian elegance of phrase which appealed to the middle classes of the time and place and which allowed him to present his materials in an educational if not a revolutionary manner, which had every appearance of verisimilitude.

However, it is unjust to dismiss all Harvey's writings in such a patronizing manner, for his contributions to the literature of Newfoundland were, at the time, important and widely read.²¹ As evidence of his merit, he was elected a Fellow of the Royal Geographical Society of London (1886) and of the Royal Society of Canada (1891); both were worthy distinctions.

He wrote several books on Newfoundland, the most popular of which he wrote in collaboration with the English

²⁰ Evening Telegram, Sept. 5, 1901. Judge Prowse was a contemporary of Moses Harvey, and was another prominent writer on the island's affairs. He wrote A History of Newfoundland (New York: MacMillan and Son, 1895).

²¹ An indication of just how widely his name was known is that in 1890 Harvey was elected an honorary member of the Trinity Historical Society of Dallas, Texas. Moses Harvey's Scrapbooks, Newfoundland Public Archives.

author Joseph Hatton.²² It was a general work containing passages on the history, geography, geology and biology of the island, and it was well received in both England and North America.²³ Harvey did most of the research and wrote much of the book; Hatton supplemented the research and polished the prose.

In all the books on Newfoundland that Harvey published a large section of the zoology was devoted to a discussion of giant squids. Other authors did not find it so important; one would know the writer even if the articles had been published anonymously.

Newfoundland, Britain's Oldest Colony was Harvey's best known work and it led to his election as a fellow of

²² Joseph Hatton and Moses Harvey, Newfoundland, Britain's Oldest Colony (London: Chapman and Hall Ltd., 1883).

²³ Fortunately Harvey kept several scrapbooks over the years and a number of review articles of this book taken from foreign newspapers appeared in it. One review in the London Academy, date unknown:

In no other work is the Newfoundland staple trade treated so fully or so well. We cannot say so much for some of the other sections. They display a lack of knowledge essential to the geographer. A trained man of science would have easily seized the salient points and given them a few lines divested of the verbiage and needless detail which a compiler treading unknown ground does not spare us. Thus the pages on botany are extremely perfunctory, of little or no interest to the botanist, and not at all to one ignorant of that science. The zoology is a little better.

The Royal Geographical Society and of The Royal Society of Canada.²⁴ The latter was a great honour "which is generally reserved for the best and brightest men in the Dominion. The honour is made remarkable by being extended to a citizen of Newfoundland."²⁵

The society was devoted to the stimulation of the sciences and arts in Canada. Harvey was elected for his contributions in the latter field, although his inaugural lecture on "The Artificial Propagation of Marine Food Fishes and Edible Crustaceans"²⁶ would appear to have come from a scientist. His knowledge in this area came from his work as the Secretary of the Newfoundland Fisheries Commission.²⁷ Harvey's article was really a summary of the

²⁴ The Royal Society of Canada (est. 1881) "A professional body of residents of the Dominion who have published original works or memoirs of merit, or who have rendered eminent services to literature or science" (Proceedings and Transactions of the Royal Society of Canada, I, 1882-1883, p. ii). According to a paper delivered at the meeting of the Canadian Historical Association at McGill University, May 1972, by Peter J. Bowler, The Early Development of Scientific Societies in Canada, the Royal Society deliberately excluded amateurs from its ranks. Harvey must therefore have been considered a writer of professional standing.

²⁵ Montreal Gazette, June 1, 1892.

²⁶ Moses Harvey, Transactions of the Royal Society of Canada, Vol. IX, 1892-1893, Section IV, pp. 17-34.

²⁷ The Newfoundland Fisheries Commission was established in 1887 to study conditions of the fish stocks around Newfoundland, and to study the operations of other countries in the artificial propagation of food fishes.

Commission's findings. Nevertheless, in the form in which he presented it it generated a considerable amount of discussion in Canada.²⁸

Harvey did fancy himself as something of a scientist, and his greatest scientific achievement was the "discovery" of the great devil-fish²⁹ in 1873.

In October 1873, two fishermen from Portugal Cove (a settlement about fifteen miles from St. John's) while out fishing on Conception Bay were attracted by what they took to be some floating wreckage. Upon closer examination it turned out to be a great "sea-monster". The thing wrapped one of its long tentacles and a shorter arm about the boat, and proceeded to drag it under. One of the men seized a small hatchet and severed the encompassing arms,³⁰ and they then made good their escape, taking the severed portions with them.

Their trophies would probably have rotted on the beach had not the local clergyman, Mr. Gabriel, advised the men that the tentacle might have some value. Moses Harvey

²⁸From a newspaper clipping from the Montreal Gazette found in one of Harvey's Scrapbooks. (The trouble with such clippings is that Harvey seldom gave their source or date.)

²⁹Harvey liked the name devil-fish for it gave his stories a certain dash. The name has been variously applied to several large and/or formidable fish and other marine animals, usually members of the "ray" family, but also to the Californian gray whale, the piranha, octopus and cuttle-fish. The devil-fish in Victor Hugo, Toilers of the Deep was a giant octopus (Complete Oxford English Dictionary).

³⁰In his early articles Harvey reported only the two fishermen in the boat. But later in a story he wrote in 1899

said that Mr. Gabriel suggested to the men that he, Harvey, was a likely person to show them to, because he was "crazy after all kinds of strange beasts and fishes".³¹ However, from an early letter written by Alexander Murray, the Director of the Newfoundland Geological Survey, we learn that the fishermen had contacted him about their discovery. "Murray in turn notified his friend Harvey"³² and together they studied the tentacle.

Alexander Murray was born at Dollerie House, Crieff, Scotland, on June 2, 1810. After a brief career in the Royal Navy he settled in Upper Canada to farm. On a visit to England in 1841 he met William Logan (later Sir William Logan, Director of the Canadian Geological Survey), who introduced him to Sir Henry de la Beche, Director of the Geological Survey of Britain. Murray was appointed to the British Survey and the experience he gained there was the only formal training he received in Geology.

"How I Discovered the Great Devil-Fish", Wide World Magazine, he embellished the tale by adding a twelve year old boy, Tom Picot, to the crew. He became the hero of the hour by remaining calm in the face of imminent disaster. In this version he picked up the hatchet and severed the entwining tentacles from about the boat.

³¹ Moses Harvey, "How I Discovered the Great Devil-Fish", Wide World Magazine, London, 1899, p. 736.

³² "Capture of a Gigantic Squid at Newfoundland", American Naturalist, Vol. VIII, 1874, p. 121.

When Logan needed an assistant for the newly instituted Geological Survey of Canada he chose Murray. Murray helped map the whole of Upper Canada from the Ottawa River to Windsor and northwestward to Sault Ste. Marie.

In 1863 Murray was appointed the Director of the Geological Survey of Newfoundland. Like Harvey, Murray took an active interest in his adopted country and tried to publicize it abroad. In 1867 he took an exhibit of Newfoundland minerals to the Universal Exposition in Paris. He published articles on the island in the journals of the Royal Geographical Society and the Society of Arts. In St. John's he also lectured before the Athenaeum Society, and when that society gave up its museum in 1871 Murray opened a small geological museum to take its place. In 1883 Murray resigned and returned to Scotland, where he died the following year.³³

Although Murray lacked formal professional training, he was, nevertheless, a professional scientist. His field was geology, but he managed his excursion into zoology with professional aplomb.

After he received the tentacle from the fishermen, he arranged to have it preserved, and made a cursory

³³The biographical information on Alexander Murray was taken from Robert Bell, "Alexander Murray, F.G.S., F.R.S.C., C.M.G.", The Canadian Record of Science, Vol. V, April 1892, pp. 77-96, and Richard Hughes, "Alexander Murray (1810-1884)", The Geology Association of Canada Proceedings, Vol. 23, 1971.

examination of it. He and Harvey then set about the task of informing interested zoologists of the find.

From the description supplied by the fishermen there was no doubt that the creature was a giant cephalopod. The size appears to have been exaggerated. The body was said to be sixty feet long and the tail ten feet across. When the creature was mutilated it made off backwards or tail foremost, "after the manner of the squids".³⁴ By the time Murray and Harvey saw the tentacle it had shrunk from nineteen feet to seventeen feet. The men reckoned they had cut it off ten feet from the base, making the tentacle nearly thirty feet long. (The other arm had been destroyed before Murray and Harvey saw it.)

Murray conveyed the findings of his examination to the celebrated Louis Agassiz.³⁵ His descriptions were clear and concise with diagrams and photographs to illustrate his remarks. Agassiz's reply supplied little in the way of useful information for Murray and Harvey, but it shows us

³⁴ Alexander Murray to Louis Agassiz, St. John's, Nov. 10, 1873. (Letter reprinted in "Capture of a Gigantic Squid at Nfld.", American Naturalist, Vol. VIII, Feb. 1874, p. 121.)

³⁵ Louis Agassiz, b. Switzerland, 1807, d. Cambridge, Mass., 1873. A world renowned naturalist, he was particularly interested in ichthyology, geology and paleontology. In 1846 he was appointed Professor of Zoology at Harvard and in 1859 he established its Museum of Comparative Zoology. He is also remembered as one of the most vocal of Darwin's opponents. For a complete biography, see Edward Lurie, Louis Agassiz, A Life in Science (Chicago: University of Chicago Press, 1960).

how little was known about giant squids even by scientists of Agassiz's standing. From his reply it does not appear that he had read even Packard's article on the subject, published in February of the same year.

Agassiz replied, "I am delighted at last to have direct information concerning the gigantic cephalopods of the Atlantic of which so much has been said since the days of Pontoppidan."³⁶ He added that he would look up some information on them. He made no mention of Steenstrup's work in his reply.

It is strange that Agassiz had no personal communication with Steenstrup at all. Agassiz had been building up a fine collection for the Museum of Comparative Zoology at Harvard, and Steenstrup had a very fine collection of pelagic animals, including cephalopods from both sides of the Atlantic. He was also very interested in sharing the resources of his collection with others.

I consider it my duty to take care that several original specimens from my museum, described as new American species, should be placed at the disposal of the Smithsonian Institution for examination being convinced that science should thereby be freed from the errors of identity of species. I am therefore sending the specimens to Washington.³⁷

³⁶ Jules Marcou, The Life, Letters and Works of Louis Agassiz, 1896, p. 211.

³⁷ Steenstrup to S.F. Baird, 1857, Steenstrup Papers. But in the Steenstrup Papers, there are no letters either from or to Agassiz.

But Steenstrup's good intentions appear not to have profited Agassiz, and the latter was able to give little assistance to Murray. Nor was he left much time to examine the case further, for when he received Murray's communication Agassiz was already a sick man, and died only two months later.

Harvey at the same time had forwarded an account of the specimen to Sir J.W. Dawson, the principal of McGill College and President of the Natural History Society of Montreal.³⁸ Dawson was a well known Canadian geologist, probably better known to Murray than to Harvey at this time.

In a report of the Nov. 24th meeting of the Natural History Society of Montreal, Dawson referred to Harvey's letter and suggested that the specimen might possibly belong to one of Steenstrup's two species. Dawson mentioned Packard's article, which he had obviously read, and gave a brief reference to the writing of both Pontoppidan and Denys de Montford.³⁹

About three weeks after the incident in Conception Bay another giant squid became entangled in a herring net at Logy Bay. Harvey had offered a reward for any news of further specimens, and he managed to secure the one from

³⁸ The Montreal Natural History Society was one of the oldest and most respected societies of its kind in Canada. It had been established in 1827.

³⁹ Montreal Gazette, Nov. 26, 1873.

Logy Bay. This time he had a complete specimen and he was obviously delighted. He wrote later that he knew he had in his possession what all the museums of the world did not, a complete specimen of a giant squid.⁴⁰ He rather grandly imagined how he would "astonish the savants, confound the naturalists and startle the world at large."⁴¹ It was pretty heady stuff for the St. John's minister.

Once again, with Murray's help, the carcass was brought back to St. John's to be preserved. Harvey first put it in strong brine, but unfortunately this did not prove to be a good preservative, and only after decomposition had started was the carcass placed in alcohol. The St. John's Museum had the pleasure of housing this valuable trophy.⁴²

Harvey and Murray again took a series of measurements of the specimens: body eight feet long and three feet in circumference, arms six feet long. (It had the basic

⁴⁰ Moses Harvey, "How I Discovered the Great Devil-Fish", Wide World Magazine, 1899, p. 736.

⁴¹ Ibid.

⁴² The St. John's Museum was the rather grand title Harvey gave to Murray's small geological museum. A local newspaper when announcing Harvey's services to science with the "discovery" of giant squid, added that the existence of a museum in St. John's had escaped their notice. Moses Harvey's Scrapbooks.

measurements of the 1639 specimen, but was much smaller than the 1790 one).

Murray informed Agassiz of the latest acquisition, and he published a couple of short journal articles.⁴³ But it was Harvey who really took over the publicity of the giant squids, and took the credit for their discovery. Harvey, unlike Murray who saw the giant squids purely as interesting scientific phenomena, also saw their popular potential. He was already corresponding with several newspapers and the devil-fish provided him with exciting new material. Murray was left behind and Harvey took all the credit to himself. He also treated the complete specimen as his own property, to be disposed of as he saw fit.

In the beginning Harvey knew little or nothing about giant squids, save the possibility of their existence. Apart from this, it is difficult to determine exactly how much he did know. He later claimed that he was "fortunately well versed in the whole literature of this class of animal."⁴⁴ This was certainly an exaggeration, but it is typical of Harvey, who tended to suffer from an inflated sense of his own importance, probably the result of his reign as one of

⁴³ Murray's letters to Agassiz were published in the American Naturalist, Vol. VIII, p. 120, Feb. 1874. He also published articles in Nature, Vol. IX, Feb. 28, 1874, p. 522, and in Appleton's Journal, Jan. 31, 1874.

⁴⁴ Moses Harvey, "How I Discovered the Great Devil-Fish", Wide World Magazine, 1899, p. 742.

St. John's leading intellectuals. We must remain skeptical of the extent of his knowledge, considering the rather limited publicity that had been given to giant squids apart from the occasional sensationalist newspaper report, and the availability, or rather the lack of, such literature in Newfoundland.⁴⁵

In the articles Harvey initially published he limited himself to brief accounts of the discovery of the Conception Bay specimen, usually with an aside to the effect that the existence of such animals was doubted or denied by most naturalists. He and Murray, as the co-discoverers, had been interested in its scientific value, as witnessed by their efforts to contact naturalists like Dawson and Agassiz. Their replies must have made Harvey realize that his discovery was more important than he had supposed. The notion that he had made a scientific find excited and fascinated him. Then he had secured a complete specimen, and he knew he had possessed something unique, something that would astonish the savants.

⁴⁵ There is an article that Harvey wrote in March, 1874 in which he gave a very good summary of some of the historical accounts of encounters with giant squids. These include quotes from Pontoppidan. Where he found excerpts, or a copy of the Natural History of Norway in St. John's one can only imagine. He certainly seems to have found it only after the capture of the Logy Bay squid. (Moses Harvey, "The Devil-Fish in Newfoundland Waters", Maritime Monthly, March, 1874.

At this point he began to combine its obvious commercial possibilities with its scientific value. Harvey was to make use of his many journalistic contacts and wrote articles for a number of magazines and journals. Later he would obtain a degree of fame as an historian of Newfoundland, but he made his name as the discoverer of the devil-fish. He popularized the giant squid, proving its existence to the laymen and thrilling them with blood-curdling descriptions:

It is difficult to conceive of a fate more horrible than to be enfolded in those clammy arms, which grasp with death-like tenacity, lashing themselves to the flesh by the suckers which seem to sink in and drink the very blood.⁴⁶

Compared to this, the scientific description of the suckers is very bland and tame:

The eight shorter arms were six feet long, their inner faces are occupied by two alternating rows of large obliquely campanulate suckers, with contracted apertures surrounded by broad, oblique, marginal rings, armed with strong, acute teeth round their entire circumference.⁴⁷

Harvey did not, however, neglect entirely the scientific interest while writing to nearly every North American newspaper and magazine with his devil-fish story.

⁴⁶ St. John's Advertiser and Newfoundland Gazette, Dec. 9, 1873, reprinted from the Boston Traveller, date unknown.

⁴⁷ Addison E. Verrill, "Cephalopods of the North Atlantic", American Journal of Science, Vol. IX, 1875, p. 126.

Having divided the carcass into more manageable pieces to facilitate preserving it in alcohol, he then decided to distribute it piecemeal around the continent. He therefore wrote to several museums offering them portions of the complete specimen. Whether he thought it better to allow several scientists a chance to study the pieces, or whether he wished to astonish as many savants as possible is mere speculation.

Amongst the institutions he contacted was the Smithsonian in Washington. Spencer Baird, the Assistant Director, disagreed profoundly with his intentions to scatter around the pieces and wrote to Harvey to try and dissuade him from it:

It would be a great pity, in the interest which attaches to the animal, that it should be considered expedient to mutilate it by dividing it among different museums, especially as it is desirable that a full zoological description be made and published, which can only be based upon a comparatively perfect specimen.⁴⁸

Baird suggested that Harvey might send the specimen to Professor Verrill at Yale for study, "he being our highest authority in regard to the particular study of the cephalopods".⁴⁹ Baird hastened to assure Harvey that if he still so desired, when the examination had been completed

⁴⁸ Spencer F. Baird to Moses Harvey, Jan. 22, 1874. Baird Papers, Smithsonian Institution, Washington.

⁴⁹ Ibid.

the carcass would be divided amongst various museums.

Harvey responded favorably to this suggestion, and the specimen was sent to Yale. Possibly as a result of Baird's intervention, Harvey became more closely allied with American scientists than with their Canadian counterparts. This probably reflects the rather undeveloped state of scientific enquiry in Canada at this time.⁵⁰ Verrill, however, was certainly the undisputed North American authority on molluscan studies, and had at his disposal the facilities to deal with the giant squid. Perhaps sensitive to the defective state of research facilities north of the border, Harvey, twenty years later, was to press the Canadian government to establish a joint marine research station with the Newfoundland Government, to carry out fisheries research and the study of interesting marine fauna.⁵¹

Baird's correspondence with Harvey was always very cordial and diplomatic. Harvey was apparently much taken with his new role as "collector of natural history curiosities", and he offered to collect other interesting

⁵⁰ For a discussion of the development of science and a scientific community in Canada, see Trevor H. Levere and Richard A. Jarrell, A Curious Field-Book, Science and Society in Canadian History (Toronto: Oxford University Press, 1974.)

⁵¹ Moses Harvey, "The Artificial Propagation of Marine Food Fishes and Edible Crustaceans", Transactions of the Royal Society of Canada, Vol. IX, 1892-1893, Section IV, pp. 17-34.

objects for Baird. It appears that Harvey continued to "contact Baird about new strandings of giant squids, but over the years they became increasingly more difficult to secure.

Apparently, Harvey's articles had been extremely successful in generating interest in the giant squids. The sale price for a fresh specimen rose considerably due to the interest shown in them on the American market. In 1881 Harvey wrote to Baird:

I used my best efforts to secure it for you, but all in vain. A Mr. Morris, a sharp fellow who is agent for the New York Herald got wind of it before me and bought it from the fisherman with a view to speculating with it in New York.... When a fellow gets an idea that he's going to make a "big thing" out of speculation it's no use reasoning with him.⁵²

Harvey offered \$100.00, but to no avail.

The American showman, P.T. Barnum, sent Harvey an order to catch two of the very largest devil-fish for him and to spare no expense.⁵³

By early in the year 1874, news of the giant cephalopods from Newfoundland had gone far. It had even been passed on to the Colonial Office in London. The Governor of Newfoundland, Stephen Hill, had written to the Colonial

⁵² Harvey to Baird, Nov. 17, 1881, Baird Papers.

⁵³ Moses Harvey, "How I Discovered the Great Devil-Fish", Wide World Magazine, 1899, p. 740.

Office with the hope that they would convey the information to the appropriate source. The opening sentence of the letter, "The existence of large cephalopods in the North Atlantic has been questioned by naturalists",⁵⁴ would appear to suggest Harvey's presence in the wings. Two of Harvey's newspaper articles and a photograph of the tentacle were forwarded with the letter. The fact that the news was forwarded via the Colonial Office shows that Harvey could not have had any contacts in England, or known to whom he should send the information direct.

The Colonial Office contacted Sir Richard Owen and suggested that the photograph of the giant squid should be kept in the British Museum. It was added to the collection of the Natural History Museum.⁵⁵ Owen promptly forgot about the whole thing for nearly a decade. The only English study of the giant squids carried out at this time was done by a

⁵⁴ Stephen Hill to Lord Kimberley (Colonial Office), Government House, Newfoundland, Dec. 16, 1873. Copies of this letter and the ones to and from Sir Richard Owen are in the Newfoundland Public Archives, Miscellaneous Collection.

⁵⁵ The Museum already possessed a nine-foot arm of a giant squid, but officials at the museum were very interested as to when and from where the arm had come. The photographs of the Newfoundland squid are still in the museum, the arm has been mislaid.

minor English zoologist, William Saville Kent.⁵⁶

Kent had been informed of the giant squid through the courtesy of the editor of the American Sportsman, who sent him a copy of one of Harvey's articles.⁵⁷

Kent supported Harvey's supposition that the monster belonged to the ten-armed cephalopods, and added evidence of his own to support the existence of giant squids (as though their existence was still in some doubt). "Fortunately we are in possession of other substantial evidence which proves beyond doubt the existence of a species of calamary as formidable in point of size as the one (Harvey's) just described."⁵⁸ Kent was referring to the arm in the British Museum, not to any evidence supplied by Steenstrup or Harting. Kent mentioned Steenstrup's work but

⁵⁶William Saville Kent. There is very little information available on Kent. He was a Fellow of the Zoological Society of London, a one-time assistant in the Natural History Department of the British Museum, and was the superintending naturalist/curator of the Brighton Aquarium. He later spent some time in Australia and gave the 1881 presidential address to the Queensland Royal Society. This information was gleaned from introductions to a couple of papers he wrote.

⁵⁷Moses Harvey, "Narrow Escape of Two Fishermen from a Gigantic Cuttlefish", Rod and Gun and American Sportsman, Dec. 6, 1873.

⁵⁸W. Saville Kent, "Note on a Gigantic Cephalopod from Conception Bay, Newfoundland", Proceedings of the Zoological Society of London, March, 1874.

He presented "reliable" evidence for five different specimens, with Harvey's representing numbers two and five in chronological order of appearance.⁶⁴ Verrill considered it likely that they belonged to the two species of Architeuthis as described by Steenstrup. In August 1875 he wrote to Steenstrup to ask his opinion on the pamphlets he, Verrill, had written, and on the conclusions he had drawn. When one considers that Steenstrup was the only zoologist with any real experience of these creatures, it is amazing that Verrill waited so long before seeking his advice. Verrill admitted that he knew very little of the characteristics of A. dux;⁶⁵ Architeuthis monachus had been described in Packard's article "Colossal Cuttlefish".

Steenstrup's reply was prompt, lengthy and extremely helpful. He premised his remarks on Architeuthis with the information that he had two complete specimens preserved in spirits, one from the south Atlantic, and the other from the northern coast of Iceland.⁶⁶ He assured Verrill that he had

-
- ⁶⁴ No. 1 - found floating on the Grand Banks, 1871, only the beak preserved.
 No. 2 - Conception Bay specimen, 1873.
 No. 3 - Coombs Cove specimen, from the description, one arm and one tentacle missing, it could have been identical with No. 2.
 No. 4 - Jaws and Suckers from Bonavista Bay, reported by the Rev. Mr. Munn, no date.
 No. 5 - Complete specimen from Logy Bay, Nov. 1873.

⁶⁵ Verrill to Steenstrup, Aug. 15, 1875. Steenstrup Papers.

⁶⁶ Steenstrup to Verrill, Sept. 4, 1875.

was valid and that Kent's credentials were up to the mark. Baird reassured him: "I have not seen any special criticism of Saville Kent's name for the cuttlefish, but presume, as he is an accomplished marine zoologist, that he knows what he is talking about."⁶¹

Baird was obviously unaware of it, but there had been criticism of Kent's classification. Verrill had assigned the specimen to the genus Architeuthis. In an anonymous letter to the Globe, Kent's right to institute the new genus Megaloteuthis was questioned on the grounds that Verrill had actually identified the Newfoundland specimen as belonging to Steenstrup's Architeuthis.⁶²

Verrill collated all the evidence he had been able to find on the existence of giant cephalopods off the North American coast; in doing so he was bowing to the "popular interest that has been excited by several articles that have recently been published in Canada and the U.S."⁶³

⁶¹Baird to Harvey, June 4, 1874. Baird Papers.

⁶²W.S. Kent, "The Newfoundland Cuttlefish, Megaloteuthis harveyi", Nature, Vol. IX, March 26, 1874. (Though the original Globe article could not be located, the gist of the attack was contained in Kent's rebuttal in the above article.)

⁶³Addison E. Verrill, "Occurrence of Gigantic Cuttlefishes on the Coast of Newfoundland", American Journal of Science, Vo. 8, 1874, p. 158.

was of the opinion that Steenstrup had not had sufficient evidence to institute the title Architeuthis. His work in Kent's opinion had only supplied evidence to support the theory that giant squids might exist. On the other hand the American, Verrill, was prepared to consider the Newfoundland specimens as additions to the genus Architeuthis.

Kent's main argument was that Steenstrup did not have sufficient evidence to allow for the reidentification of his species, A. dux and A. monachus, and as such had no grounds for creating a new genus. Kent, basing his classification on a single tentacle (having just rebuked Steenstrup for working with too little evidence) instituted the new generic title Megaloteuthis (Megalos - huge, teuthis - squid) and the species Megaloteuthis harveyi "In honour of the source to which we are indebted for this valuable knowledge."⁵⁹

By the time the news of this honour appeared in a St. John's newspaper the names had become somewhat twisted. We are informed that W. Saville Bent proposed to institute for these giant cuttlefishes the generic title Negalothenis harveyi!⁶⁰ Harvey was delighted to have the species named for him, but checked with Baird to make sure that the name

⁵⁹ Ibid., p. 181.

⁶⁰ Newspaper clipping from one of Harvey's scrapbooks. No date or reference given.

no doubts of the generic value of his genus Architeuthus, and that the Newfoundland specimens certainly belonged to that genus. This confirmed Verrill's own adoption of the Architeuthis classification.

Kent, on the other hand, felt that Steenstrup's classification was unsatisfactory, though in reality he knew very little about Steenstrup's work. He had only familiarized himself with it following the discovery of the Newfoundland specimens. Lacking access to Steenstrup's original descriptions of Architeuthus, he accepted the rather dubious authority of Crosse and Fischer's article in the Journal de Conchyliologie.⁶⁷ That article gave such a poor representation of Steenstrup's work that it is little to be wondered that Kent was skeptical of the validity of Architeuthus.

This must really be considered Steenstrup's fault. His articles established his right to name the giant squids, but they did little, at the time, to enlighten many zoologists. It was only with the publication of "Spolia Atlantica - Architeuthus" in 1898 that his early studies on the giant squids were fully described. But for his correspondence, little or nothing would have been known about Architeuthis.

⁶⁷W. Saville Kent, "A Further Communication Upon Certain Gigantic Cephalopods Recently Encountered Off the Coast of Newfoundland", Proceedings of the Zoological Society of London, June 1874.

outside a limited number of Scandinavian naturalists.⁶⁸

The only other reference to Steenstrup's work that Kent found was in Pieter Harting's 1861 article on giant cephalopods, and we have no evidence that Kent tried to contact Steenstrup directly for there is no record of any such communication in the Steenstrup Papers. Kent lighted upon Harting's suspicion that A. dux was, in reality, the same as Ommastrephis todarus (D'Orb.). He was convinced that the giant squids were Ommastrephids, and he rescinded his earlier classification of Megaloteuthis harveyi in favor of Ommastrephes harveyi.

But when Harting had classified A. dux and O. todarus (D'Orb.) together, he had made the proviso that his suspicion could only be proved, one way or another, when the tentacle of a giant squid was examined. The tentacle from Conception Bay did not show the characteristic sucker arrangement of Ommastrephes todarus (D'Orb.). Instead of examining the possibility that Steenstrup's classification could be correct,

⁶⁸ There was one reference to Steenstrup's Architeuthis made by an English zoologist in 1869: Gwynn Jeffrey's British Conchology (London: Jan Van Voorst, 1869), Vol. V (The Mollusca), p. 124.

There can be little doubt that this class comprises the giants of the Mollusca, the Kraken, even, may be one of the endless wonders of the sea.

Professor Steenstrup has collected several trustworthy accounts of such monsters, which he refers to the species Architeuthis. The mutilated carcass of a huge cephalopod, perhaps belonging to Steenstrup's species, was stranded in 1860-1861 between Hillswick and Scalloway on the west of Shetland.

Kent chose to call the species Ommastrephes harveyi.

Kent also took time to examine the arm of the giant squid that had so long been preserved in the British Museum. He concluded that the arm belonged to a species apparently identical to O. todarus (D'Orb.);⁶⁹ the same, which according to Harting, was synonymous with A. dux.

Kent published no further work on the giant squids after June 1874. He had been at a distinct disadvantage with regard to the Newfoundland specimens, for he could not examine them himself and was forced to rely on the observations of others.

Addison Verrill, on the other hand, had received the specimens for study and had close liaison with Harvey. Harvey's numerous contacts around the island gave Verrill access to a number of strandings, and in the event that the specimen was not available for personal examination, he could at least receive a good description of it.

Verrill's study of the giant cephalopods was delayed by his involvement in moving Yale's zoological collections to a new museum finished in 1876. He was further delayed by having to arrange the collection without much assistance.⁷⁰ He did publish some short articles on the giant squids in

⁶⁹W. Saville Kent, "A Further Communication on the Gigantic Cephalopods Recently Encountered off the Coast of Newfoundland", Proceedings of the Zoological Society of London, June 1874, p. 493.

⁷⁰Verrill to Steenstrup, New Haven, July 7, 1879, Steenstrup Papers.

the American Journal of Science, but his major work on them was not published until 1880. He completed a detailed study of the cephalopods of the North Eastern Atlantic coast; the material on the giant squids comprised half of this publication.⁷¹

This work contained all his own observations on the Newfoundland specimens, twenty-three in all, with a résumé of the studies completed on similar large species by foreign authorities, Steenstrup, Kent and Harting.

When the first specimens were found Verrill had thought they could be assigned to either Architeuthis dux or Architeuthis monachus. There certainly appeared to be two different species represented, but additional study of the structure of the beaks and caudal fins suggested that these were two different species from those characterized by Steenstrup. Verrill instituted two new species, Architeuthis princeps and Architeuthis harveyi (the same as Megaloteuthis harveyi). The differences between them were to be found in the relative lengths of the arms to body size. A. harveyi had arms of equal length and size, and were shorter than the combined length of the body and head. The arms of A. princeps were of unequal lengths, the longest exceeding the body and head length by one-sixth.

⁷¹Addison E. Verrill, "The Cephalopods of the North Eastern Coast of America" (Part I, The Gigantic Squids - Architeuthis - and their allies), Transactions of the Connecticut Academy of Arts and Science, Vol. V, New Haven, 1878-1882.

quadrate shape (the eight arms of the squid are paired). The unusual sucker arrangement on which Owen also commented, and which Kent had thought distinguished it as O. todarus (D'Orb.), was, in Steenstrup's opinion, due to the hectocotylization of the arm of the fourth pair.⁷⁷

Owen was an old man at the time he wrote the article, which may be used to account for the fact that it was full of errors. He thought Packard assigned the name A. princeps to Mr. Harvey's "great Newfoundland Teuthid" in Feb. 1873. The fact that the Newfoundland teuthid was not found until October 1873, or that it was Verrill and not Packard who instituted the species A. princeps, did not seem to count. Plectoteuthis grandis was subsequently listed as Architeuthis grandis.⁷⁸

The end of the influx of Newfoundland strandings in the 1880's also marked the end of the initial phase in the study of the giant cephalopods. In the early twentieth century occasional papers were written, usually following one of the rare sightings or the stranding of a giant squid. It was not until the 1960's that so concentrated a study of

⁷⁷ The Cephalopod Papers, pp. 160-161.

⁷⁸ An up-to-date (1886) list of species of Architeuthis can be found in The Report of the Scientific Findings of H.M.S. Challenger (London: 1886), Vol. 16.

it is obvious from his comments that his knowledge of the giant cephalopods outclassed Verrill's. While Steenstrup admired Verrill's work, he sometimes accused him of undue haste in his classifications, and of not being familiar with existing literature on the subject, which resulted in an unnecessary duplication of effort.⁷⁵

But had Verrill not insisted on the validity of Architeuthis, Steenstrup's classification might not have been accepted. (Verrill was one of the few who had kept up with that part of the literature.) Steenstrup's major work, Spolia Atlantica - Architeuthus, supported his early claims, but in 1873 Architeuthis was a long way from being universally accepted.

Even as late as 1881, Sir Richard Owen instituted yet another generic title Plectoteuthis grandis, following his study of the cephalopod arm that had lain forgotten in the British Museum for decades.⁷⁶ This was the same which Kent had described as Ommastrephes todarus (D'Orb.). Owen had felt justified in identifying a new genus because of the unusual quadrate form of the cross section of the arm; the usual form in giant squids is triangular. Steenstrup had noticed that the fourth pair of arms usually displayed this

⁷⁵ Ibid., p. 108.

⁷⁶ Sir Richard Owen, "On New and Rare Cephalopods", Transactions of the Zoological Society, 1881.

more than one species taken off Newfoundland, how many have still not been determined.

Verrill, like many nineteenth-century zoologists, was primarily a taxonomist, interested mainly in the identification of new species. The whole of his lengthy article on the giant squids was purely descriptive, distinguishing the various anatomical differences in the specimens. In the whole of Verrill's article on the giant squids he never speculated why they should suddenly have appeared off the Newfoundland coast in such numbers. No apparent interest was shown as to whence they had come, why they should have been stranded or why they suddenly ceased to appear.

Steenstrup, on the other hand, though a taxonomist, went on to do anatomical comparisons of different genera and species to gain insights into the structure of the giant squids. In distinguishing the Architeuthid characteristics from those of the Ommastrephids, he finally showed the clear differences between the two,⁷⁴ firmly establishing the genus Architeuthis. He was also curious about their natural habitat.

Steenstrup followed closely Verrill's work, both on the giant cephalopods and on the smaller varieties, and

⁷⁴The Cephalopod Papers, pp. 73-74.

Steenstrup, when he saw Verrill's classifications, maintained that the differences in the structure of the caudal fin could be accounted for by the action of the preservative used.⁷² Such damage could, in Steenstrup's opinion, have accounted for the differences between A. monachus and A. princeps.

Since the 1870's the number of different species of Architeuthis has multiplied with each new specimen found. The result is that no-one is quite certain just how many species of Architeuthis do exist. Dr. Aldrich suggested in his Sarsia article that the Newfoundland specimens taken in the 1960's all belonged to one species, A. /dux, and that many of the characteristics used to describe new species could be accounted for by the age of the specimen, or the battering it had received in the course of stranding. Most specimens have been dead for some time prior to discovery, and the soft body has begun to deteriorate. However, a study by Marguerite Aldrich,⁷³ showed that a comparison of the radula teeth (the radula is a ribbon-like "tongue" in the beak of the squid used to aid digestion), indicated that there were certainly

⁷² Steenstrup to Verrill, Copenhagen, Sept. 4, 1875. Steenstrup Papers.

⁷³ M.M. Aldrich, The Teuthoid Radula as Taxonomic Criterion with Special Reference to the Families Architeuthis and Ommastrephes (Memorial University of Newfoundland, unpub. M.Sc. Thesis).

these creatures was again launched. This time when the giant squids came to Newfoundland there were scientists here to study them. In the ninety years between the first sightings in the 1870's and those of the 1960's, Newfoundland had entered the mainstream of North American scientific activity.

Conclusion

During the first half of the nineteenth century, the style and practices of scientific enquiry, especially in the natural sciences, had been undergoing comprehensive alterations. The gentleman naturalist was being replaced by the more technical, university-trained scientist. In the United States, for example, we find that by 1840⁷⁹ the importance of the naturalist and of natural history societies as key figures and institutions in the life of science had all but ceased. The shift from taxonomy to anatomy, physiology and embryology, had made them redundant. More exacting methods of study required a new type of scientist, one with

⁷⁹ The United States is being used here to illustrate the point. This transition was inevitable, but it manifested itself at different times in different places. In Canada, for instance, scientific development occurred much later than in the United States. Whereas, in America, natural history societies were in their decline in the 1830's and 1840's, in Canada they were just beginning to appear on the scene. The earliest societies were the Historical Society of Quebec, established in 1824, and the Natural History Society of Montreal, established in 1827.

more specialized training.⁸⁰

Unlike the physical sciences, which from very early times had demanded a more specialized background, the natural sciences had been open to anyone with sufficient interest. The study of geology was popular because the material was easily comprehensible, local phenomena could be studied by amateurs on the spot, and the interpretations were controversial; in such circumstances one did not have to be an expert in order to make valuable contributions.⁸¹ The same was true for botany and zoology. The increasing complexity of the biological sciences had drastically altered this situation. It is hoped that this present history, therefore, in considering the growth and development of the scientific study of the giant squid, has thus given us a chance to witness the changes that took place in the style and direction of at least these scientific researches.

Pontoppidan's Natural History of Norway was, as we have seen, supposedly a work on natural history, and yet the section concerning giant squids reads like a highly imaginative adventure story liberally tintured with old

⁸⁰ See William M. Smallwood, Natural History and the American Mind (New York: Columbia University Press, 1941), Chap. 12 - The Passing of the Naturalist 1830-1840.

⁸¹ Charles C. Gillespie, Genesis and Geology (New York: Harper and Brothers, 1959), p. 187.

wives' tales. Many of his readers doubtless believed his exaggerated accounts (after all, they had been raised on similar stories), but they did not convince the skeptics of his own or of later times, for the stories were just too fabulous for an increasingly sophisticated audience. In the span of a single century that separated the learned Pontoppidan and Steenstrup, however, we witness a remarkable change. Both men used similar sources, both reached the same basic conclusions, and yet their approach to the subject and their treatment of the material were radically and (we shall find) irreversibly altered. The difference is very similar to that illustrated on page 73 of this study, in our comparing a description by Harvey with a similar one by Verrill. Even the very style of writing changed, for with the professionalization of science, there developed a much more precise use of language, and the journals and the articles ceased to be written for public consumption, and instead were directed towards the more limited and more scholarly world of the professional researcher.

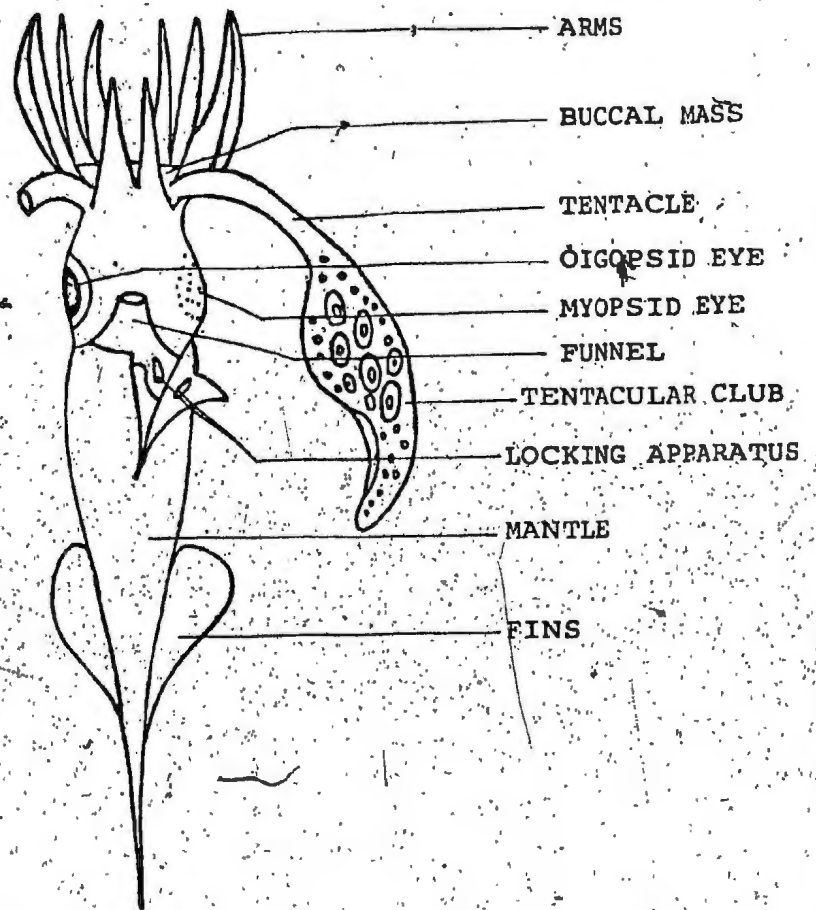
The materials presented in Chapter I of our study leave little doubt that there were "proofs" for the existence of giant squids long before the time of Steenstrup. Even if we are inclined to disallow the semi-mythological versions of very early writers, this conclusion still

stands, for the Irish accounts, and the evidence uncovered by Hamilton Smith in the Haarlem Museum, are unquestionably reliable. Why, then, was there a controversy over the very existence of the species which, it would appear, only nineteenth-century scientists could lay to rest? One wonders what the outcome would have been had Moses Harvey written his reports in 1773 instead of 1873. What had changed? Was it perhaps the emergence of the professional zoologist which was the most significant factor? Was it perhaps a result of the genesis of the "Age of Science"? The men of the Renaissance had, in general, been perfectly willing to accept that the world was populated with hobgoblins and giant squids. There was, after all, no compelling reason why this should not be so. It was the age of reason which had tried to exterminate such (for them) obviously nonsensical ideas. And it took the gentlemen of the age of science to re-establish and legitimate some of the monstrous inhabitants of this planet so vigorously denied by their "rational" forebears. In the case of the giant squids, what many mariners had long known was finally verified to everybody's satisfaction in 1873. A sometimes unfortunate faith in the pronouncements of scientists was able to convince people where sometimes tangible evidences had failed.

Now, at last we can see clearly the roles played by Steenstrup and Harvey, who have dominated this account. There is no doubt that Steenstrup was the key individual in the scientific researches, and yet it was not his works, but Verrill's publications which finally settled the "Architeuthis" question. Steenstrup, as we know, wrote for a very limited audience. But although Verrill's work expanded the numbers who knew of the giant squids, it was Harvey who was the real publicizer of them. He had, of course, good material on which to work. The gigantic devil-fish, with its mixture of the monstrous and the bizarre, had a natural appeal for the public, and it certainly cannot be denied that the Reverend Harvey played to his audience, both to his and their satisfaction.

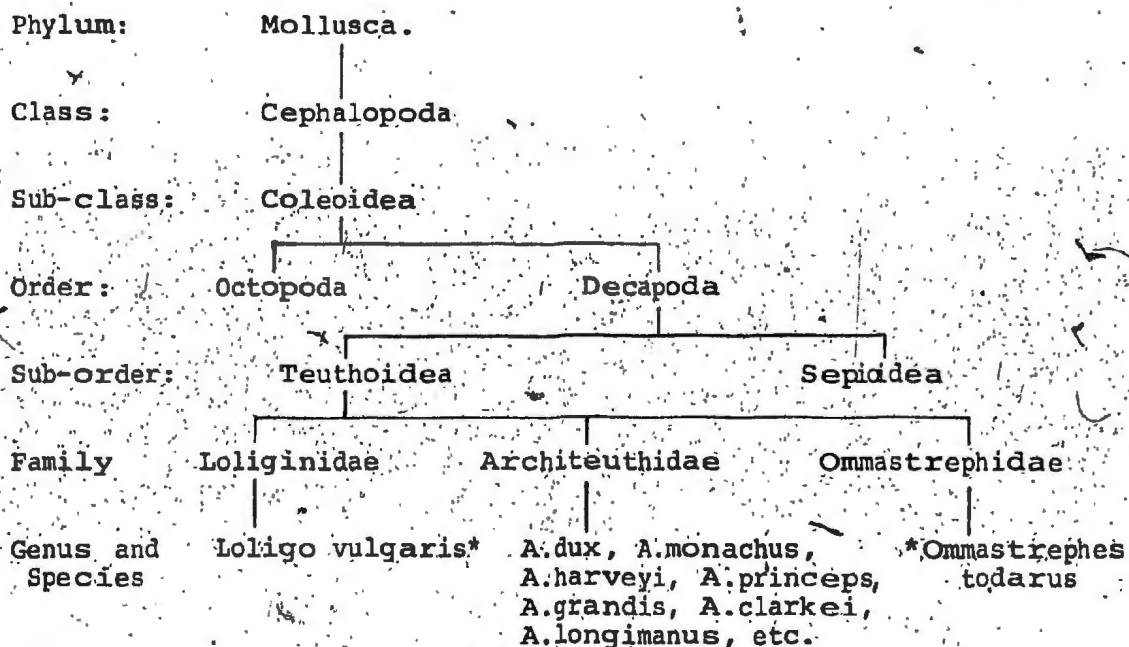
We may see his articles not so much as academic contributions to the growth of marine biology, but rather as literary productions which may, with more accuracy, be placed at the end of that tradition which, from the time of Aristotle and Pliny onwards, had supported the existence of giant cephalopods. They belong less to the realm of the "journal" than to that of journalism, and their orientation was less to the scientist than to the layman. Chronologically he was, of course, a contemporary of Steenstrup and Verrill. Mentally, however, and in the character of his writings, he stands alongside Olaus Magnus and Pontoppidan, and it was

in their style that he wrote the final chapters in the history of the Kraken. The scientific tradition in the study of the giant cephalopods had begun with Steenstrup; the literary tradition had ended with Harvey.



SCHEMATIC DIAGRAM OF A SQUID

APPENDIX 2

THE FAMILY ARCHITEUTHIDAE AND RELATED FAMILIES

* These are just examples from the numerous species of Loligo and Ommastrephes.

APPENDIX 3

In referring to Steenstrup's works, I have often included the name and date of his original paper in addition to the page numbers in The Cephalopod Papers. The names of the magazines in which the articles appeared have also been listed in an abbreviated form. The following is a list of their full titles:

1. Dansk. Vid. Selsk. Skr. - Det Kongelige Danske Videnskabernes Selskabs Skrifter.
2. Skand. Naturf. Forhandl. - Forhandlingar vid det af Skandinaviska Naturforskare och Läkare hållna Möte i Gotheborg.
3. Kjobenhavn, Oversigt - Oversigt over det Kongelige Danske. Videnskabernes Selskabs. Forhandlinger og dets Medlemmers Arbejder i Aaret.
4. Froriep. Notizen - Notizen aus dem Gebiete der Natur und Heilkunde; von L. von Froriep.

BIBLIOGRAPHY

PRIMARY SOURCES

Manuscripts

Baird Papers, Smithsonian Institution, Washington.

Colonial Office Letters, Newfoundland Provincial Archives,
PG/A/17.

Moses Harvey's Scrapbooks, Newfoundland Public Archives,
PG/A/17.

Minutes of the Senate, McGill University, Montreal, March, 1890.

Steenstrup Papers, Det Kongelige Bibliotek, Copenhagen.

Newspapers

Montreal Gazette, 1873-1899.

Newfoundlander, St. John's, November 5, 1875.

Evening Telegram, September 5, 1905.

SECONDARY SOURCES

Theses

Aldrich, M. M. "The Teuthoid Radula as a Taxonomic Criterion, with Special Reference to the Families of Architeuthis and Ommastrephes." Unpublished M.Sc. Thesis. Memorial University of Newfoundland, 1971.

Magazines, Journals, etc.

Aldrich, Frederick A. "The Distribution of Giant Squids (Cephalopoda Architeuthidae) in the N. Atlantic & Particularly about the Shores of Newfoundland," Sarsia, Vol. 34, pp. 394-398.

Bell, Robert. "Alexander Murray," The Canadian Record of Science, Vol. V, April, 1892, No. 2, pp. 78-92.

- Bordage, Edmond. "Scientific News," American Naturalist, Vol. 28, 1894, pp. 287-289.
- Cain, A. J. "Logic and Memory in Linnaeus' System of Taxonomy," Proceedings of the Linnaean Society, London, Vol. 168-169, 1957-58, pp. 144-163.
- Cooke, A. H. "In Memoriam - M. Crosse," Nautilus 12, 1898-99, pp. 104-106.
- Crosse, H., and Fischer, P. "Nouveau Documents sur les Céphalopodes gigantesques," Journal de Conchyliologie, 1862, pp. 123-145.
- Gervais, P. "Remarques au sujet des Grandes Céphalopodes décabranchides constituant le genre Architeuthis," Journal de Zoologie, Vol. V, 1875, pp. 82-92.
- Harting, Pieter. "Descriptions de Quelques Fragments de Deux Céphalopodes Gigantesques," Afdeeling Natuurkunde, Vol. 9, 1861, pp. 9-15.
- Harvey, M. "Narrow Escape of Two Fishermen from a Gigantic Cuttlefish," Rod and Gun and American Sportsman, December 6, 1873.
- _____. "A Monster of the Deep - Sixty Feet in Length - The Kraken or Devil Fish Seen at Last," The Royal Gazette and Nfld. Advertiser, December 9, 1873.
- _____. "Occurrence of a Large Cephalopod in Conception Bay," The Naturalist, December 13, 1873.
- _____. "The Devil Fish in Newfoundland," The Field, January 31, 1874.
- _____. "The Devil-Fish in Newfoundland Waters," Maritime Monthly, March, 1874, pp. 193-211.
- _____. "Gigantic Cuttlefish at Catalina," Boston Traveller, October 10, 1877.
- _____. "The Artificial Propagation of Marine Food Fishes and Edible Crustaceans," Transactions of the Royal Society of Canada, Vol. IX, 1892-1893, Section IV, pp. 17-34.

Harvey, M. "How I Discovered the Giant Devil-Fish," Wide World Magazine, London, 1892, pp. 732-739.

Hughes, R. "Alexander Murray, 1810-1884," The Geology Association of Canada, Proceedings, Vol. 23, 1971, pp. 1-4.

Kent, W. S. "Gigantic Cuttlefish," Popular Science Review, 13 (1874) pp. 113-127.

_____. "The Newfoundland Cuttlefish, *Megateuthis Harveyi*," Nature, Vol. IX, March 26, 1874, p. 403.

_____. "Note on a Gigantic Cephalopod from Conception Bay, Newfoundland," Proceedings of the Zoological Society, London, March, 1874, pp. 175-182.

_____. "A Further Communication Upon Certain Gigantic Cephalopods Recently Encountered Off The Coast of Newfoundland," Proceedings of the Zoological Society, London, XXXII, June, 1874, pp. 489-494.

More, A. G. "Notice on a Gigantic Cephalopod which was Stranded at Dingle in Kerry Two Hundred Years Ago," Zoologist, Vol. 10, No. 118, July, 1875, pp. 4526-4532.

Murray, A. "Capture of a Gigantic Squid at Newfoundland," American Naturalist, VIII (1874) 120-23.

_____. Nature, Vol. IX, February 28, 1874, p. 522.

_____. Apoleton's Journal, January 31, 1874.

Owen, R. "On New and Rare Cephalopods," Transactions of the Zoological Society, 1881, 156-168.

Packard, A. S. "Colossal Cuttlefishes," American Naturalist, Vol. VIII, February, 1873, pp. 87-94.

Report of the British Association for the Advancement of Science, 1841.

Robson, G. C. "On Observations on *Architeuthis Clarkei*, a New Species of Giant Squid, with Observations on the Genus," Journal of Zoology, No. 3, May, 1933, pp. 681-697.

Verrill, A. E. "The Gigantic Cephalopods of the North Atlantic," American Journal of Science, Vol. IX, 1875, p. 126, pp. 123-130, 177-185.

Verrill, A. E. "Notes on Gigantic Cephalopods - A Correction," American Journal of Science, XII, 1876, pp. 236-237.

_____. "The Cephalopods of the North Eastern Coast of America, Part I, The Gigantic Squids - Architeuthis and Their Allies," Transactions of the Connecticut Academy of Arts and Science, Vol. V, New Haven, 1878-1882, pp. 177-249.

_____. "The Giant Cuttlefishes of Newfoundland and the Common Squids of the New England Coast," American Naturalist, VIII (1874) pp. 167-169.

_____. "Occurrence of Another Gigantic Cephalopod on the Coast of Newfoundland," American Journal of Science, XIII (1877) pp. 425-426.

_____. "The Colossal Cephalopods of the North Atlantic," American Naturalist, XI (1875) 21-36.

_____. "Occurrence of Giant Cuttlefish on the Coast of Newfoundland," American Journal of Science, Vol. 8, 1874, pp. 158-161.

Whiteway, L. "The Athenaeum Movement: St. John's Athenaeum (1861-1898)," Dalhousie Review, Winter, 1970-71, pp. 540-550.

Anonymous. "In Memoriam," Edinburgh Field Naturalist and Microscopical Society Transactions, Vol. 3, (1898) pp. 272-273.

Books

The Report of the Findings of H.M.S. Challenger, London, 1886.

Aelian. On the Characteristics of Animals. Translated by A. F. Scholfield. London: William Heinemann Ltd., 1957.

Agassiz, L. Essay on Classification. Cambridge, Mass.: Belknap Press of Harvard University Press, 1962.

Aristotle. Historia Animalium, Translated by A. L. Peck. London: William Heinemann Ltd., 1969.

- Bassett, F. S. Legends and Superstitions of the Sea and of Sailors. Chicago and New York: Belford Clarke and Co., 1885.
- Cohen, D. A Modern Look at Monsters. New York: Dodd, Mead, and Co., 1970.
- Cole, E. J. A History of Comparative Anatomy. London: McMillan and Co. Ltd., 1944.
- Gillespie, C. Genesis and Geology. New York: Harper and Brothers, 1959.
- Holland, P. The Natural History of the World. London: Islip, 1834.
- Homer. The Odyssey. Translated by E. V. Rieu. Penguin Books, 1946.
- Jeffray, G. British Conchology (Volume V). London: Jan van Voorst, 1869.
- Lever, T., and Jarrell, R. A Curious Field Book, Science and Society in Canadian History. Toronto: Oxford University Press.
- Lurie, E. Louis Agassiz, A Life in Science. Chicago: University of Chicago Press, 1960.
- Marcou, J. The Life, Letters, and Works of Louis Agassiz, 1869.
- O'Brien, C. F. Sir William Dawson, A Life in Science and Religion. Philadelphia: American Philosophical Society, 1971.
- Olaus Magnus. Historia de Gentibus Septentrionalibus. Rome, 1555.
- Pliny. Natural History. Translated by W. Rackman. London: William Heinemann Ltd., 1956.
- Pontoppidan, E. Natural History of Norway. London, 1755.
- Price, D. Big Science, Little Science. New York: Columbia University Press, 1963.
- Selmer, C. (ed.) Navigatio Sancti Brendani Abbatis (University of Notre Dame Publications in Mediaeval Studies, Vol. XVI). University of Notre Dame Press, 1969.

Simpson, G. W. Principles of Animal Taxonomy. New York: Columbia University Press, 1961.

Skelton, R. A. Decorative Printed Vans of 15th-18th Centuries. London: Staple Press, 1952.

Smallwood, W. M. Natural History and the American Mind. New York: Columbia University Press, 1963.

Spencer, H. Principles of Biology. New York: Appleton and Co., 1896.

Thompson, D. A Glossary of Greek Fishes. London: Oxford University Press, 1957.

Townsend, E. W. Captain Cartwright and His Labrador Journal. Boston: Dana and Co., 1911.

Tryon, G. W. Manual of Conchology. Philadelphia, 1879.

Volsoe, A., Knudsen, J., and Rees, W. (trans.) The Cephalonod Papers of Japetus Steenstrup. Copenhagen: Danish Science Press, 1962.

Wolff, T. Danish Expeditions to the Seven Seas. Copenhagen, Rhodes, 1967.

Dictionaries

The Dictionary of National Biography. London: Oxford University Press, 1917.

Dictionary of Scientific Biography. Ed. C. Gillespie. New York: Charles Scribener's Sons, 1973.

Who's Who in Science from Antiquity to the Present. Hannibal, Missouri. Marquis Who's Who Incorp., West Publishing Co., 1968.



