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with black. The hind tibiæ may have a cream-coloured stripe on basal half. The face-markings in the specimens described are more or less discoloured.

♀.—Similar, but the face is without light markings and the area in front of the ocelli is brassy.

Hab. Queensland (*Gilbert Turner*, 383 Hy., males, and 269 Hy., females). Two of each sex.

The mouth-parts of this species seem not to be those of true *Prosopis*; it is probable that the Australian species assigned to this genus should form the basis of one or two new genera, but I do not feel able to offer a plan of segregation just at present.

Prosopis Lubbocki, n. n.

Prosopis metallica, Smith, Trans. Ent. Soc. Lond. 1862, p. 69 (Australia, in coll. of J. Lubbock), ♂, not ♀.

It seems very unlikely that the insects described as the sexes of *P. metallica* are conspecific, and it will probably cause less confusion if the male is separated under the above name.

Prosopis Frederici, n. n.

Prosopis similis, Smith, Cat. Hym. Brit. Mus. 1853, p. 26 (Australia). Not of Fabricius, 1793.

Prosopis Cameroni, n. n.

Prosopis sulcifrons, Cameron, Mem. Manchester Soc. 1897, p. 51 (New Zealand). Not of Smith, 1853.

University of Colorado,
Boulder, Colorado, U.S.A.,
June 27, 1905.

XLVI.—*Some Results of the North-Atlantic Fin-Whale Fishery.* By THOMAS SOUTHWELL, F.Z.S.

Our knowledge of the specific distinctions, habits, and distribution of the members of the family of Cetacea known as the Balaenopteridæ, or Fin-Whales, has until quite recently been lamentably deficient, and even now it cannot be said to be very complete. This has undoubtedly been owing to the wide dispersal of these animals over the oceans of the world, their gigantic size, and to the circumstances under which

they until of late occurred having rendered their study a matter of extreme difficulty; for although members of the family have long been more or less familiar objects in all quarters of the globe, the only opportunities for their scientific study have been the accidental stranding of individual examples on the shores of civilized countries; and these events have too often occurred in desolate regions, far from the reach of a competent authority, or even of individuals capable of recording the features essential to the due recognition of their species. It thus happened that, mainly owing to hasty deductions from insufficient materials, species were unduly multiplied and an almost inextricable state of confusion arose; this, happily, through the recent labours of British and Continental cetologists, has at last been reduced to comparative order.

One great aid to the study of these animals has been the perfecting by a Norwegian seaman, Captain Svend Foyn, of Tönsberg, of an apparatus by which these giant whales, hitherto regarded as too dangerous to be attacked by the methods employed in the capture of the Polar whale, could be successfully overcome, and this (although it cannot, in one respect, be regarded otherwise than with extreme regret, seeing that it risks the eventual extermination of these interesting animals) has been the means of providing abundant materials for a critical study of the various species—facilities which have been duly utilized by the naturalists of Europe and America. The whales when captured are towed to the various shore-stations, where their carcasses are converted into oil and manure.

I may here remark that one of the results of the prosecution of this industry is the revelation of the astonishing numbers in which these animals occur in summer in the North Atlantic—a result altogether unlooked for, except perhaps by the far-seeing Capt. Foyn; and especially has this been the case with two species, Rudolphi's Rorqual and the Blue Whale (*B. Sibbaldii*), which had been regarded as extreme rarities.

I need not dwell further on this portion of the subject than briefly to chronicle the development of the fin-whale fishery; the success of Herr Foyn soon led to his example being extensively followed, and on the expiration of his patent in 1882 many other companies were formed to hunt from the Finmarken and Murmansk coast, till the Norwegian government enacted restrictions which, added to the growing scarcity of the whales, caused the opening of fresh stations in Iceland, where the whalers had greater freedom of action,

and subsequently of other centres in the Faroe and Shetland Islands.

On the western side of the Atlantic also, in the year 1898, a company, under the name of the "Cabot Steam Whaling Company," commenced operations, thus becoming the pioneer of quite a fleet of vessels now engaged in this fishery from Newfoundland.

It is to a comparison of the results obtained in these three centres, remote from each other, that I wish now to call attention. It may here be remarked that just as happened when the fishery for *Balæna biscayensis* in the temperate water of the North Atlantic was abandoned in favour of that of *B. mysticetus* in the Polar seas, the skill and seamanship of the old Basque whalers were still requisitioned, so now in the extension of this new industry in Europe and America it is the Norwegian originators who fill the positions requiring expertness and experience.

In the following notes I purpose to examine, taking each species in succession, the results of the operations in the three great centres of the industry, with a view to ascertaining if possible whether any racial variation is to be observed in the members of the same species frequenting the several localities, as indicated by appreciable differences in their habits, frequency, or external characters. I shall therefore, avoiding as much as possible the commercial aspect of the question, confine my remarks mainly to the comparative abundance of each species with any departures from the normal type, the season of their occurrence, proportionate numbers of the sexes, period of gestation, number of young produced, and such minor considerations as may help to throw light upon the identity or otherwise of the races frequenting the localities under consideration.

As the pioneers of this industry the Norwegians claim our first attention, and it is desirable to use the statistics of a somewhat early period in order that they may be as distinct as possible from those of the more southern areas, which were invaded later on. I am therefore especially fortunate in being allowed, through the kindness of Mr. Alfred Heneage Cocks, to use the statistics collected by that gentleman during his visits to the Finmarken whaling-stations in the years 1883 to 1889*, on which what follows is mainly based.

The field of operation in the first instance was contiguous to the coast, the whales, especially the large blue whale (*B. Sibbaldii*), penetrating far into the fjords in search of

* 'Zoologist,' 1834-1890.

food; but as the result of persecution they soon discarded the shore, and the final area in which their pursuit took place was off the coast of Lapland to the north of 70° N. lat., especially between Söriön on the west and Varanger Fjord on the east, but extending below 70° N. off the Murmansk coast (Russia) to Svjatoi Nos in about longitude 40° E.

The fin-whales killed, in the order of their frequency, are as follows:—

BALÆNOPTERA MUSCULUS, Linn.

Norwegian Area.

The common rorqual (finhval, sildhval, or rörhval of the Norwegians). This, the most numerous species, occurs from March to the early part of September: 473 were killed in the season of 1885, 646 in 1886, 463 in 1887, and from that year the numbers began to decline; this decline in the number of whales, added to the legal restrictions already referred to, led to the removal of some of the factories to Iceland, the result of which, so far as known, will be included in the Shetland fishery.

The common rorqual is so well known a species that no description of the normal form is needed, but it is subject to considerable variation both in form and coloration; the most important of these is frequently referred to by Mr. Cocks as well known to the Norwegian whalers under the name of "bastarder" or bastard whales, and commonly believed to be the joint offspring of the common rorqual and the blue whale (*B. Sibbaldi*). It appears to attain larger dimensions than the type of the species, and is described as grey rather than white on the under surface; the anterior baleen-plates are white, and the remaining portions darker than normal; the average length of eight females was 68 feet and of five males 70 feet, but 80 feet appears to be no uncommon length. The "bastards" killed in 1887 averaged nearly 5 feet longer than those of the normal type.

Another well-recognized variety is known as the "loddehval," i. e. capelan whale. This is the common fin-whale of the north; it is white under the belly, and disappears at the end of April. The fin-whale which then comes, Capt. Ellevsen informed Mr. Cocks, "has more or less grey colour among the white, especially on one side [an asymmetrical disposal of colour common to all the rorquals], its snout is generally more pointed, and the whale is more slender and

longer"; he adds that the whales which eat the capelan or "lodde" are only in Finmarken waters in the spring, and "those that eat the 'kril' (*Calanus finmarchicus*), i. e. the southern form, come later." This variety is also known as the "langrör" (literally long-reed, as rorqual (rörkval) is the Finmarken dialect for rörhval or reed-whale: *Cocks*), and Capt. Horn, of Yeretiki, informed Mr. Cocks that of sixteen rorquals captured by him off the Murmansk coast in 1889 all were of this variety, and not one normal fin-whale. The variation in colour taken by itself would not amount to much, but in conjunction with several other minor differences in form, food, and the season of their appearance would seem to suggest subspecific value.

It is the opinion of experienced Norwegian whalers that this species pairs in December or January, and that, as a rule, the fœtuses found in April are from 6 to 12 inches long, whereas in August they are from 6 to 10 feet in length and at birth 16 to 20 feet; but that there are many exceptions to this generalization the following examples of actual dates and measurements of fœtuses will show:—

March.—4 ft.

April.—1 ft. 4½ in.—5 ft.

May.—2nd, female in milk; 7th, 4 ft.; 19th, 4 ft. 2 in.; 20th, 4 ft. 2 in.; 21st, 5 ft. 2 in.; 23rd, 19½ in.

June.—2nd, 4 ft. 5 in.—3 ft. 8 in.; 10th, 8 ft.; 18th, 2 ft. 1 in.; 20th, 3 ft.; 25th, 4 ft. 6 in.

July.—1 ft. 10¾ in.; 5th, 4 ft. 2 in. and 6 ft.; 7th, 6 ft. 6 in. and 8 ft. 1 in.; 8th, 6 ft.; 9th, 6 ft. 6 in.; 12th, 1 ft. 5 in.; 16th, 8 ft. 5 in.; 20th, 3 ft. 1 in.; 24th, 7 ft.; 28th, 4 ft. 8 in.

August.—1th, 5 ft. 7 in.; 8th, 10 ft. 5 in.

A whale of this species which came on shore at North Woolwich in November 1899 was delivered after death of twins; and Mr. Haldane tells me that two fœtuses were taken out of a cow at Faroe last year (1904), also that Capt. Castberg, of Ronas Voe, met with a similar case two years ago. These are the only instances of twins which have come to my knowledge.

The deductions to be drawn from the above appear to be that this species in the North-east Atlantic produces a single young one (on very rare occasions two) at rather irregular dates in the autumn months, and that the period of gestation is probably ten months. The destruction of so many gravid females is a matter of great regret, but seems inevitable

under the circumstances. The quantity of oil yielded by one of these animals varies from 800 to 1400 gallons, but averages somewhat over 1000 gallons. 65·64 per cent. of the whales killed in Finmarken, according to Mr. Cocks's statistics, were of this species. The average length of a large number of males was 62 ft. 5 in., and of females 66 ft. 1 in., the proportions of the sexes being about equal. The food consists of herrings, capelan (*Mallotus arcticus*), and various crustaceans (copopods), according to season.

The Shetland Area.

The gradual decrease in the number of the whales and certain restrictions imposed by the Norwegian government led Capt. Foyt to establish a station in Iceland about the year 1883; but here, again, he met with difficulties from the Danish government, and the enterprise was abandoned before operations had commenced, but eventually they were successfully renewed and spread to the Faroes as well. In 1893 there were said to be thirty steamers fishing from Iceland and seven from the Faroes, and in 1902 nearly 2500 whales were killed by them. In 1903 two stations were opened at Ronas Voe, a third at Colla Firth in 1904, and subsequently a fourth at Olua Firth, all on the mainland of Shetland. In the Hebrides a station was also established at Bunaveneader in North Harris. It is to the results of the operations in this more southerly group of stations that we will now refer.

Mr. R. C. Haldane, of Lochend, Ollaberry, Shetland, has most kindly allowed me to avail myself of his valuable notes on the fishery from Shetland, which has been carried on in his immediate neighbourhood, and as the result of his enquiries informs me that the Iceland fishery was at first pursued on the west coast in Ise Fjord, Brede Fjord, &c., and gradually spread further west, most whales being taken along the Greenland ice in July and August; latterly the east coast has been resorted to. The present areas of the fishery are, I am informed, as follows:—

Iceland . . .	63°-67° N. lat.,	10°-30° W. long.
Faroe . . .	61°-64°	5°-9°
Shetland . . .	60°-62°	0°-5°

Before entering upon the comparison of the statistics from this area of the species under consideration (i. e. *B. musculus*), it may be well to mention that a very unlooked-for feature in the fishery has been the occurrence of a number of sperm-

whales. In 1903 a sperm-whale 68 feet long was killed by a Shetland whaler out of a school of five, four of which escaped, and five or six others were killed by the Iceland vessels. A considerable school of these valuable animals, estimated by some at thirty individuals, visited the seas to the eastward of Iceland, and apparently wintered there, for five others were killed by the Bunavencader vessels in the past season of 1904. But by far the most interesting capture was a whale killed on 3rd July, 1903, in 61° N. lat. and 4° W. long., with whalebone 7 feet long, evidently an Atlantic right whale (*Balæna biscayensis*).

Of the first year's operations at Ronas Voo there are no statistics further than that 126 whales were killed; these Mr. Haldane states, with the exception of the sperm-whale already mentioned, "one with barnacles" (probably a hump-back), and a bottlenose, were all the common finner (*B. musculus*).

In 1904, 400 finners were killed from Shetland and 37 from Bunavencader. Of the Shetland finners 236, or 59 per cent., were males and 164, or 41 per cent., females, showing a very large majority of males. Of the total catch of 506 of various species from these islands, 86 (36 per cent.) were finners. Mr. Haldane gives the average length of 135 males as 62 ft. 9 in., and of 91 females 66 ft., an excess of 3 ft. 3 in. over the males. The five longest males were 78, 77, 77, 75, and 75 feet respectively, and the five longest females 78 (an exceptionally large animal), 76, 75, 75, and 73 feet; but the 'Norrone' has since killed a male, confidently asserted to be of this species, 82 feet long.

The average length of the adult female is believed to be 65 or 66 feet, but a fœtus 2 feet long was taken from an example only 50 feet long. In a fœtus 16 feet long the baleen had not begun to show, but in one 22 feet long it was well developed and the colour of the young one the same as its mother; at birth the baleen should be quite 2 inches long. The growth of the calf is very rapid, and suckers 40 feet long have been seen; the general opinion among the Norwegian whalers is that a calf of this size is not more than a year old and that the suckers remain with the mother twelve months. In support of the early sexual maturity of the female Mr. Haldane mentions the example just referred to, which, although only 50 feet long, contained a fœtus. The whalers, who have had great experience, believe the period of gestation in this species to be eleven months; and a table* of measurements of eighteen fœtuses given by Mr. Haldane,

* Annals of Scot. Nat. Hist., April 1905, p. 70.

varying from 6 inches to 16 feet, all obtained in one season between the months of April and September, indicates that the dates of birth must be very irregular. In three instances, mentioned above, twins have been observed in this species.

Two fresh slips of whalebone of *B. musculus* kindly sent me by Mr. Haldane were coloured blue-black on the outer margin, toning down to blue-grey for the first third of their width, and merging into clear cream-yellow with a few longitudinal stripes of blue-black in the second third, thence to the inner margin wholly cream-yellow, the hairy fringe the same colour as the portion from which it took origin. The slips of bone measured 25 inches from the gum, to which the bristles added 8 inches, and at the gum they were 12½ inches wide. A small anterior slip was 11 inches long and ¼ inches wide, bristles 3½ inches long; wholly a clear pale cream-colour and very transparent.

For about a month from 12th June in 1903 there was an absence of "kril" in the water, and the whales fed largely on herrings, but in 1904 "kril" (*Thysanopoda inermis*) was abundant and they consumed very few herrings; it was quite evident that the kril was their favourite food, and the whales which fed on it were in better condition than when of necessity they were feeding on herrings.

Mr. Haldane informs me that, in addition to the double row of hairs found under the chin in a finner, he has found "another double row on the upper jaw, beginning 3 feet from the snout and running up to just beyond the blow-hole."

North-west Atlantic.

Passing to the western side of the Atlantic, we have now to consider the results of the fin-whale fishery from the shores of Newfoundland.

In the year 1896 the steamship 'Cabot,' of 160 tons, was fitted out by a company at St. Johns for the purpose of hunting fin-whales after the manner of the Norwegians. At first the operations took place in Notre Dame Bay, and subsequently in Hermitage Bay, but the number of factories was gradually increased till, according to the Annual Report of the Newfoundland Department of Fisheries for 1904, there were fourteen of these establishments in operation, extending around the island and as far north as Cape Charles on the Labrador coast; and five others were expected to commence operations in the spring of 1905. In the year 1903 there were killed 858 whales, 345 of which were *B. musculus*, and

in 1904 the number was 1275, of which 690 were the species under consideration.

I am not able to give the proportion of males to females of these 1035 "finners," but of the total catch of various species for the two years, numbering 2133 (the sex of one was not recorded), 1192, or 55.91 per cent., were males, and 940, or 44.09 per cent., were females. It may be well to give here the numbers of each species (although they will be repeated as they come separately to be considered). They were as follows:—

Finners	1035	Rudolphi	39
Sulphur-bottoms . .	489	Sperm	1
Humpbacks	568	Unknown	1

The preponderance of finners will be noticed here also. After the middle of July the finners are found in Notre Dame Bay, where they are most numerous in August; in October they become scarce and in poor condition, and finally leave the coast.

In the year 1899 Dr. F. W. True, of the U.S. National Museum, Washington, paid a first visit to the whaling-station at Snook's Arm, Notre Dame Bay, and as the result of this and subsequent visits there appeared in 1904 a most exhaustive treatise on the 'Whalebone Whales of the Western North Atlantic,' wherein, with all the thoroughness which characterizes the work of that gentleman, he enters minutely into the history of the species of the whales frequenting those regions, and compares them with those inhabiting the European waters. I am thus enabled to avail myself of Dr. True's carefully compiled statistics in what follows.

In 39 examples where the sex was noted 24 were males and 15 females; the males averaged 58 ft. 7 in. and the females 62 ft. 3 in. Ten of the females killed in the month of August contained fetuses or were accompanied by young: of seven fetuses measured by Dr. True, one on the 5th August measured 6 ft. 5 in., another on 15th August 15 ft. 2 in., and a third on the 27th August 6 ft. 10½ in.; it is evident therefore that, as in the European waters, the date of pairing must vary considerably. No instance of twin fetuses is mentioned.

The average length of the longest slip of balcen in six individuals over 55 feet in length, measured from the gum and exclusive of the bristles, is given as 21½ inches.

The following table shows the average measurements of a

large number of Norwegian and Shetland finners, which, although in excess of like averages of the Newfoundland whales given by Dr. True, is still less than the average of the Norwegian whales given for comparison in his table; this is probably owing to my having rejected the so-called "bastard" whales, the inclusion of which would have considerably increased the average.

The figures given below for the Newfoundland whales are from Dr. True's table and the Report of the Newfoundland Department of Fisheries, and those for Norway from Mr. Cocks's reports.

Balaenoptera musculus.

Region.	Number and proportion of sexes.			Length.				Length of baleen.
				Males.		Females.		
	Total.	Males.	Females.	Max.	Med.	Max.	Med.	
Norway	240	118	122	ft. 75	ft. in. 62 5	ft. in. 77 1	ft. in. 66 1	36 × 12 in.
Shetland	400	236	164	78	62 9	78 0	66 0	25 × 12½ in.
Newfoundland.	59	24	15	65	57 1	70 8	62 3	21½ in.

The "bastard" whales are not included in the above: of these, 16 males averaged 66 ft. 2 in., and 16 females 68 ft. 5 in.; of these several were evidently immature, thus reducing the average. The longest male measured 72 ft. and the longest female 80 ft. 6 in.; omitting all those under 65 ft. as immature, 7 males averaged 69 ft. 5 in., and 13 females 70 ft. 2 in.

Mr. Haldane found a fœtus in a finner 50 ft. long, but the ordinary length of a sexually mature female would probably be over 60 ft.

Of 2893 fin-whales killed in Norway, 1869, or 65·64 per cent., were of this species, and of 2131 killed in Newfoundland the percentage was 48·56.

The Norwegian foot has been taken as 12½ English inches in the above calculations.

It remains to consider what, if any, is the taxonomic value

of the variations observed in these animals, and it is convenient to do so with regard to the present species, which is far the best known and with regard to which there is so much more material on which to base conclusions. Dr. True minutely examined ten freshly killed specimens in Newfoundland and compared them with Sars's careful description of a Norwegian individual, the whole showing conspicuously the great individual variations to which the species is subject so far as the intensity and distribution of the body-colours are concerned, the constant features being a dark left lower lip, white right lower lip, white anterior right whalebone, and the marked asymmetry of coloration. Where individuals differ so materially it would be unsafe to generalize on the mere shade or disposal of colour; Dr. True, however, instituted a very careful comparison of the measurements of the East and West Atlantic fin-whales, and found that the former were larger in all their proportions than the latter, which is confirmed by the foregoing table so far as length is concerned. He does not from this fact conclude that there exists even subspecific differences between those inhabiting the two sides of the Atlantic; but I think it clearly demonstrates that the herds frequenting the two distant areas do not intermingle, their normal line of migration being south to north in summer, rarely, if ever, under normal conditions latitudinal, and that they may be considered *racially* distinct. Perhaps we may go even farther than that, and regard the gigantic "bastard" whale of Mr. Cocks, which has been known to reach the enormous length of 80 ft. 6 in., as at least a distinct race; and probably the same may be said of the southern form of *B. musculus*, the "sildchval" of the Norwegians, which goes north in summer to occupy the area in the ocean already vacated by the "loddehval," which has then departed to a more northerly latitude. That the *species* may be cosmopolitan cannot at present be conclusively disproved, but, as Dr. True very pertinently remarks, "even should it be demonstrated that the species of large whalebone whales are cosmopolitan, it does not follow that the individuals constituting these several species range throughout the globe, the probabilities are much against such world-wide movements." So long ago as the year 1898* I endeavoured to show with regard to the Polar right whale that the areas frequented by separate races or herds of those animals were vastly more restricted than was generally supposed; and I think expe-

* "On the Migration of the Right Whale," *Natural Science*, June 1898, pp. 397-414.

rience will show the same to be the case with the fin-whales inhabiting the North Atlantic Ocean.

With regard to the recorded measurements of these animals, in some instances they are taken in a straight line, in others along the curves, and till a system is adopted ensuring uniformity, although useful in their way, they cannot be regarded as scientifically accurate, and are therefore only approximately useful for comparison.

BALÆNOPTERA SIBBALDII.

Norway.

Sibbald's rorqual, the blaa-hval or blue whale of the Norwegians and sulphur-bottom of the American whalers, is the chief prize of the whalers; it yields an average of 2800 gallons of oil, occasionally even as much as 10,000 gallons. Mr. Cocks states that twenty-five years ago Varanger Fjord was a favourite resort of this huge animal in summer, and that it penetrated far into the fjord in search of the "kril" (*Thysanopoda inermis*), on which it delighted to feed; all this is now a thing of the past, constant harrying has taught the survivors to keep out to sea, and, in addition, no whales are allowed by law to be captured at a less distance than 7 kilometres* from the shore.

The time for the appearance of this whale upon the Finmarken coast is, as a rule, about the middle of June, exceptional instances have been known in May, and they have departed by the middle of September—the date of departure probably being dependent on the falling-off of the food-supply, and not due, as was formerly supposed, to the decreasing temperature of the sea. Mr. Robert Gray, when in the 'Eclipse' whaler on April 27th, met with blue whales in lat. 70° 14' N., and speaks of the partiality of this species for water of very low temperature; its departure, therefore, from the Finmarken coast cannot be directly attributed to declining temperature.

Dr. Guldberg describes this species as blue-grey or blue-black above, and sometimes copper-brown when rolling about in the sea; it has always a more or less pronounced blue-grey colour on the back—hence its trivial name. The underparts are minutely flecked with white and grey, but it varies considerably in coloration. The baleen-plates are black, with black hairs, about 36 inches long by 24 inches broad at the gum. Mr. Cocks remarks that "the sex of a blue whale (and in a less marked degree it is, I believe, true of other species

* This for ten years.

of *Balenoptera* and possibly of other whalebone whales) may be distinguished by the shape of the baleen-plates, which in a male are long (up to 4 feet including gum) and narrow, but thick; while in a female they are short and broad, but thinner." The baleen is much infested with a species of copepod (*Balenophilus unisetus*).

The greatest length given by Mr. Cocks is that of a female 88 ft. 7 in. long, and the sexes occur in about equal numbers. There is no certain information as to the season of pairing, but two males are said to have been "making overtures" to a female on August 5th. Capt. Sørensen believes they have no fixed time for pairing, and fetuses have been found in August measuring 13 ft., 18 ft. 9 in., 9 or 10 ft., and 15 ft. 6 in.; Mr. Cocks, however, does not vouch for the exactness of these measurements. Calves have been seen following the mother estimated at 40, 50, or even 60 feet long. The probable length of the sexually mature female is about 70 feet. Dr. Guldberg is of opinion that the blue whale goes with young eighteen or twenty months, and that, judging mainly from the large size of the young ones which have been seen following the mother, she produces only every third year; but perhaps he does not fully allow for the rapid growth of the young one. Two fetuses, both males 6 and 4 feet long respectively, were found in a female only 60 feet in length which was brought into Eide Fjord, Faroe, in June 1894, as recorded by Mr. Harvie-Brown in the Ann. of Scottish Nat. Hist. for April 1905.

No blue whales were taken from Shetland, but, in addition to that already mentioned as killed from the Faroes in 1894, forty-two of these whales and five sperm-whales were killed last season (1904) from the station at Bunaveneader, Harris, which would seem to indicate that this species follows a more westerly course on its northward passage than the other fin-whales.

Newfoundland.

Turning to the consideration of the blue or sulphur-bottom whale, as it is known by the American whalers, in the Western Atlantic, we find, according to Dr. True's careful statistics, that, like the common fin-whale, the dimensions of the Newfoundland examples are on the average considerably less than those found in the European waters, although agreeing fairly with the latter in other respects. In colour there is a close resemblance, subject to the same considerable individual variations, but all exhibiting more or less of the characteristic irregular "milk-white spots" below the pectorals on the fluted sides of the breast described by Sars.

The only important difference which Dr. True points out is in the coloration of the dorsal fin, which in the Newfoundland specimens "is usually more or less white or whitish, except on the margins, with darker curved lines extending up vertically from its base"; but he remarks that this fin is not fully described in a fresh condition by any European authority. There seems to be no appreciable difference in the colour of the balcen. Dr. True arrives at the conclusion that, notwithstanding its superior dimensions, there is no sufficient reason for separating the European blue whale from the American sulphur-bottom.

Balenoptera Sibbaldii.

Region.	Number and proportion of sexes.			Length.				Length of balcen.
				Males.		Females.		
	Total.	Males.	Females.	Max.	Av.	Max.	Av.	
Norway	104	47	57	ft. in. 85 5	ft. in. 75 4	ft. in. 83 7	ft. in. 77 0	36×24 in.
Newfoundland.	25*	10	15	72 7	68 3	72 2	68 0	23-32 in.

Taking the average length of sexually mature females at 72 feet, Dr. True arrives at an average of 74 ft. 8½ in. for that sex in Newfoundland; subject to the same test the Norwegian females average 79 ft. 3 in.

Of 2893 fin-whales killed in Norway, 338, or 11.68 per cent., were of this species; in Newfoundland of 2132, 489, or 22.94 per cent., were *B. Sibbaldii*.

None of these whales have hitherto been killed in Shetland.

MEGAPTERA LONGIMANA (Rudolphi).

Norway.

The third large species of fin-whale is known to the British whalers as the humpback (from its low dorsal fin),

* In another table Dr. True gives the average of a larger number of these whales from other sources—57 males equalling 70 ft. 8 in. and 35 females 70 ft.; but the above are measurements carefully taken by himself.

to the Norwegians as the knöllhval, pukkellhval, or troldhval. Although it was not fully recognized as a European species till the year 1829, when Rudolphi described and figured a specimen cast ashore at the mouth of the Elbe, it has been found fairly plentiful on both sides of the North Atlantic; owing, however, to the fact of its sinking when killed and to its small yield of oil it is not considered a very desirable capture. It is of moderate length, but bulky in proportion, and yields from 600 to 800 gallons of oil: Mr. Haldane, however, heard of a Finmarken specimen, 50 feet long and 16 feet in diameter, which yielded 125 barrels of oil; as the petroleum barrels used by the Norwegians are of the capacity of about 40 gallons, this would represent some 5000 gallons!

A marked characteristic of this species is the great length of its pectoral fins: in a specimen 40 ft. long the pectoral fin measured 12 ft. in length and 2 ft. 8½ in. in its greatest breadth; in a 44 ft. example measured by Mr. Cocks the flipper was 13 ft. 9 in. to the skin of the axilla and 3 ft. 7 in. in width; the height of the dorsal fin was 9 in. The pectorals also vary exceedingly in colour, being sometimes black on the upper surface and white below, or in some instances entirely white on both surfaces. The body-colours are equally variable; the throat and nearly all the underside may be white or entirely black. These variations do not seem to bear any relation to sex or age. Another peculiarity is the extent to which they are generally infested by external parasites—*Cyamus* in abundance and a cirriped (*Diadema coronula*), the latter in turn bearing the curious *Conchoderma auritum*. Mr. Cocks also mentions the loud screaming of the humpback when harpooned, which he compares to the gruesome sound uttered by a pig when being killed. The food of this species appears to be rather mixed, consisting of small fish as well as kril; possibly, as with the common finner, this may be the result of circumstances. The baleen is black, with yellowish-brown hairs, and the longest plates measure about 2 feet.

The humpback comes on the Finmarken coast very early in the year, having been killed on the 21st of February, and departs in the middle of September. The date of pairing is uncertain, as is also the period of gestation; but foetuses have been found in June (no day mentioned) 12 in. long, again on June 21st 13 in., July 1st and 15th each 13 in., and on the 28th 17½ in. (Norwegian), on August 21st 31¾ in.—thus showing a more regular approach to maturity than in most species.

Capt. Wiborg informed Mr. Cocks that in 1886 he saw a

humpback followed by two calves each 10 Norwegian feet long, but he does not give the date, and Scammon gives a beautiful plate of a humpback suckling two calves; the birth of twins, therefore, in this species seems to be of occasional occurrence. Far more males than females of this species are killed; of 37 taken in 1886 28 were males. The average length of 27 males was 38 ft. 5 in., and of 13 females 42 ft. 3 in. The largest specimen Mr. Cocks records was a male 53 Norwegian feet (55 ft. 3 in., English) long; he mentions the girth of a female 52 English feet long as 40 feet, but this measurement in a dead whale is absolutely valueless, as distension commences immediately after death. The total number killed in six years was 317, and the largest number in a single year 96.

Shetland.

Of the results of the Shetland fishery I have very little information, and no particulars as to species or measurements before 1904; in that season eight humpbacks were taken by the Shetland boats and five from Harris in the Hebrides. The Shetland vessels, Mr. Haldane informs me, fish in about 60° to 62° N. lat. and 0° to 5° W. long.; the Faroo boats work to the southward and the Shetland vessels as far as 120 miles north of those islands. Of the Shetland humpbacks four females measured 30, 39, 40, and 46 feet respectively, three males 47, 49, and 46 feet; the last male had pectoral fins 13 ft. 10 in. long. The colours varied as already described. The food of those which Mr. Haldane examined consisted of krill and a few shrimps; herring also form part of their diet. The average yield of oil was 1200 to 1600 gallons.

Newfoundland.

In the Newfoundland fishery this species figures largely: in the season of 1893 287 were killed, and 281 in 1901; unfortunately no statistics as to sex or dimensions have been collected at these stations—desiderata which, I hope, will, at least to some extent, be supplied in the present season,—and therefore nothing can be added to the investigations made by Dr. True. That gentleman only had the opportunity of personally examining three specimens at Snook's Arm in August 1899, but of these he gives minute descriptions: he also gives the dimensions supplied to him of 18 others killed in the two following years between April 26th and July 6th,

the bulk (12) being killed in May, 21 in all; of these 10 were males, 4 females, and 7 sex not recorded. By the table it will be seen that the maximum of the Norwegian specimens of both sexes considerably exceeded that of those taken in Newfoundland, but in other respects (colour, dermal tubercles, dorsal and pectoral fins, and flukes) they present no material difference. Dr. Truc is of opinion that the various nominal species into which the humpbacks of the North Atlantic have been divided are all referable to one species, and in this he agrees with European cetologists; but considering the extensive range thus assigned to this whale it seems probable that the individuals inhabiting, say, the West Indies or the Californian coast are racially distinct from those frequenting the Greenland seas.

Mcgaptera longimana.

Region.	Number and proportion of sexes.			Length.				Length of baleen.
				Males.		Females.		
	Total.	Males.	Females.	Max.	Av.	Max.	Av.	
Norway	40	27	13	ft. in. 55 3	ft. in. 38 5	ft. in. 52 0	ft. in. 42 3	24 in.
Shetland	7	3	4	49 0	47 4	46 0	38 9	
Newfoundland..	14	10	4	46 11	37 6	46 6	41 6	22 in.

Of 2893 fin-whales killed in Norway, 236, or 8.16 per cent., were humpbacks.

BALÆNOPTERA BOREALIS (Lesson).

Norway.

This species, known to the Norwegian whalers as the sejhval (coal-fish whale), until the establishment of the Finmarken fishery believed to be of excessive rarity, is found in varying numbers, singly or in schools of perhaps fifty individuals, every summer in the months of May and June off the coast west of the North Cape. Up to the year 1885 it could only be regarded as a straggler eastward of that cape. In the year mentioned, however, Mr. Cocks was assured that

they were common along the whole coast hunted by the Norwegian and Russian whalers during nearly the whole season, and an immense number remained off Sylte Fjord (East Finmarken) for about three weeks in May and June. They appear, however, to have reached the Russian coast somewhat later, the first killed by one of the Yeretiki steamers being on July 10th; the large number of 771 were killed during that season, these being fairly distributed among all the vessels of the fleet. In 1886 only 62 were killed (40 of which fell to one vessel), the whales having again resorted to their habitat westward of Söröen. In 1887 they were again abundant, and 245 were killed, 110 of these by Capt. Bull, chiefly between Loppen Island and Reisen, the first on May 21st and the last on the 12th of August. The next year the number fell to 92, but in 1889 it again increased to about 113—thus showing this species to be a constant visitor in considerable, but fluctuating, numbers off the Finmarken coast.

It is not much sought after by the whalers, and owing to its small size and proportionately small yield of oil is neglected when other species are to be obtained.

As is the case with all the members of this family, the date of pairing, period of gestation, and season of calving are not known with certainty, but the following measurements of fœtuses, with the dates of their occurrence, afford some indication:—

		Date.	Length of fœtus.			
			ft. in.			
	June	21	. . . . .	4	10	
	July	3	. . . . .	2	1	
		18	. . . . .	6	0	} Two fœtuses.
			. . . . .	4	0	
		26	. . . . .	8	5	
		28	. . . . .	5	6	
	Aug.	6	. . . . .	3	7	
		10	. . . . .	6	0	
		10	. . . . .	5	0	
		15	. . . . .	9	0	

A female, 46 ft. 10 in. long, brought into the factory at Tuffjord on the 18th July, 1885, contained twin fœtuses of opposite sexes. Prof. Collett (P. Z. S. 1886, p. 261) mentions a similar instance of twins in a whale of this species 43 ft. long captured at the entrance to the Varanger Fjord, which contained two young ones each 6 ft. 7 in. long. So far as I am

aware, these are the only instances of twins in this species on record.

In 34 instances where the sex is given, 17 were males and 17 females: the former averaged 45 ft. 4 in. and the latter 46 ft. 7 in. in length; the longest male was 51 ft. 1 in., and the longest female 52 ft. 1 in. The measurements are variously given in Norwegian and English feet; I have reduced the former to English measurement on the scale of 12½ inches to the Norwegian foot.

The yield of oil averages about 200 gallons, rarely as much as 280 gallons. The food of this species is believed to consist very largely of "kril" (*Thysanopoda inermis*), a small crustacean, and *Calanus finmarchicus* (a copepod).

Professor Collett visited the factory at Vardö in 1885, and contributed an excellent paper on the "external characters" of this species, of which he stated that even then our knowledge was very deficient, to the P. Z. S. 1886, pp. 243-265, with illustrations.

The baleen is black, with white bristles, and the longest plate measures 31 inches.

Of 2266 fin-whales killed in Norway in the years 1886, 1887, and 1889 (omitting the abnormal kill of 771 in 1885), 420, or 18.5 per cent., were Rudolphi's rorquals.

Shetland.

Of 507 fin-whales killed from Shetland and the Hebrides in 1904 only 9 were of this species, and I have no particulars as to sex or measurements further than that two were bulls 37 and 41 feet long respectively.

Newfoundland.

None of these whales came under the notice of Dr. True when he visited the Balæna Station at Hermitage Bay, nor do any appear to have been killed till 1904, when 5 were obtained from Balæna, 30 from Bay Chaleur, and 3 from Rose au Ruc; there therefore exists no material for comparison of specimens from the three fishing-centres.

The lesser rorqual (*B. rostrata*) does not figure in the returns from any of the above "fisheries."