Biological Investigation on Blue Whales (*Blalaenoptera musculus*) and Fin Whales (*Balaenoptera physalus*) caught by the Japanese Antarctic Whaling Fleets.

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BY

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Chapter I Introduction

I. Authorized Antarcitc whaling expedition in the season 1948-49.

The third whaling expedition since the cessation of the war was authorized by GHQ, SCAP with a far better condition than the previous years.

The Japanese Whaling fleets, with a composition as shown below, were able to carry out their operation, bringing valuable foodstuff and scientific results of various investigations. We owed all of them to the kindness of the SCAP authorities with deep gratitude from the bottom of our heart.

The Japanese Antarcitc Whaling Expedition in the season 1948-49 was composed of the following two fleets.

The first fleet (Nihon Suisan K.K.)

Name of vessel	Category of vessel	Gross tonnage	Type of engine	HP
Hashidate-maru	Factory ship	10,841 tons	turbine	8,600
Tadotsu-maru	Refrigerator	10,175	〃	8,600
Settsu-maru	Refrigerator	9,670	diesel	3,600
Sagami-maru	Frozen meat carrier	988	〃	800
Chikuzen-maru	〃	1,161	〃	800
Gyokuei-maru	Tanker	10,245	〃	4,000
Koyo-maru No. 1	Catcher	364	〃	1,800
Koyo-maru No. 2	〃	366	〃	〃
Koyo-maru No. 3	〃	〃	〃	〃
Koyo-maru No. 5	〃	〃	〃	〃
Shonan-maru No. 8	〃	355	recipro	1,000
Shonan-maru No. 11	〃	354	〃	1,000
Kyo-maru No. 6	〃	374	diesel	1,800

Note. Kyo-maru No. 6 was chartered by Kyokuyo Hogei K.K.

The second fleet (Taiyo Gyogyo K.K)

Name of vessel	Category of vessel	Gross tonnage	Type of engine	HP
Nisshin-maru	Factory ship	11,781 tons	turbine	5,000
Tenyo-maru	Refrigerator	10,269	〃	5,000
Tenyo-maru No. 2	〃	10,595	diesel	5,400
Bansyu-maru	〃	983	semi-diesel	800
Tenyo-maru No. 3	〃	3,500	diesel	2,400
Bansyu-maru No. 35	Frozen meat carrier	999	〃	950
Bansyu-maru No. 36	〃	998	〃	950
Bansyu-maru No. 38	〃	998	〃	950
San Diego maru	tanker	7,268	〃	2,400
Fumi-maru No. 3	catcher	312	〃	1,600
Fumi-maru No. 5	〃	384	〃	1,600
Fumi-maru No. 6	〃	304	〃	1,600
Seki-maru	〃	365	〃	1,600
Seki-maru No. 3	〃	300	recipro	1,400
Seki-maru No. 7	〃	306	diesel	1,600
Seki-maru No. 8	〃	300	〃	1,600

II. Purpose of the whaling investigation.

This investigation was carried out on board of the Hashidate-maru, factory ship, Nihon-suisan K.K., and the Nisshin-maru, factory ship, Taiyo Gyogyo K.K., which operated from 15 Dec. 1948 to 26 March 1949 with the above authorization. Their action is shown in Fig. 1. The whaling ground was divided into four large sections, indicated by different colours for the convenience, understanding the characteristics of each whaling ground. In some cases, these divisions, could be taken as seasonal. (Cf. Appendix I: Geographical study on krill and whale composition)

Number of whales caught by the Japanese fleets during this season were 631 blue whales (*Balaenoptera musculus*) 1,013 and fin whales (*Balaenoptera physalus*), of which 2 blue whales were lost by the Nisshin-maru (1 whale torn off at tail and 1 flowing whale lost).

The purpose of this investigation was to find out the composition of the whales caught as a part of the investigation on Cetaceae in the Antarctic, the natural resources of the world. At the same time, this would show the world, the sincerity of the Japanese Fleets for the International Regulations in figures. As has been pointed out in many places in this report physiological and histological study on individual whales, or anatomical study on whale foetus were omitted.

In short, this is a statistical study for the above mantioned purpose. Even if they were statistical data, some under studying such as relations between colour of the eye lens and age, or between baleen and age, will be made published. In separate reports though only a part of them was included in the appendix.

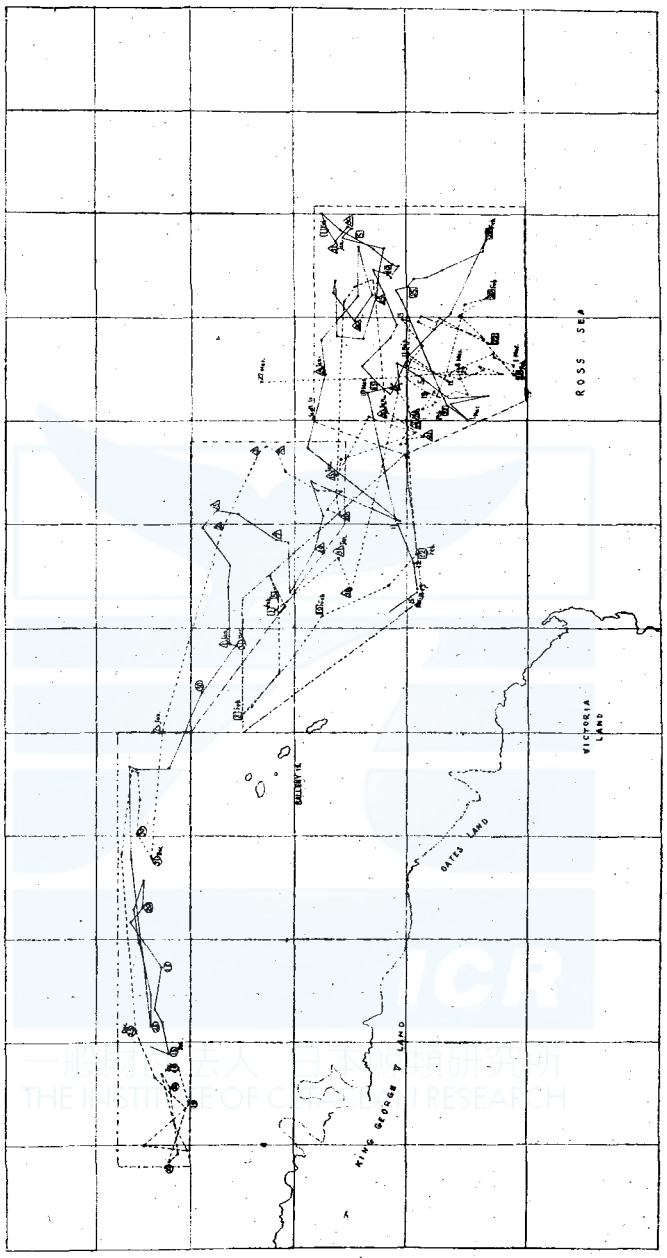


Fig. 1.

III. Methods of work.

1) Species, sex, serial number, date when whales were killed and date when treatment was commenced were described in a usual way. Time was taken in a

unit of 5 minutes.

2) Body length was measured with a 100 feet steel tape according to the International Regulations.

3) In order to obtain statistical data, the number and clarity of pale spots on blue whales were observed with the naked eye.

On fin whales, investigation was carried on the following items:

Depth of body colour, extent of the pigmentation on the ventral grooves, i.e. how the pigmentation on the lower part of the flipper expends to the ventral groves with the normal extention up to the 11th or 13th groove from the navel line presence of pigmentation behind the anus, and unification of right and left pigmentation in front of tail flukes.

4) White scar: Total number of white scars was compared with number of last year's and of older one.

5) External parasites: The number and kinds of parasites attached to the body surface (except the undersurface in contact with the flensing deck) with emphasis on frequency of species of parasites.

6) Thickness of blubber: As the flensing method by the Japanese fleet was different from that by foreign fleets, it was measured in cm. at the following two points: (1) The point on a vertical line from the dorsal fin where it intersects the horizontal line of the body and (2) the point on the vertical cut near the ear hole, where it intersects the mid-dorsal fin.

7) Mammary glands: Cutting off in several places at right angles to the body axis, the colour and thickness of the thickest portion was observed.

8) Foetus: Sex and body length were observed on every foetus the latter with a steel tape. Body weight was also measured on some foetuses.

9) Stomach contents: The size and amount of *Euphausia* were mainly measured with the degree of digestion by the method used in the Dicsovery Reports.

10) Testes: The weight of testes was measured in Kg with a platform scale after connective tissue and epidymis had been removed: the center width and height and length of diameter was measured with a caliper.

11) Ovary: The weight of ovaries was measured after removal of connective tissue: the presence of corpora lutea was investigated by cutting the ovary with a knife, and also the diamerer of the largest Graafian follicle was measured.

12) Ossification of vertebrae at thoracic and lumbar series:

In thoracic series between 7th and 8th one from the head, and in lumbar series, between 8th and 9th one from the first chevron bone of the caudal series,

it was observed. In case of harpooning scar at the above points, the nearest one was chosen.

Ankylosis was graded according to the Discovery Reports.

13) Various parts of whale body were measured with a steel tape according to Mackintosh and Wheeler's method in the Discovery Reports.

(1) Total length.
(2) Lower jaw: proportion beyond tip of snout (omitted).
(3) Tip of snout to blow hole.
(4) Tip of snout to angle of gape (omitted).
(5) Tip of snout to center of eye.
(6) Tip of snout to tip of flipper.
(7) Eye to ear, centres.
(8) Notch of flukes to posterior emargination of dorsal fin.
(9) Flukes, width at insertion.
(10) Notch of flukes to anus.
(11) Notch of flukes to umbilicus.
(12) Notch of flukes to end of ventral grooves.
(13) Anus to reproductive aperture (centers).
(14) Dorsal fin, vertical height.
(15) Dorsal fin, length of base.
(16) Flipper, tip to axilla.
(17) Flipper, tip to anterior end of lower border.
(18) Flipper, length along curve of lower border.
(19) Flipper, greatest width.
(20) Severed head, condyle to tip.
(21) Skull, greatest width.
(22) Skull length, condyle to tip of premaxilla (omitted).
(23) Flipper, tip to head of humerus.
(24) Tail, depth at dorsal fin.
(25) Flukes, notch to tip.
(26) Flukes, total spread (omitted).

14) After dissection, the weight of various parts of whale body was obtained by adding the weights of blocks cut into suitable size (about 50 cm^3) for weighing on a 200 kg platform scale. Then, loss of blood and other body fluids was unavoidable, though collected saw-dusts was weighed and added. Stomach and intestinal contents were removed as much as possible.

The difference on dissecting method between the Nisshin-maru and the Hashidate-maru brought inevitably the different size of each block. However, it

can be safely said the whole body weight is correct. For the purpose of comparing with blue whales caught in the adjacent waters of Japan, emphasis of this investigation was put on blue whales. As mentioned above, the loss of blood and other body fluids makes the figures inexact as the body weight but if the errors are assumed to be same for all the bodies studied, the figures must present an approximate body weight.

This investigation was carried out carefully so as to diminish individual errors, by some biologists and their assistants under the supervision of whaling inspectors appointed by the Japanese Government. The following men were in charge.

Title	On Hashidate-maru	On Nisshin-maru
Senior Government Inspector	Yoshiro Terada	Keijiro Maeda
Junior Government Inspector	Katsunari Ozaki	Shigeo Miyamoto
Government Biologist	Masaharu Nishiwaki	Tadahiro Oye

IV. There was no special limit on the action of the Japanese whaling fleets in the season 1948-49 except to observe the International whaling Regulations. With the later opening of the whaling season by a week than last year, the Nisshin-maru set sail from Yokosuka on 12th Nov. 1948 and the Hashidate-maru left Yokohama on 13th Nov. 1948. Both fleets reached 65° South Latitude, on 14 Dec. 1948 through the east seas of Australia. The further action of their enormous efforts and expenses, both fleets tried in vain to enter the Ross Sea by any means. If an airplane had been allowed to use it would have contributed much to find out the entrance to the Ross Sea and to scout whales.

Though they could not enter the Ross Sea, they obtained satisfactory results operating in West Longitude. The Nisshin-maru leaving the whaling ground on 15 March 1949, and the Hashidate-maru, on 26th March 1949, they returned home through the same course.

V. Catch amount by the Japanese whaling fleets in the season 1948-49.

As shown on Fig. 2, we caught smaller number of whales than expected in the early stage of whaling season. Later, however, we caught not only numerous whales but also large sized ones, as shown on whale composition by region. At the end of December, we commenced the entrance investigation to the Ross Sea, to two reasons, season opening on 15th Dec. and both fleets's eager hope for operating in the Ross Sea. As time went by, we could find better and better whaling grounds.

Though about the middle of Jan. rather an animated appearance presented, most whales, especially blue whale, were small. After the full effort for search-

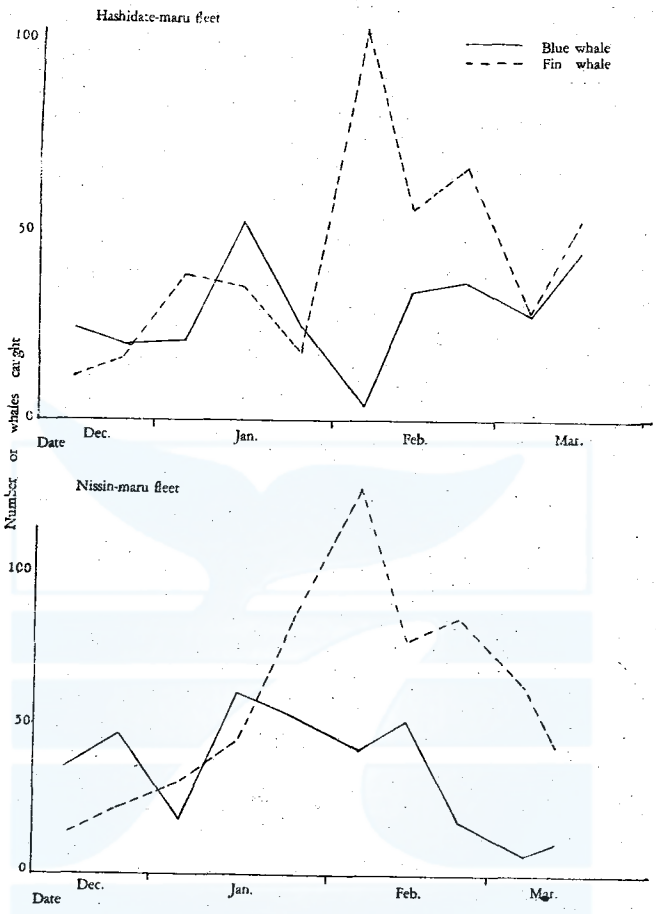


Fig. 2.

ing the good whaling ground, fortunately, moving from East Longitude through Scott Island to West Longitude in the middle of Jan., the Nisshin-maru fleets discovered the good fin whale ground and the Hashidate-maru fleets too. The success of this season became definite in this ground. Great was the exploit of the Nisshin-maru fleet which brought the success of the other fleet as well as of herself. The principal object was fin whale for weather (mainly fog) and pursuit hours made it profitable. The rare catch of blue whale was due to the operation more than 50 miles off from pack ice line. So we can not tell there were few blue whales in this waters and in this season.

This whaling ground was the so-called virgin ground for us, where the Japanese fleets had never operated in the past including the pre-war time. Good as this year's catch was, it is a question whether there is such a good whaling ground

in such Longitude and Latitude every year, taking into consideration the fact of no finding the entrance to the Ross Sea. Rather speaking, it should be considered the whaling ground relating to the Ross Sea.

As usual, the suddenly increasing coldness at the beginning of March brings the freezing of the sea. About that time whale begins to move north. The precious experience during this time was gained by the Hashidate-maru fleet which operated as long as 26th March. Quite formidable was the velocity of the monsoon and freezing.

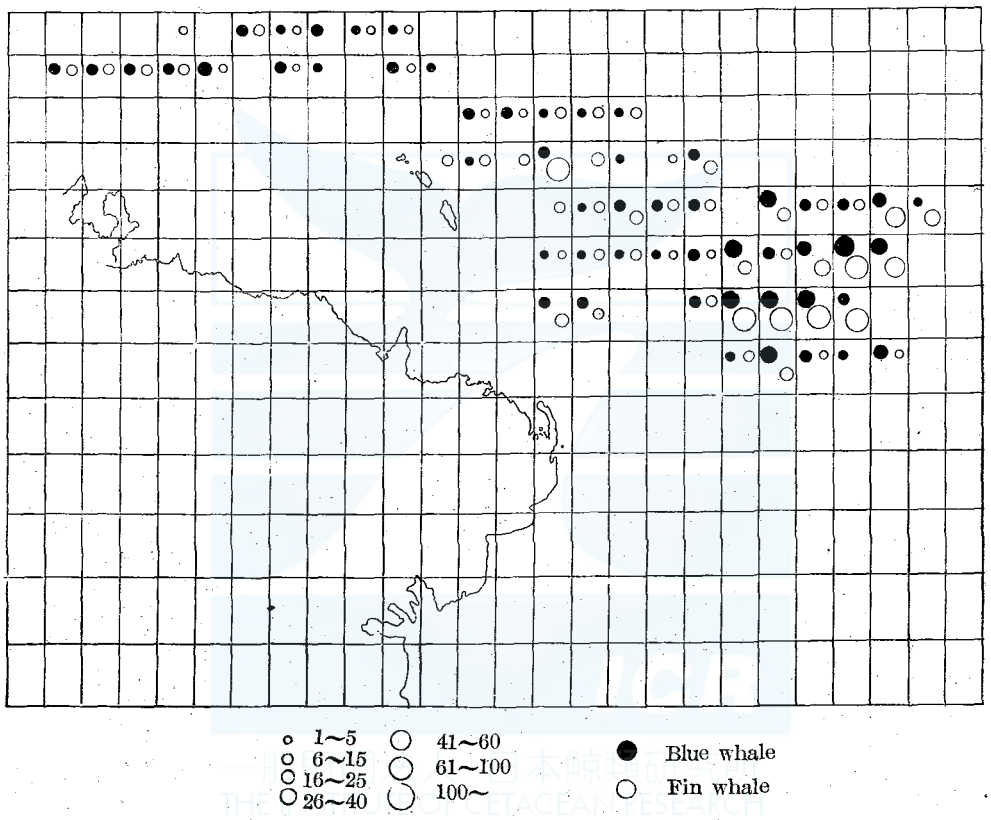


Fig. 3. The Map of catch by Japanese fleets. (1948~49 Expedition)

Fig. 3 shows the number of whales caught by region with the usual standard. (the Whaling ground in the Antarctic Whaling data 6-1 by the Japanese Whaling Association)

MATERIALS AND DATA.

The whales examined in the course of the work by the Hashidate-maru and the Nisshin-maru are classified as follows.

species		By the Hashidate-maru	By the Nisshin-maru	total
Blue whale	Male	183	208	391
	Female	108	132	240
	total	291	340	631
Fin whale	Male	203	285	488
	Female	222	302	524
	total	425	587	1012

Grand total 1643 whales (1137 B.W.U.)

The data on the individuals will be separately published by Fisheries Agency.

The average interval between death and the Commencement treating was as follows.

Name of fleet	the Hashidate-maru	the Nisshin-maru
blue whale	5 h. 41 m.	5 h. 01 m.
fin whale	6 h. 00 m.	4 h. 57 m.
average	5 h. 52 m.	4 h. 59 m.

Expression of terms

*Species Blue whale.....B, Fin whale.....F.

*Sex Male .....M, Female .....F.

*Colour of Blue whale

Pale spot.....distribution..... none.....0
scarce 1
few 2
normal 3
numerous ...4
very numerous.....5

degree of distinctness none.....0
indistinct.....I
distinct.....II
very distinct III

White flecks.....distribution.....equal to pale spot's description

Striation.....degree of distinctness.....eaual to the above

*Colour of Fin whale

Colour.....normal.....N, Blackish.....B.

Extention of pigmentation on ventral grooves

.....upper than normal.....U

normal (11-13 stripes of ventral grooves upward from navel line).....N

lower than nommal L

Tongue-like pigmentation behind anus

present.....+, absent.....−

Meeting of pigmentation in frot of tail flukes

meet.....+ not meet.....−

white scars Number none.....0 State...more numerous last year than
scarce .....1 previous years .....a
few .....2 last year equal to previous years ...b
numerous .....3 more scarce last year than
very numerous ...4 previous years c

*External parasites

infected a little .....−
infected numerous.....++
infected very numerous .....+++

*Thickness of blubber

The point on verticl line from the dorsal fin, where it intersects the horizontal cut side of the body .....point No. 1

The point on the vertical cut near the ear-hole, where it intersects the mid-dorsal line .....point No. 2

*Mammary glands

Colour.....white.....W.
reddish yellow.....Ry pink.....P
dark yellow .....Dy brownish yellow (normal colour)...Y
red .....R brown .....B

*Stomach contents (Auphausis s.)

Size.....length (from rostrum to telson) over 5 cm.....L.
5 cm to 4 cm .....M.
under 4 cm .....S.
mixture .....X.

Quantity.....empty.....0
few.....r
moderate .....rr
much .....rrr
full .....R

Degree of digestion.....fully digested.....f
half digested .....ff
fresh.....fff
very fresh .....F.

Ossification of vertebrae

Nos .....descript the numbers of each series

State .....ankylosed, no sign of join .....A

ankylosed, but a sign of join visible .....a

not ankylosed, thin cartilage .....n

not ankylosed, thick cartilage .....N

Constitution of whales caught

Fig. 4 shows it for this season. Its mode is at 79 feet for male blue whale

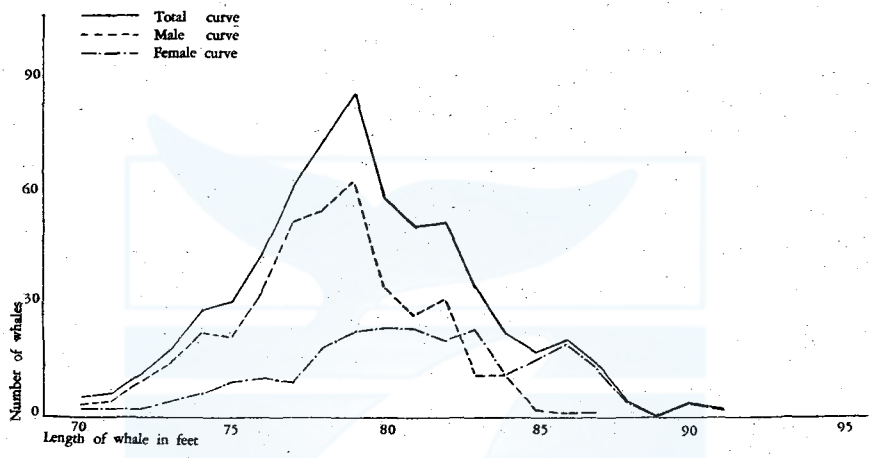


Fig. 4a. Size of whales caught (From all examples of Japanese fleet in 1948~49 expedition) Blue whale.

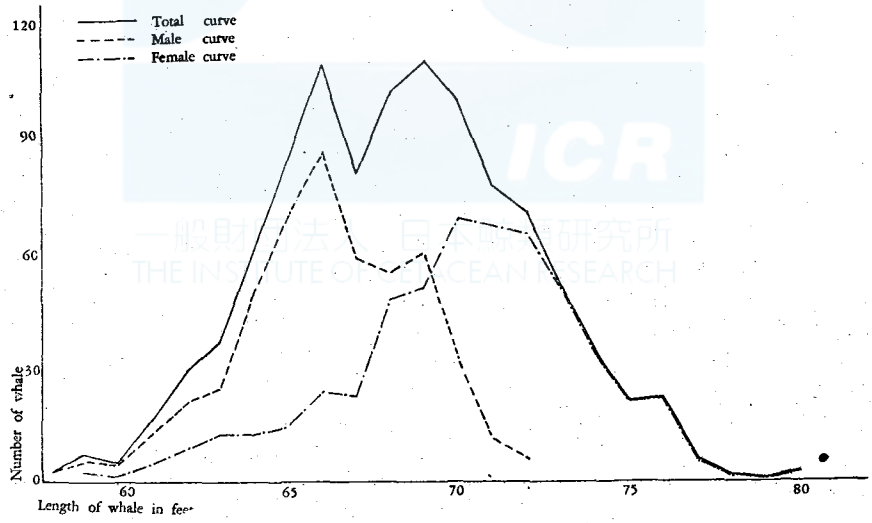


Fig. 4b. Size of whales caught (From all examples of Japanese fleet in 1948~49 expedition) Fin whale.

and at 83 feet for female blue whale, but the latter shows the nearly uniform catch from 78 feet to 86 feet. This fact made the one peak as whole. On fin whale, it shows 66 feet for male and 70 feet for female. Both male and female show the usual catch constitution with the respective peak on the whole curve. In this season, there was no violence of the International Regulations concerning the body length. It can be endorsed by this graph too.

2. Sex ratio

Sex ratio, as the whole, is as follows.

Blue whale	male	female	total
	391	240	631
	62.0%	38.0%	
foetus			
	50	33	83
	60.2%	39.8%	
Fin whale	male	female	total
	488	524	1012
	48.2%	51.8%	
foetus			
	82	88	120
	48.8%	51.8%	

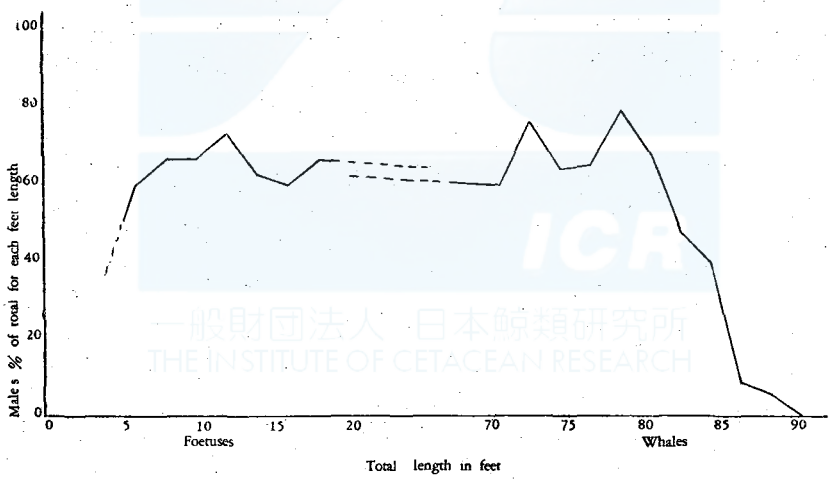


Fig. 5a. Sex ratio and total length. (Blue whale)

Sex ratio by body length is shown on Fig. 5a and 5b. On blue whale, more that 60% of total male are under 78 feet, long extremely few over 79 feet and none more than 88 feet. On fin whale too, the same is true with the boder line of 64

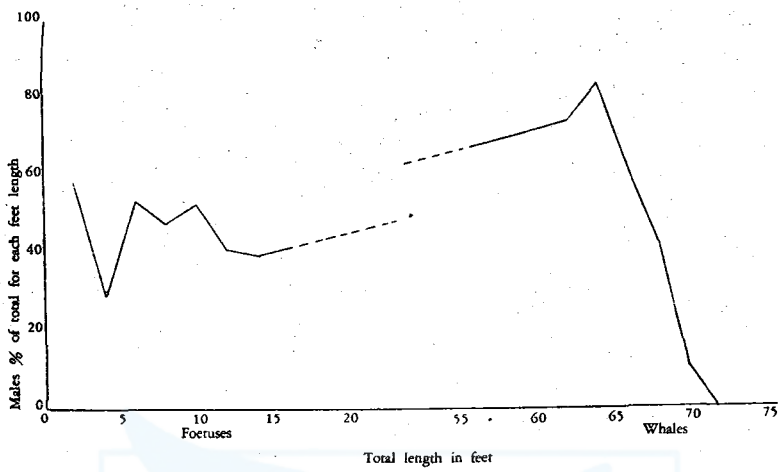


Fig. 5b. Sex ratio and total length. (Blue whale)

feet. These reason is quite same as last year. (Cf. the Report for 1947-48)

The composition of whales classified by group of size.

The size of sexual maturity was according to Mackintosh and Wheeler. Generally blue and fin whale also reach maturity at the following length.

male blue whale.....74 feet 2 inches (74 feet)
female blue whale.....77 feet 9 inches (77 feet)
male fin whale.....63 feet 8 inches (63 feet)
female fin whale.....65 feet 7 inches (65 feet)

species classification	blue whale	number	%	fin whale	number	%
group I	70 ft. and under	5	0.8	under 55 ft.	0	0
group II	71-85 ft.	583	92.4	55-65 ft.	237	23.5
group III	86 ft.	43	6.8	over 66 ft.	775	76.5
total		631			1012	
immature male		30	7.9		43	8.8
mature male		361	92.1		445	91.2
immature female		35	14.6		39	7.4
mature female		205	85.4		485	92.6
total immature		65	10.3		82	8.1
total mature		566	89.7		920	91.9

Male Whale composition

On all blue and fin male whales which were caught by the Japanese fleets, their testis's weight and size were measured. By the result of last year's investigation, the weight and size were nearly parallel. So in this report the size

was neglected. For the weight can show clearer quantity, while the size needs multiplication, not always meaning the quantity.

(1) Total weight of right and left testis by body length is plotted in Figs. 6a

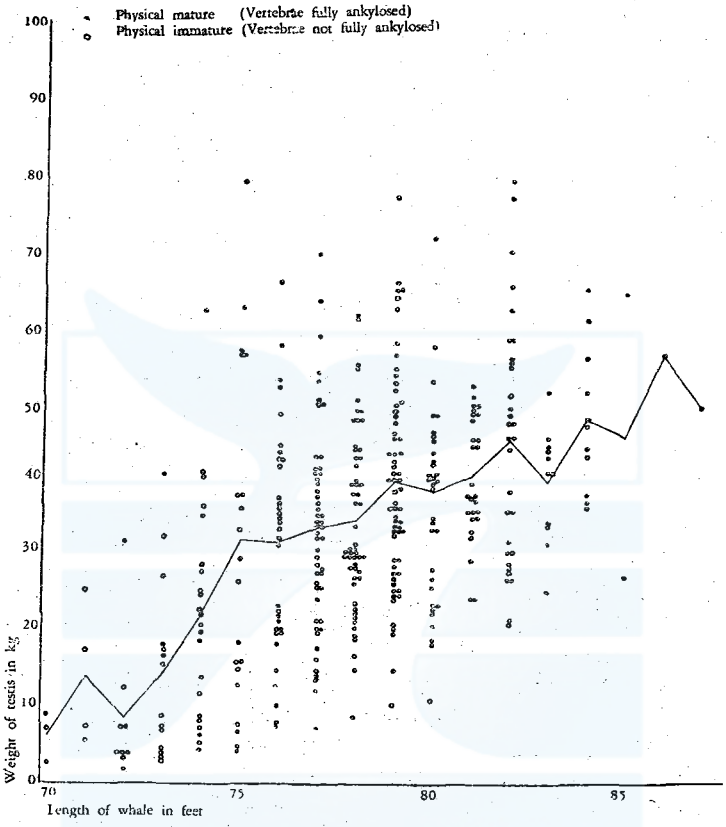


Fig. 6 a. Weight of testis in different length. (Blue whale)

and 6b with the average value in graph. These show that there is more steep slope of the curve on blue whale under 75 feet (more increasing ratio of weight of the testis) and gentle slope over 75 feet though increases. Supposing that blue whale comes to sexual maturity in 75 feet nearly same curve is gained on fin whales. The weight of genitals increases remarkably under 62 feet. That is, the fin whale reaches maturity at 62 feet long.

(2) The average body length by the weight of testis is shown in Figs. 7a and 7b. After the remarkable increase of body length till 10 kgs in testis's weight on blue whales the more the weight of testis increases, the less notable the increase of body length is. And the same is true with fin whales with the border of 5 kgs. This is another point of view for the above mentioned and means that as long as

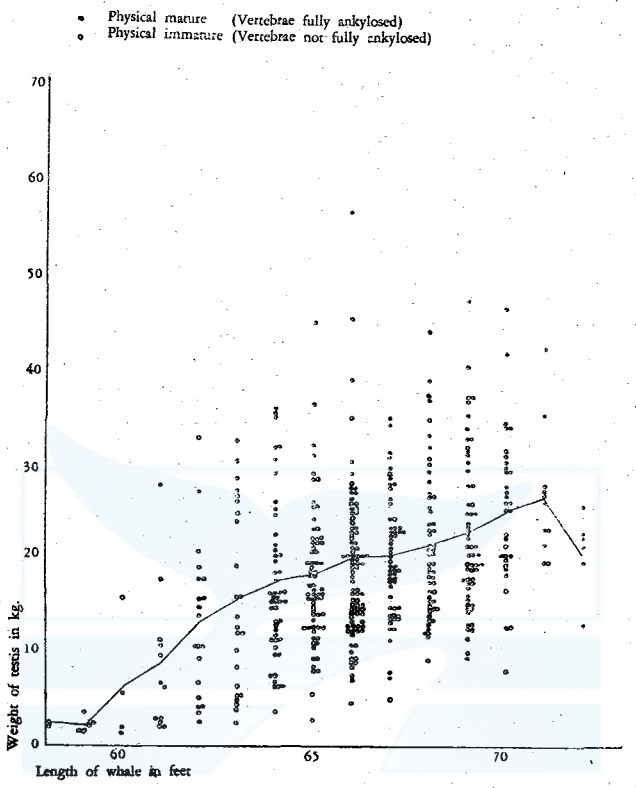


Fig. 6b. Weight of testis in different length. (Blue whale)

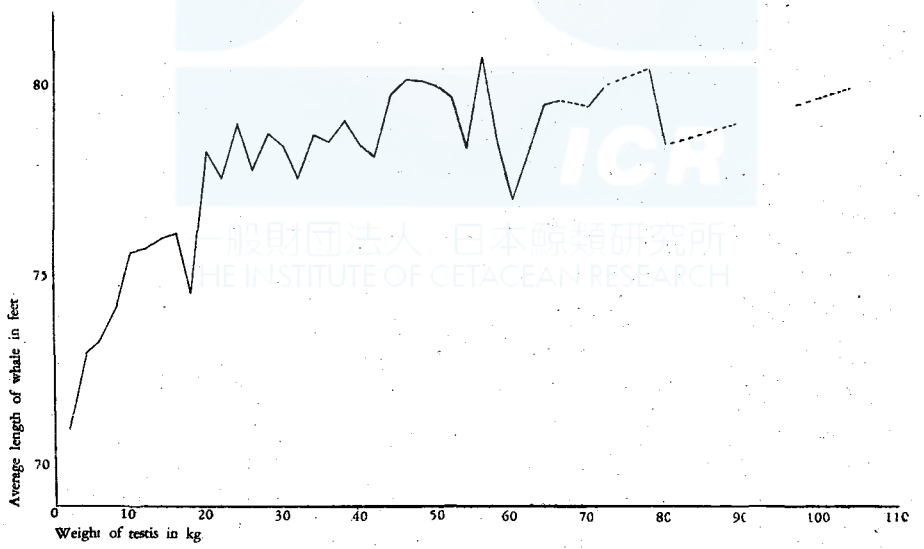


Fig. 7a. Average length of whales in each class of weight of testis. (Blue whale)

the whale grows into the constant weight of testis and body length, it shows the rapid development and after that gentle.

Hitherto, the Japanese investigators have classified sexual mature and immature with the weight of testis, 10 kg for blue whale and 5 kg for fin whale. In Fig. 6 too, you can find it appropriate.

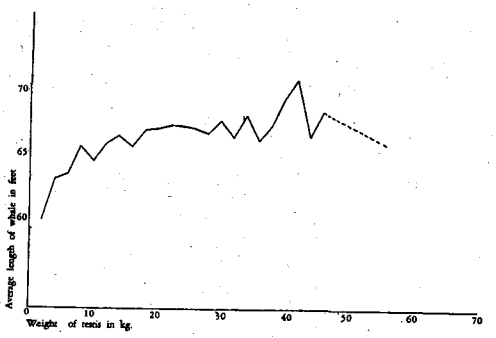


Fig. 7b. Average of whales in each class of weight of testis. (Fin whale)

(3) Next, from another point of view, let's study the sexual and physical maturity by body length. 10 kg total weight of right and left for blue whale and 5 kg for fin whale were regarded as sexual mature and percentage of sexual matur for total number by body length was made into chart (Cf. Figs. 8a and 8b). These curves show the sexual maturity. And on every whale caught, the ankylosis was observed at thoracic region and lumbar. When either of them were ankylosed, the whales were considered physical mature and their percentage for total number by body length was made into chart in Figs. 8a and 8b.

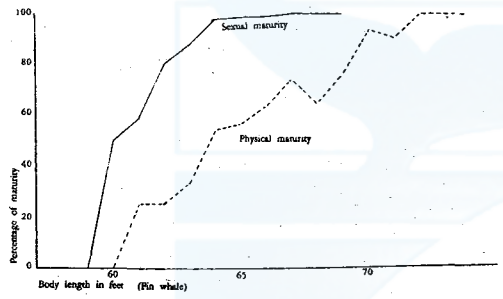


Fig. 8a. Maturity curve on different length. (Male)

These charts show that the body length of sexual and physical mature is 75 ft and 79 ft respectively for blue whales and 62 feet and 69 feet for fin whales, if we can regard the body length of more than 75% of mature as that of physical and sexual mature.

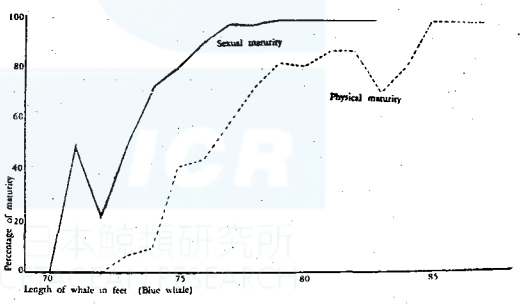


Fig. 8b. Maturity curve on different length. (Male)

FEMALE WHALE COMPOSITION

Similar to the report of the 1947–48 season, we studied female whale composition—principally on the presence of corpora lutea in the ovaries and complement-

ally presence of foetus, weight of the ovaries, condition of the ovarian follicles and state of the mammary glands.

The number of corpora lutea distributed by body length is shown in Figs. 9a

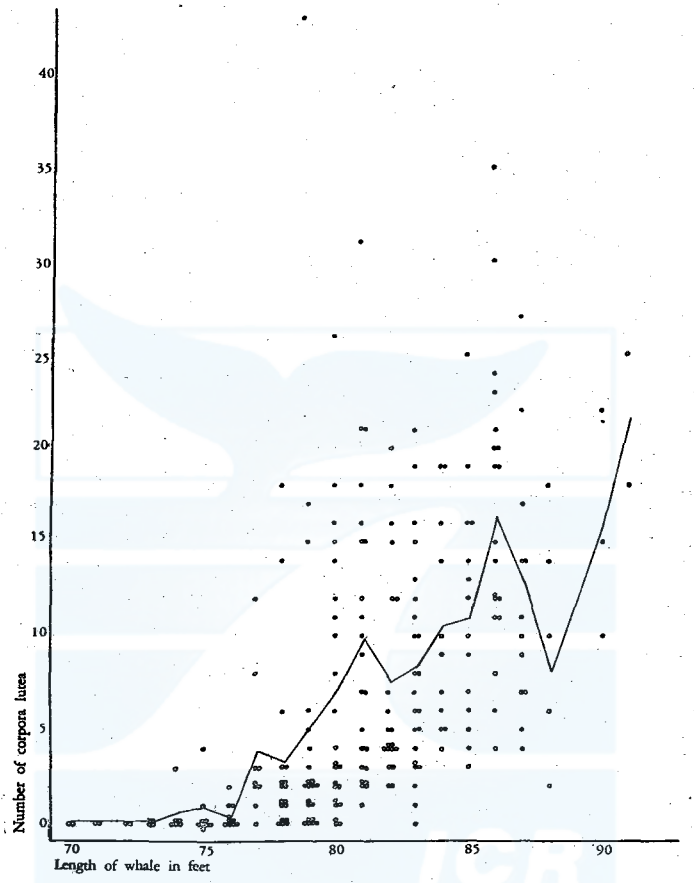


Fig. 9a. Length of whale and number of corpora lutea. (Blue whale)

and 9b. On blue whales (Fig. 9a) the average curve of the number of corpora lutea by body length rises extremely high from 78 feet to 81 feet and around them shows a rather gentle curve. Compared with the last year's data, it can be said that the gentle curve in more than 80 feet means more numerous younger whales (small number of corpora lutea). Shaded dots mean the physically mature whale. (This year, even though the thoracic series of vertebrae were not ankylosed, whales with ankylosed lumbar series of vertebrae were regarded as physically mature.) With some exceptions, generally, physically mature whales have more than 12 corpora luteas. The fact that there are some immature whales with many

corpora luteas is due to taking for not ankylosed owing to the unsufficient bone shaving in observation on board of the Nisshin-maru. But the data were not revied.

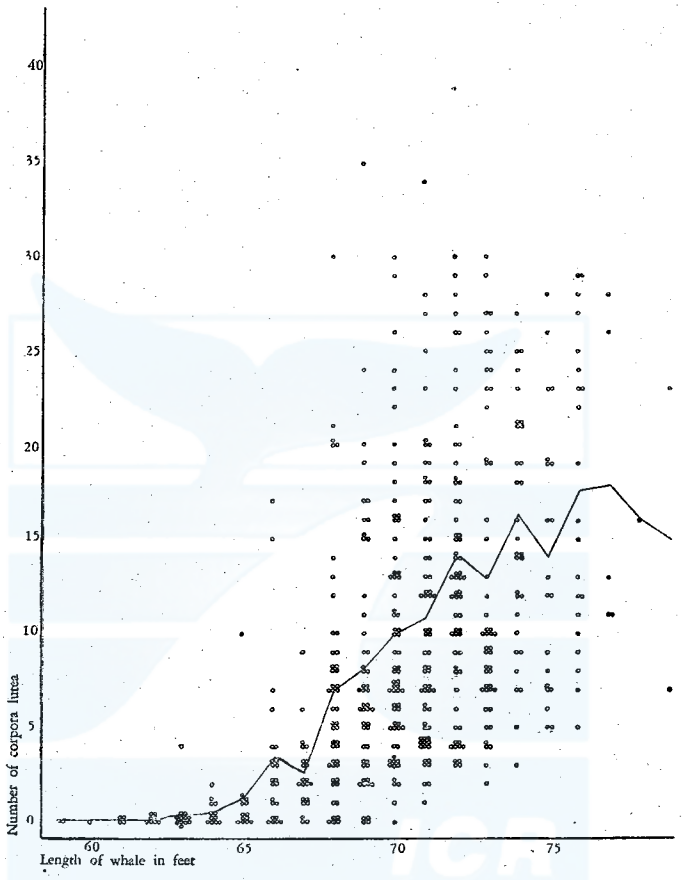


Fig. 9b. Length of whale and number of corpora lutea. (Fin whale)

Nearly the same thing can be said with fin whales (Fig. 9b) There is a lower turning point of average of number of corpora lutea for the body length around 67 feet. This corresponds with the last year's data but means comparatively small number of corpora lutea, this is due to larger number of whales of younger age.

The relation of physical maturity of fin whales too agrees almost with that of blue whales. It is quite unusual that a whale with 53 corpora luteas (72 feet in length) was caught. Further information about it will be mentioned elsewhere.

As for the average length of whales in each class of corpora lutea numbers (Figs. 10a and 10b), sudden increase of average body length (from 81 feet to 84

feet) can be seen between 6 and 7 corpora luteas in blue whales (Fig. 10a). After that, it fluctuates around 83,5 feet in general with some unevenness. And

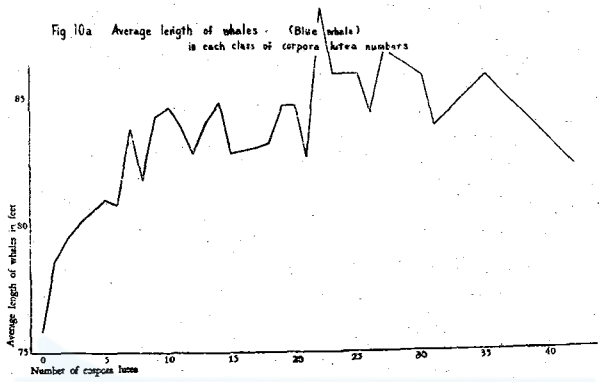


Fig. 10a. Average length of whales. (Blue whale) in each class of corpora lutea numbers.

between 21 and 22 in number of corpora lutea, a sudden change can be seen again and after 22, there is a group of 84 feet. According to the last year's data, though 86 feet group was found in large number of corpora lutea, normal size of female blue whale was generally 84 feet. And the same was true for this year too.

These facts lead that lately the average body length of whales has been becoming smaller and that the standard length of whales is about 84 feet and after that it keeps growing (increases the body length) though it is slack.

These curves of the last two years show the decrease of average body length around the largest number of corpora lutea. As seen in human being and other mammals, isn't it a proof that a phenomenon of shrinking in old age is found in whales also?

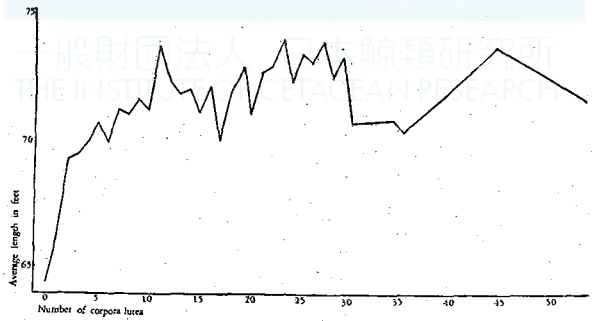


Fig. 10b. Average length of Whales. (Fin whale) in each class of corpora lutea numbers

The same thing can be said with fin whales (Fig. 10b). Its standard body length is 72 feet and the group of whales with larger number of corpora lutea is 73 feet type, it is thought.

From another point of view, the ratio of the number of sexual mature (whale, with more 1 in number of corpora lutea) to the number of sexual immature (whales with no corpora lutea) in each body length in percentage was made into chart in Fig. 11. If sexual mature is supposed of the body length (age) in which sexual mature is over 75% of the total, the length of sexual mature is 78 feet in blue whale and 67 feet in fin whale. (The broken line show physical matures which can bring the same result. It will be stated later.) The percentage of physical maturity in this body length, (78 feet, for blue whales and 67 feet for fin whale) is 11% for the former and 15% for the latter.

The average number of corpora lutea is 3 for both blue and fin whales

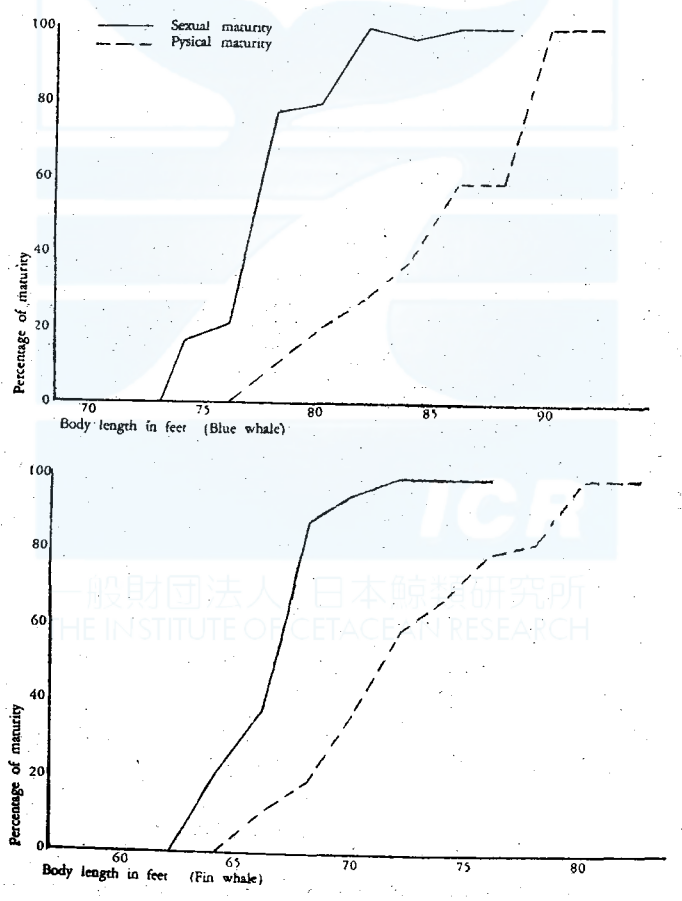


Fig. 11. Maturity curve on different length. (Female)

(omitting the figure below decimal point).

The average number of corpora lutea for each body length is shown in Fig. 12

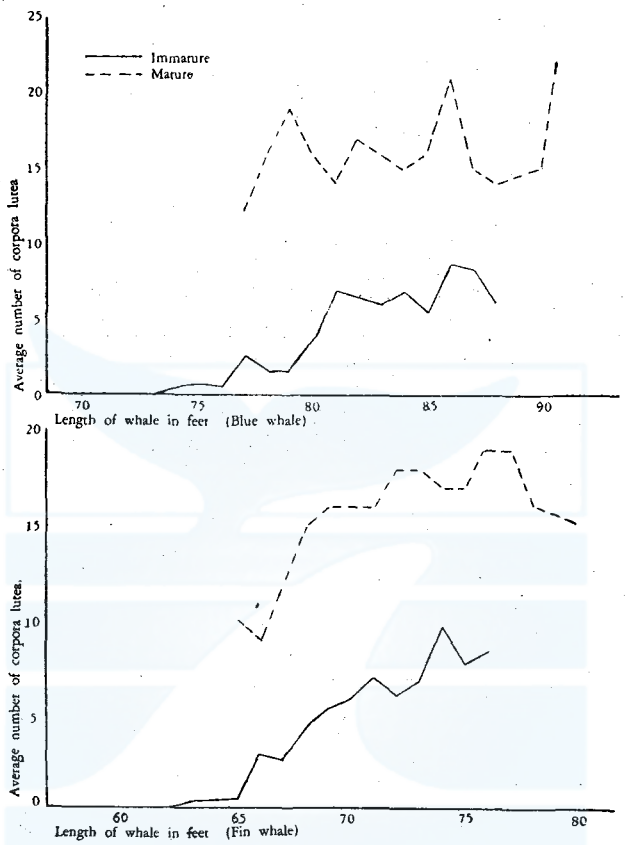


Fig. 12. Average number of corpora lutea in different length on physical maturity.

respectively on physical mature and immature. There the increase of number of corpora lutea with the increase of body length is found. It is an interesting fact that mature and immature are divided distinctly with an border line of 10 in number of corpora lutea (both in blue and fin whales). The last year's data did not divide them so distinctly as this.

The relation between mature and immature, namely percentage of mature whale for total whales in each body length is shown with physical maturity curve in Fig. 11. The curve for this year is extremely typical by chance. The body length 75% of which is mature is 89 feet for blue and 75 feet for fin whale.

Let's compare the sexual maturity with the physical maturity. In sexual

maturity, some blue whales suddenly begin to get mature about 73 feet in length and almost all female whales have grown up in 82 feet long. In physical maturity, however, early matured whale begins to reach maturity around 76 feet in length and late matured one does not show the perfect maturity till 90 feet long. This is probably the reason why the body length of whales is laid stress on as data of age.

On fin whales the former begins from 62 to 72 feet long and the latter 64 feet in length, probably with an increase of body length to 80 feet.

The average number of corpora lutea in the body length, 75% of which reach physi al maturity, namely 89 feet for blue whales and 75 feet for fin whales, is 12 for the former and 14 for the latter. The average number of corpora lutea in physical mature only is 17 both on blue and fin whales. It is very interesting to read the charts again, considering the above items.

The composition of female whales by sexual immature (with no corpora lutea) pregnant and resting one, is shown as Fig. 13. Immature has a special peak but

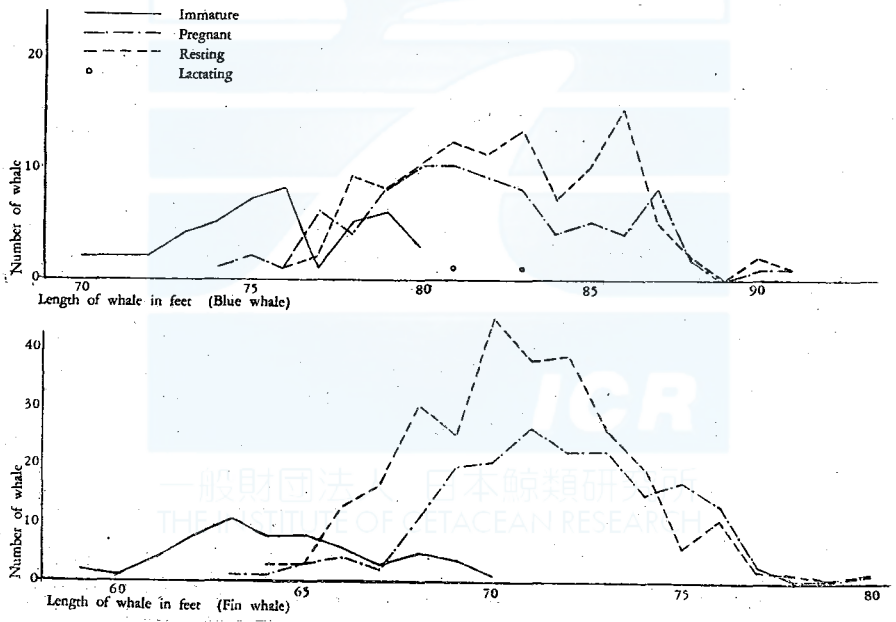


Fig. 13. Maturity of female in all Japanese fleet.

this, as Figs. 4a and 4b show, forms a part of the gentle curve as whole. It is natural that the number of immature increases towards small in body length but the peak in 76 feet on blue whales proves that large sized whales were caught as whole. The more this peak of immature moves to small in length, the younger

whales are chased, it proves. The modes of pregnant and resting one agree well. Even from this fact, probably the pregnant ratio is nearly 45% of total mature whales.

The same observation can be done with fin whales and their pregnant ratio is less than blue whales. The percentage of the pregnant whales by month for this year is shown as Fig. 14. After a slight decrease from December to January, blue

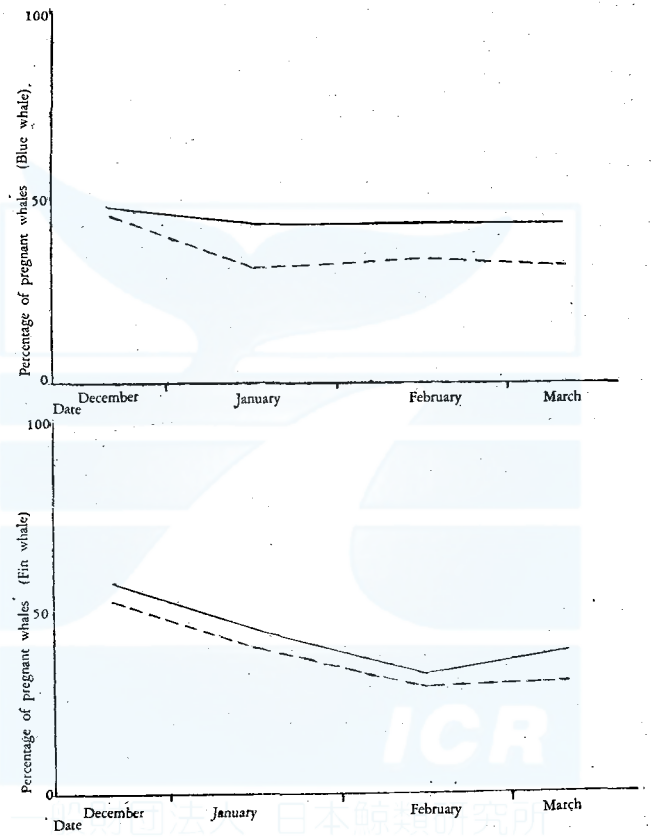


Fig. 14. Percentage of pregnant whales in catch by month. (contain the whale, which has functional corpora lutea & no foetus)

whales show nearly same percentage, around 45% (in a real line for mature female whales and in a broken line for total female whales). This is thought a a very good condition for whales.

Fin whales show slight increase in March but in general, show the decreasing line in and after December. Even in February when both the Nisshin-maru and the Hashidate-maru fleets caught more fin whales, it is thought a good efficiency

to keep the percentage more than 30%.

Anyhow, it is fortunate for whales that this year there was no large fluctuation or no descendance to around 10% as seen last year.

The figures of the pregnant ratio through the whole whaling season is as the following table.

Whale species	Sexual immature	Resting	Pregnant	Total
No of blue whales	45	112	83	240
%	18.7%	46.7%	34.6%	100%
% for total mature		57.4%	42.6%	100%
No of fin whales	61	295	168	524
%	11.6%	56.3%	32.1%	100%
% for total mature		63.7%	36.3%	100%

Note: Resting stage contains lactating stage.

The frequency curve of the number of corpora lutea is shown in Figs. 15a and 15b.

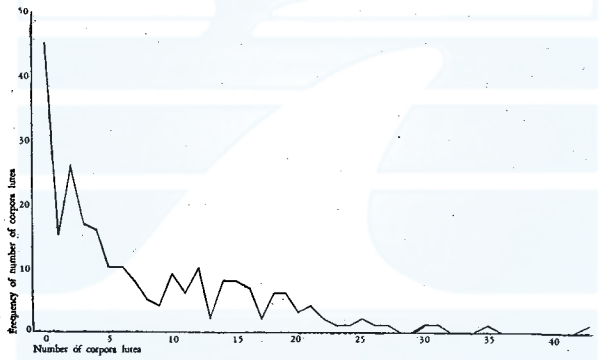


Fig. 15a. Frequency of number of corpora lutea. (Blue whale)

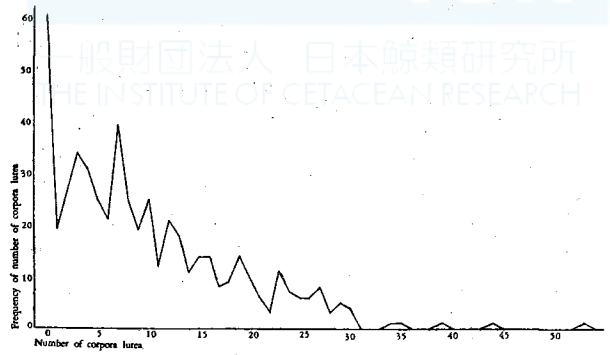


Fig. 15b. Frequency of numbers of corpora lutea. (Fin whale)

The blue whale's peaks for this year are 2, 6, 10, 12, 14, 19, 23, 25 and 29 for last year.

The fin whale's peaks for this year are 3, 7, 10, 12, 15, 19, 23, 27 and 29, agreeing with 2, 5, 7, 10, 12, 14, 18, 23, 27, and 30 for last year.

Both are the extremely gentle curves and especially more whales with more than 10 in number of corpora lutea are very conspicuous.

Under the classification of female whales into sexual immature, resting and pregnant group, (Lactating whales are included in the resting or pregnant group specially, marked with O.), the average weight of ovaries in each body length is shown in Fig. 16a and Fig. 16b.

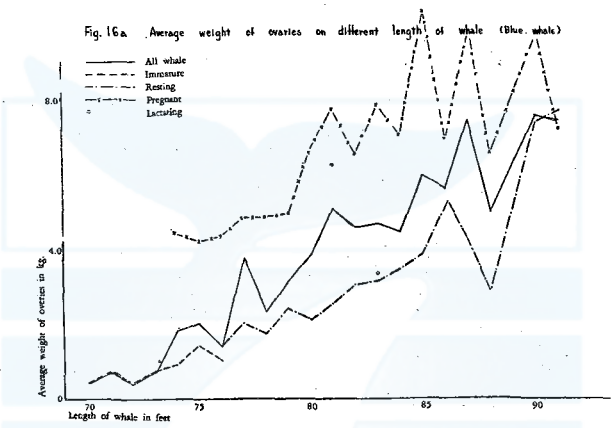


Fig. 16a. Average weight of ovaries on different length of whale. (Blue whale)

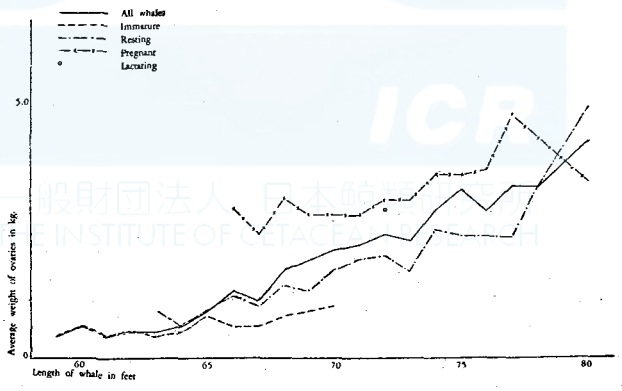


Fig. 16b. Average weight of ovaris on different length of whale. (Fin whale)

The real line means the average weight of all female whales and it is due to the existence of functional corpora lutea that there is the curve of pregnant whales

in the far heavier part than this.

It is natural that ovaries of resting whales are heavier than those of immature and that the ovaries of the pregnant whales are the heaviest.

And it is also natural and interesting that each curve shows an increasing weight with age (body length).

Figs. 17a and 17b show the comparative curve of the average number of

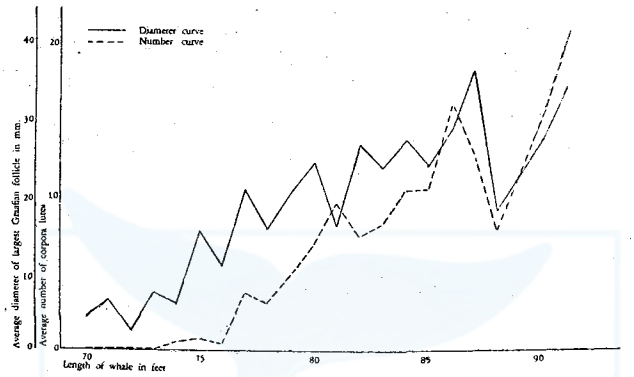


Fig. 17a. Average diameter of largest Graafian follicle and average number of corpora lutea. (Blue whale)

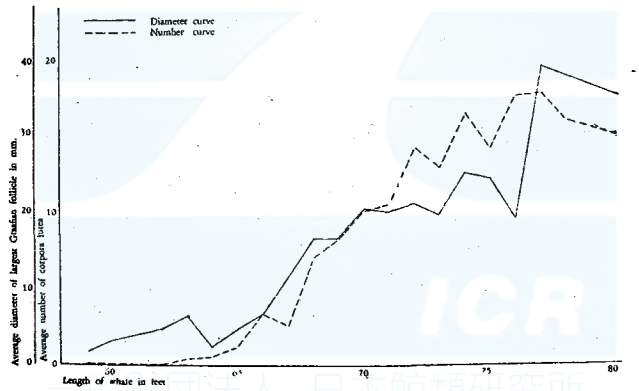


Fig. 17b. Average diameter of largest Graafian follicle and average number of corpora lutea. (Fin whale)

corpora lutea in each body length (same with Figs. 9a and 9b) and average diameter of the largest Graafian follicle.

They show that the less the number of corpora lutea is and the shorter the body length is, the smaller is the Graafian follicle, with quite the same trend in both average curves.

Some maintain the theory that the Graafian follicle in ovaries with the functional corpora lutea is small but we asserts the above theory, namely the largest

Graafian follicle becomes large in proportion to age (body length and the number

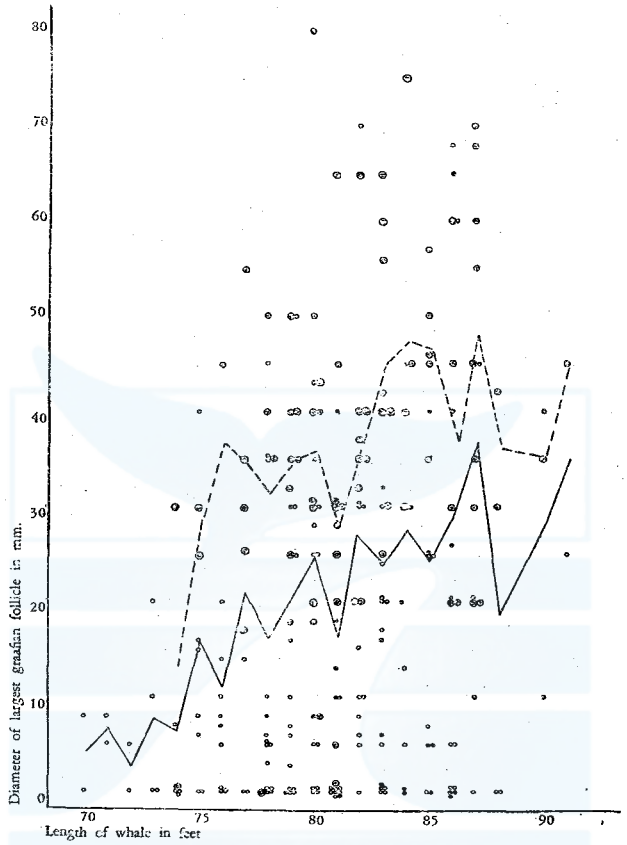


Fig. 18a. Diameter of largest Graafian follicle. (Blue whale)

of corpora lutea) Figs. 18a and 18b explain it.

○ means whales physically immature and not pregnant
◎ means whales physically immature and pregnant.
● means whales physically mature and not pregnant.
◉ means whales physically mature and pregnant.

And the real line curve is the average diameter of Graafian follicle of all whales for each body length and the broken line curve is that of pregnant whales only. Both in blue and fin whales, their trends agree entirely and Graafian follicle of pregnant whales (with functional corpora lutea) is never smaller than that of other whales. Rather speaking, its average is larger than the average of all whales. But in some cases, whales with functional corpora lutea and yet non-

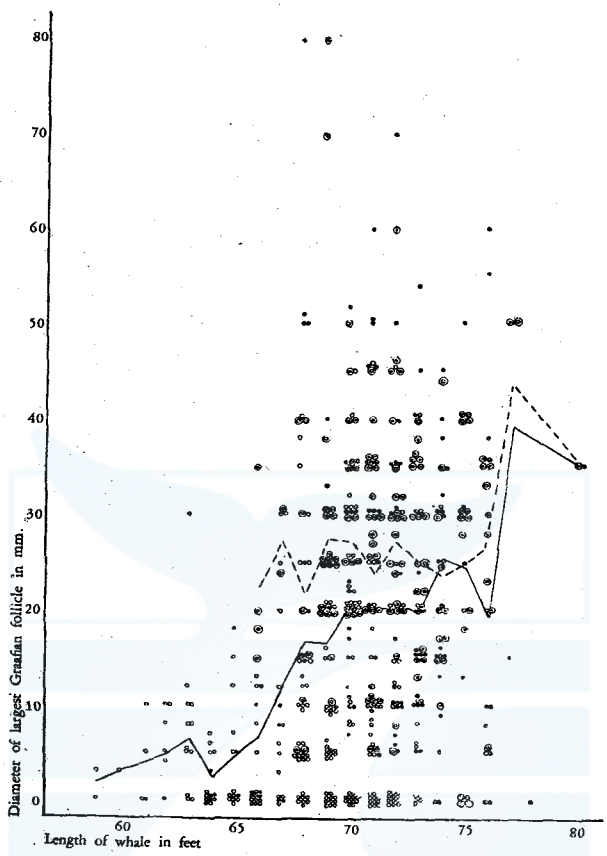


Fig. 18b. Diameter of largest Graafian follicle. (Fin whale)

developed Graafian follicle were found. And the same is true with whales in other (resting or lactating) stages. What we can infer from these facts is the usual fact that when one developed ovum has been discharged from ovary, the next ovum does not develop but after the development of the whole ovary, the ovum is probably discharged one by one.

MAMMARY GLANDS

This time too the investigation on the colour and thickness of mammary glands was carried out . The number of whales observed is 240 blue female and 524 fin female whales. The whales, on mammary glands of which the secretion of milk had been found in treating them, as well as with the jetting milk from their pappilae were counted as lactating one. In other cases than this, all were in not lactating stage and classified into resting, (This time all lactating whales were resting one.)

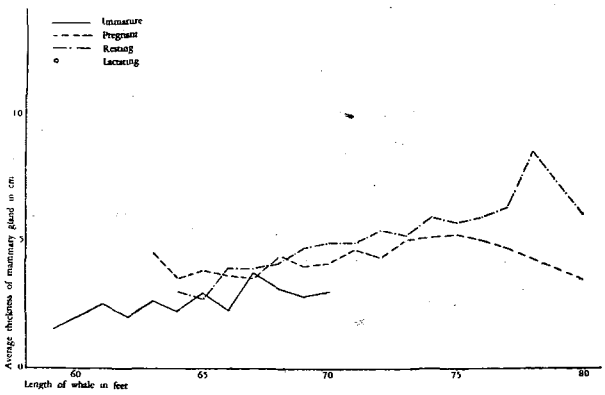


Fig. 19a. Average thickness of mammary gland in different length. (Fin whale)

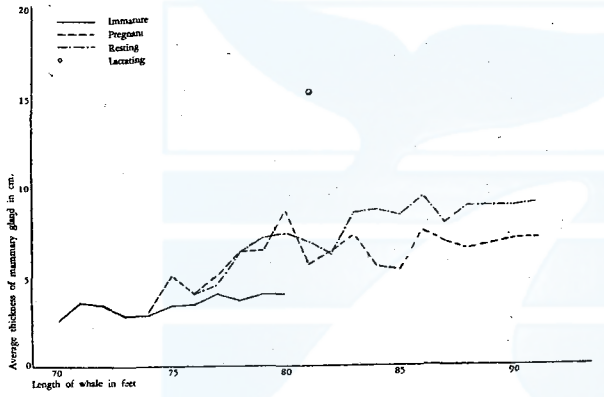


Fig. 19b. Average thickness of mammary gland in different length. (Blue whale)

pregnant and immature.

On each of them, the average thickness in each body length is shown in Fig. 9 a and Fig. 19 b. There, we can find that though the thickness inceases with age (body length) the lactating whales only have far thicker mammary glands, irrespective of this fact. It is same as last year that the younger whales are the lighter colour they show and the yellowish brown becomes deep with its age. The mammary glands of lactating whales is red brownish yellow, irrespective of their age. It is same as the thickness of mammary glands and thickness of blubber of lactating whale increase and decrease regardless of their age.

Next, classifimed into each condition, % of colour is as follows.

Table 3 Percentage of colours of mammary glands

a. Blue whale

1. Nisshin-maru

State of colour		un-known	Y	B	R	W	P	Dy	Ry				Total
Immature	No. of whales					6	15		22				43
	%					14	35		51				100
Resting		2	1	1	2	14	19	17	22				65
	%	3.1	1.5	1.5	3.1	1	29.2	26.2	33.9				100
Pregnant				1			10	13					24
	%			4			42	54					100
Total		2	1	2	2	7	44	30	44				132

2. Hashidate-maru

State of Colour		unknown	Y	B	R	W	P	Dy	Ry				Total
Immature	No. of colour		2	1		10	10	1					24
	%		8	4		42	42	4					100
Resting		1	13	3		4	4	13	9				47
	%	2	28	6		8	8	28	20				100
Pregnant			18			2	6	11	5				37
	%		35			5	16	30	14				100
(Lactating)									(2)				(2)
	%								100				100
Total			28			16	20	25	14				108

b. Fin Whale

1. Nisshin-maru

State of coloure		unknown	Y	B	R	W	P	Dy	Ry				Total
Immature	No. of Whales	1				6	20		1				28
	%	4				21	71		4				100
Resting					2	1	43	52	73				172
	%				1.1	0.6	25	30.8	42.5				100
Pregnant			1		2		34	24	42				103
	%				1.9		33	23.3	40.8				100
(Lactating)									(1)				(1)
	%								100				100
Total		1	1		4	7	97	77	116				302

2. Hashidate-maru

State of colour		unknown	Y	B	R	W	P	Dy	Ry	By			Total
Immature	No. of Whale		3			15	12	2	1				33
	%		9			46	36	6	3				100
Resting			47	1		4	14	45	11	2			124
	%		38	1		3	11	36	9	2			100
Pregnant			29	1			3	22	9	1			65
	%		45	1			5	34	14	1			100
Total		-	79	2		19	29	69	21	3			222

On both blue and fin whales, in these tables there are more numerous Y (yellow) whales for the Hashidate-maru and larger number of P (pink) and Ry (reddisy

yellow) whales and less number of Y whales for the Nisshin-maru. These are probably due to the difference of observer's estimate and to disloyality to notabilia in observation. Though the expression may be not good, the notabilia defines "Y" the most usually observed colour. Really the colour of the mammary glands is not yellow always but has a tinge of red and cream. Nevertheless, the fact that only one whale for each species has Y leads and interpretation that the observers confused it with P, Dy or Ry.

Therefore, neglecting the Nisshin-maru's data, the classification of body colours by body length, basing on the Hashidate-maru's data only, is shown in the following table.

Table 4

Colour of mammary glands in different length

a. Blue whale (Hashidate-maru)

colour / body length	un-known	W	P	Y	Dy	Ry	B	By	R	Total
70		1								1
71			2							2
72			1							1
73		3								3
74		1								1
75		2		1	2					5
76		3	2	1						6
77		1	1	3						5
78		3	4	4	1					12
79		1	5	3	1		1			11
80		1	3	2	3	1	1			11
81				3	2	3				8
82				1	7	2				10
83	1			3	2	3				9
84					2	1	1			4
85			1	2	3					6
86				2	1	2	1			6
87				3	1	2				6
88			1							1
89										
90										
Total	1	16	20	28	25	14	4	0	0	108

In observing the mammary gland, some whales were found secreting the brown sticky fluid. After coming back home, only those which were stated on the data,

b. Fin whale (Hashidate-maru)

colour / body length	unknown	W	P	Y	Dy	Ry	B	By	R	Total
56										
57										
58										
59		1								1
60		1								1
61		2	1							3
62		3	2							5
63		4	2							6
64		1	2	1	1					5
65		2	2		2					6
66		2	4	1	1					8
67		1	4	5	2					12
68			6	12	6	3				27
69		2	3	11	7	3	1			27
70			2	13	9	3		2		29
71				9	11	1				21
72				8	8	4	1	1		22
73				7	8	3				18
74				6	7	1				14
75				2	3					6
76				4	3	2				9
77					1	1				2
78										
79										
Total	0	19	29	79	69	21	2	3	0	222

were chosen and studied into the following table. As there were some whales which were not mentioned for the short of the previous notice even if they were discovered, the further investigation should be carried out in another chance.

What I can study on the table is:—

1. Generally speaking they were so-called "whales which had experiencecd paturition" with large number of corpora lutea.

2. Their mammary glands were thicker than the normal whales.

3. No blue whale with foetus was found. Many fin whales were pregnant, even if they were secreting fluid.

4. They were discovered whenever the period might be, not depending on the catching date, and time.

5. Many whales were physically mature and large in body length.

Table 5

species	No.	Date killed	body length	mammary grand		ovary						physical maturity
				thickness in cm	colour	no. of functional corpora lutea	no. of old corpora luteu	diameter of the largest Graafian follicle	weight	foetus sex	foetus body length	
Blue whale	H-1	0450. 15th Dec.	85	12	Y	0 0	9 16	5	2.1 2.4			AA
	H-2	0445. 15th Dec.	86	10	Y	0 0	15 9	68	1.6 1.6			AA
	H-27	1905. 19th Dec.	80	14	B	0 0	7 4	35	1.1 1.5			aa
	H-565	0605. 1st Mar.	80	14	RY	0 0	11 7	8	1.1 1.0			AA
	H-574	1150. 2nd Mar.	87	10	RY	0 0	17 10	200	2.4 2.4			AA
	H-712	1415. 20th Mar.	78	10	Y	0 0	1 1	10	1.0 1.2			NN
	N-46	1050. 20th Dec.	83	11	DY	0 0	30	20	1.9 1.5			NN
Fin whale	H-58	1355. 24th Dec.	74	9	Dr	1 0	12 4	30	3.0 2.0	F	7′4″	AA
	H-82	0100. 3rd Jan.	73	9	RY	1 0	8 7	36	2.9 1.7	M	2′10″	aA
	H-268	1900. 1st Feb.	72	7	DY	0 0	8 9	40	6.5 0.6			AA
	H-321	0805. 4th Feb.	76	7	Y	1 0	11 3	30	1.7 0.9	M	10′2″	AA
	H-370	1310. 11th Feb.	69	4	DY	1 0	10 9	25	1.3 0.7	F	10′1″	aA
	H-372	1710. 11th. Feb.	71	6	DY	0 0	5 4	8	0.6 0.4			aa
	H-384	1900. 12th. Feb.	74	10	DY	1 0	6 7	32	2.2 1.3			AA
	H-394	1045. 3rd Mar.	76	4	Y	1 0	4 2	35	1.3 0.7	F	10′1″	aa
	N-120	0625. 2nd Jan.	74	7	RY	1 0	7 4	15	2.1 1.7	F	43‴	aA
	N-129	0735. 3rd Jan.	68	4	P	0 1	2 5	30	1.3 2.4	F	4′9″	NN

6. Some fin whales with the functional corpora lutea and no foetus were found. (They probably miscarried.)

In short, there is necessity for the observation on the largest corpora lutea and histological study on ovaries and mammary glands. The brown fluid secreting whales in the data are enumerated as follows.

FOETUS

On 83 foetuses of blue whales and 170 foetuses of fin whales, mean growth curve by month is shown in following figures and tables. There is nothing to be

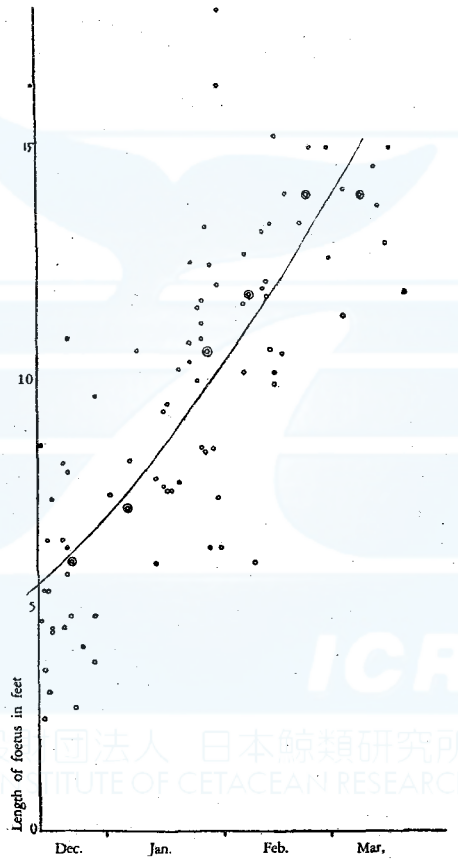


Fig. 20a. Mean growth curve of foetus. (Blue whale)

mentioned specially. As the whole, male occupied 60.2% in sex ratio for blue whales and 48.2% for fin whales. The smallest of them was a female 2 feet 6 inches long for the former and a male just 1 foot long for fin whale. The largest of them was female 21 feet 6 inches for blue whale and a female 13 feet 4 inches ong for fin whale.

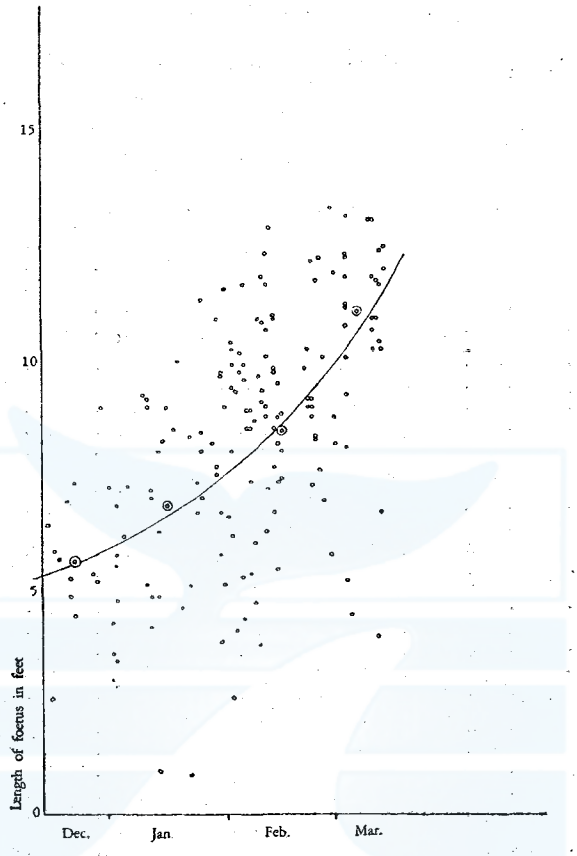


Fig. 20b. Mean growth curve of foetus. (Fin whale)

A fin whale, 71 feet in length which was caught by the "Hashidate-maru" fleet on March 14, was with a twin, male 12′6″ (380.0 kg) and femalle 12′0″ (375.0 kg) A fin whales, 75 feet long, which was caught by the Nisshin-maru fleet on March 11, was with a twin, female 11′10″ (302,0 kg) and female 10′11″ (244.0 kg). The former had two functional corpora luteas and the latter, one The development of these foetuses was normal and there is nothing to be stated specially.

A blue whale, 80 feet long, caught by the Hashidate-maru fleet on January 14. had a malformed foetus 5′11″ (85.0 kg). It was very fat in dumpy shape for its body length and the part below its waistwas bent sharp towards the ventral side. (The body length was measured in stretching its waist.) Its upper lip was a harelip and the forelegs were abnormal as shown in the figure. And the development of

Table 6

Whale foetuses measured and weighted in the Antarctic in the season 1948/49 on the Japanese fleets

Blue whale foetuses

Date when measured	Mother Length	Foetus Length	Sex	Weight in Kg.	Date when measured	Mother Length	Foetus Length	Sex	Weignt in Kg.
15th Dec.	83′	8′ 6″	M		26th Jan.	80′	11′ 2″	M	
16th 〃	87′	4′ 8″	F		27th 〃	83′	8′ 5″	F	
〃 〃	82′	5′ 4″	M		〃 〃	75′	8′ 4″	F	
〃 〃	83′	2′ 6″	F	5.0	28th 〃	85′	13′ 3″	F	
17th 〃	79′	5′ 4″	F	34.5	〃 〃	90′	11′ 8″	M	
〃 〃	83′	3′ 7″	M	14.0	29th 〃	81′	6′ 3″	M	
〃 〃	86′	6′ 5″	M		〃 〃	83′	12′ 5 ′	F	
〃 〃	82′	3′ 1″	F		〃 〃	78′	8′ 5″	M	
18th 〃	87′	4′ 6″	F		30th 〃	83′	16′ 4″	F	
19th 〃	83′	7′ 4″	M		〃 〃	86′	18′ 0″	M	
21st 〃	81′	6′ 5″	M		〃 〃	75′	7′ 4″	M	
〃 〃	79′	4′ 6″	F		6th 〃	81′	11′ 7″	M	
〃 〃	81′	8′ 1″	F		〃 〃	79′	12′ 8″	M	
22nd 〃	77′	7′ 11″	M		〃 〃	80′	10′ 1″	M	
23rd 〃	82′	10′ 10″	M	279.7	9th 〃	80′	5′ 11″	F	
〃 〃	88′	5′ 8″	F	49.0	11th 〃	81′	13′ 2″	M	
〃 〃	77′	6′ 3″	M		〃 〃	11′	11′ 11′	M	
24th 〃	78′	4′ 9″	M	35.0	12th 〃	87′	11′ 9″	M	
〃 〃	85′	2′ 9″	F		〃 〃	82′	12′ 1″	M	
27th 〃	79′	4′ 1″	F	19.5	13th 〃	84′	10′ 7″	M	
29th 〃	86′	3′ 9″	F	13.3	14th 〃	81′	13′ 4″	M	
〃 〃	87′	4′ 9″	M		〃 〃	82′	9′ 10″	M	
30th 〃	81′	9′ 7″	M		〃 〃	88′	15′ 3″	F	
2nd Jan.	85′	7′ 5″	M		15th 〃	79′	10′ 1″	F	245.0
7th 〃	79′	8′ 2″	F		16th 〃	74′	10′ 6″	M	
9th 〃	84′	10′ 7″	M		17th 〃	84′	14′ 0″	M	
14th 〃	80′	5′ 11″	M	85.0	22nd 〃	87_4	13′ 4″	M	
〃 〃	81′	7′ 9″	F		23rd 〃	80′	15′ 0″	M	
16th 〃	85′	9′ 3″	F		28th 〃	82′	15′ 0″	F	
17th 〃	85′	7′ 6″	M		〃 〃	77′	12′ 7″	F	508.0
〃 〃	80′	7′ 7″	M	113.7	3rd Mar.	87′	18′ 10″	F	
〃 〃	91′	9′ 5″	M		4th 〃	82′	14′ 1″	F	630.0
18th 〃	77′	7′ 6″	M	140.4	〃 〃	77′	11′ 4″	F	346.0
20th 〃	80′	10′ 2″	F	242.0	12th 〃	87′	14′ 7″	F	
〃 〃	81′	7′ 8″	M		13th 〃	77′	13′ 9″	M	
23rd 〃	83′	12′ 6″	M	415.0	15th 〃	79′	12′ 11″	M	515.0
〃 〃	80′	10′ 9″	F		17th 〃	81′	15′ 0″	M	
〃 〃	82′	10′ 4″	M		〃 〃	78′	4′ 2″	F	20.0
25th 〃	87′	9′ 11″	F	242.0	20th 〃	78′	11′ 10″	M	427.0
〃 〃	82′	11′ 6″	F	365.0	〃 〃	80′	21′ 6″	F	2645.1
26th 〃	85′	9′ 3″	F						

tail fin and penis was quite good.

It weighed heavier for its body length. The lengths of each part of its body will be mentioned later. (No. H—160)

There was another malformed foetus, male, 18′00″ long,

Table 7

Whale foetuses measured and weighted in the Antarctic in the season 1948/49 on the Japanese fleets

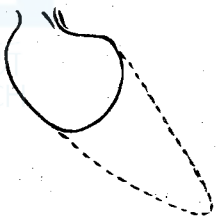
Fin whale foetuses

Date when measured	Mother Length	Foetus Length	Sex	Weight in Kg.	Date when measured	Mother Length	Foetus Length	Sex	Weight in Kg.
16th Dec.	70′	6′ 5″	F		30th 〃	69′	7′ 8″	M	
17th 〃	68′	2′ 7″	M	5.4	30th 〃	73′	7′ 6″	F	
18th 〃	74′	5′ 10″	M		30th 〃	77′	10′ 11″	M	
20th 〃	72′	5′ 8″	F		30th 〃	67′	9′ 8″	M	
23rd 〃	72′	6′ 11″	F	71.8	30th 〃	71′	9′ 9″	F	204.0
23rd 〃	72′	4′ 10″	M	33.0	30th 〃	71′	3′ 10″	F	
23rd 〃	70′	5′ 3″	F		31st 〃	69′	6′ 8″	F	66.5
24th 〃	72′	5′ 7″	F		31st 〃	75′	5′ 9″	M	42.7
24th 〃	72′	4′ 5″	M		31st 〃	70′	11′ 7″	F	
28th 〃	71′	5′ 4″	F		31st 〃	72′	5′ 1″	M	
29th 〃	75′	5′ 2″	M		31st 〃	68′	9′ 0″	M	
31th 〃	72′	9′ 0″	M		1st Feb.	70′	6′ 7″	M	70.1
1st Jan.	75′	7′ 3″	M		2nd 〃	73′	10′ 5″	M	
2nd 〃	74′	4′ 3″	F		2nd 〃	74′	10′ 3″	M	
2nd 〃	71′	3′ 0″	F		2nd 〃	72′	6′ 2″	F	57.4
2nd 〃	72′	3′ 7″	F		2nd 〃	70′	9′ 11″	F	
3rd 〃	76′	5′ 9″	F	42.6	2nd 〃	75′	9′ 5″	M	
3rd 〃	66′	3′ 5″	F		3rd 〃	71′	2′ 7″	F	5.4
3rd 〃	73′	2′ 10″	M	7.1	3rd 〃	71′	8′ 0″	F	115.0
3rd 〃	70′	6′ 10″	F	69.5	3rd 〃	70′	9′ 4″	M	158.4
3rd 〃	68′	4′ 9″	F		3rd 〃	68′	4′ 1″	M	
3rd 〃	68′	5′ 6″	M		4th 〃	69′	9′ 9″	M	217.0
5th 〃	71′	6′ 2″	M	69.0	4th 〃	76′	10′ 2″	M	242.0
6th 〃	74′	7′ 3″	M	90.0	5th 〃	74′	11′ 8″	M	
10th 〃	74′	9′ 3″	F		5th 〃	69′	9′ 11″	M	231.0
11th 〃	68′	5′ 1″	M		5th 〃	70′	4′ 4″	F	
12th 〃	73′	9′ 2″	M		5th 〃	72′	9′ 7″	M	
12th 〃	76′	9′ 0″	M		6th 〃	73′	5′ 3″	M	
12th 〃	73′	4′ 10″	M		7th Feb.	75′	8′ 1″	F	
12th 〃	74′	4′ 2″	M		〃 〃	76′	8′ 6″	F	
12th 〃	69′	7′ 2″	F		〃 〃	70′	5′ 4″	M	
12th 〃	72′	7′ 0″	M		〃 〃	69′	7′ 4″	M	
14th 〃	71′	8′ 0″	M		〃 〃	69′	8′ 11″	M	
14th 〃	68′	6′ 3″	M		〃 〃	71′	8′ 6″	M	
14th 〃	76′	4′ 10″	F		8th 〃	66′	6′ 0″	M	68.0
15th 〃	69′	1′ 0″	M		9th 〃	70′	4′ 8″	F	25.0
15th 〃	71′	8′ 3″	F		〃 〃	73′	8′ 8″	F	165.0
16th 〃	76′	9′ 0″	F	183.3	〃 〃	70′	10′ 11″	M	
18th 〃	73′	8′ 6″	M	117.5	〃 〃	71′	9′ 8″	F	202.0
19th Jan.	72′	10′ 0″	F		10th 〃	71′	3′ 9″	F	19.0
21st 〃	71′	4′ 7″	F		〃 〃	70′	9, 4″	M	177.0
22nd 〃	73′	8′ 4″	M		〃 〃	72′	9′ 1″	F	
22nd 〃	75′	1′ 11″	M		〃 〃	71′	10′ 10″	M	
22nd 〃	69′	5′ 1″	M		〃 〃	76′	11′ 10″	F	
24th 〃	73′	6′ 8″	M		11th 〃	74′	10′ 8″	F	
24th 〃	71′	7′ 4″	M	96.0	〃 〃	75′	12′ 4″	M	
25th 〃	68′	8′ 0′	F		〃 〃	70,	9′ 0″	F	
25th 〃	73′	7′ 0″	F		〃 〃	76′	6′ 3″	F	
26th 〃	71′	8′ 5″	M		〃 〃	69′	10′ 1″	F	
28th 〃	71′	8′ 5″	M		〃 〃	73′	7′ 2″	F	

Fin whale foetuses (continued)

Date when measured		Mother Length	Foetus Length	Sex	Weight in Kg.	Date when measured		Mother Length	Foetus Length	Sex	Weight in Kg.
〃	〃	69′	8′ 9″	M	160.0	〃	〃	73′	6′ 11″	M	
〃	〃	74′	11′ 8″	F		28th	〃	69′	13′ 4″	F	
12th	〃	71′	12′ 11″	F		〃	〃	73′	5′ 9″	F	
13th	〃	69′	8′ 6″	F		1st	Mar.	72′	8′ 9″	F	
〃	〃	77′	11′ 0″	M		〃	〃	72′	11′ 11″	F	
〃	〃	70′	6′ 8″	F		〃	〃	72′	8′ 2″	F	
〃	〃	68′	10′ 11″	F		4th	〃	74′	13′ 2″	F	
〃	〃	72′	7′ 8″	F		〃	〃	77′	8′ 1″	M	
〃	〃	73′	9′ 9″	M		〃	〃	76′	10′ 1″	F	271.0
14th	〃	69′	9′ 10″	F		〃	〃	71′	5′ 2″	M	35.0
〃	〃	75′	8′ 9″	M		〃	〃	73′	10′ 9″	F	
〃	〃	70′	7′ 4″	F	105.0	〃	〃	72′	12′ 4″	F	419.0
〃	〃	71′	9′ 6″	M		〃	〃	71′	11′ 2″	F	
15th	〃	67′	5′ 5″	F		〃	〃	72′	12′ 3″	F	
〃	〃	73′	8′ 10″	M	165.0	5th	〃	73′	11′ 3″	F	
〃	〃	71′	7′ 5″	F	110.5	〃	〃	73′	9′ 3″	M	
〃	〃	69′	8′ 0″	M	128.0	〃	〃	74′	11′ 10″	M	
〃	〃	75′	18′ 0″	M		〃	〃	76′	4′ 5″	F	
〃	〃	72′	8′ 2″	F	135.0	11th	〃	69′	10′ 8″	M	
21st	〃	71′	9′ 10″	M	198.0	〃	〃	75′	10′ 11″	F	
22nd	〃	69′	10′ 3″	F					11′ 10″	F	
〃	〃	70′	9′ 2″	F		〃	〃	80′	13′ 1″	F	
23rd	〃	71′	9′ 0″	F		〃	〃	71′	10′ 3″	M	
23rd	Feb.	75′	12′ 2″	M		12th	〃	68′	13′ 1″	M	
〃	〃	71′	8′ 9″	M		〃	〃	70′	10′ 11″	F	
〃	〃	66′	7′ 3″	F		〃	〃	70′	3′ 11″	F	
〃	〃	72′	9′ 0″	M	202.0	13th	〃	69′	11′ 9″	M	
24th	〃	70′	9′ 2″	F		〃	〃	68′	12′ 5″	F	
〃	〃	71′	8′ 4″	M		〃	〃	66′	10′ 5″	F	
〃	〃	71′	11′ 9″	M		〃	〃	75′	10′ 3″	F	
25th	〃	73′	8′ 3″	M		〃	〃	69′	6′ 8″	M	
〃	〃	73′	12′ 3′	F		〃	〃	70′	11′ 8″	M	
〃	〃	69′	7′ 7″	F		15th	〃	71′	12′ 6″	M	
26th	〃	75,	10′ 1″	M					12′ 0″	F	

in a fin whale 75 feet in lengh caught by the Hashidate-maru fleet on Feb. 14.



With the amnion adhered closely to its body and indistinguishable eyes, sexuaorgans and anus, the flippers and tail flukes were scarcely developed and only its mouth could be distinguished. And its whole body had changed to the callcareous matter like the cyst of nematoda. As this foetus was at a glance, very weird, to our pity, the deck workers threw it into the sea while our of us was just in a room for another business.

Though we think the functional corpora lutea was dead and developed no longer as mentioned above, (probably it is the preceeding year's foetus), it was 150×120×65mm without a vacuoles inside it, and to the naked eye, there was no

difference between it and other corpora luteas with a normal foetus.

The Nisshin-maru caught a fiin whale 72 feet long, bearing a male foetus 5′ 11″ long, with the malformed head and tail.

Last, date when all foetuses were caught, the body length of mother whales, the body length, sex and weight of foetus were ennumerated.

The study in relation to mature whales will be stated elsewhere.

Table 8

	H—160 M. 5′—10″ weight Malformed foetus 85.0 kg.	H—678 Twin M. 12′—6″ weight 380.0 kg.	F. 12′—0″ 375.0 kg.
	m.	m.	m.
1	1.76	3.80	3.67
2			
3	.30	.55	.57
4	.44		
5	.30	.68	.70
6	.87	1.64	1.62
7	.15.5	.22	.22
8	.50	1.03	1.15
9	.16.5	.25	.25
10	.17	1.22	1.15
11	.77	1.85	1.80
12	.71	1.75	1.70
13	.12	.37	.09
14	.04	.12	.13
15	.08.5	.24	.19
16	.20.5	.41	.40
17	.25.5	.55	.53
18	.27	.57	.54
19	.11.5	.14	.12
20	.40	.80	.89
21			
22			
23			
24	.29	.35	.35
25	.41 and 40	.45 and 45	.52 and 50
26			

EXTERNAL CHARACTERISTICS

I. Body colour.

As in other years, pale spot distribution and degree of its distinctness, white flecks distribution and degree of distinctness of striation on the ventral surface of tail flukes were examined on blue whales. On fin whales, (1) the colour of dorsal surface, (2) its degree of spreading to the ventral groove, (3) whether the body colour spread to the anus, like the tongue, behind it or not, and (4) just at the front of the tail fluke, whether right and left body colour band joined or not, were observed.

The above percentage by sex is shown as follows:

Table 9

	Male		Female	
	Total	%	Tolal	%
a. BLUE WHALE				
Pale spot: distribution				
0	2	0.5	0	0
1	9	2.3	6	2.5
2	76	19.4	48	20.0
3	161	41.2	107	44.2
4	131	33.9	76	31.6
5	12	3.1	4	1.7
Pale spot: degree of distinctness				
0	2	0.6	0	0
I	58	14.8	31	12.9
II	284	72.6	173	72.1
III	47	12.0	36	15.0
White flecks				
0	1	0.3	2	0.8
1	42	10.7	15	6.3
2	98	25.1	67	27.9
3	167	42.7	95	39.6
4	82	20.9	61	25.4
anomaly	1	0.3	—	—
Striation				
0	14	3.6	6	2.5
I	147	37.6	66	27.5
II	171	43.7	121	50.4
III	59	15.1	47	19.6
b. FIN WHALE				
(1) Colour				
N	374	76.6	419	20.0
B	114	23.4	105	80.0
(2) Extention of pigmentation on ventral grooves				
U	127	26.0	159	30.4
N	201	41.2	223	42.6
L	160	32.8	141	27.0
(3) Tongue of pigmentation behind anus				
+	400	82.0	405	77.4
−	88	18.0	118	22.6
(4) Meeting of pigmentation infront of tailflukes				
+	320	65.6	308	58.9
−	168	34.3	216	41.4

On abnormal colour

(1) The special white flecks on blue whales is that of the blue whale No. 148, 78 feet long, caught by the Hashidate-maru on Jan. 13. With no pale spot and no normal white flecks, its neighbourhood was pure white (Cf. Fig. 26).

(2) The abnormal fin whale on item No. 3 was caught by the Nisshin-maru. It was female, No. 796 with two processes towards anus. The rostral process was large and long and the right and left processes met on the median line, where

the lengthwise slender black part could be found at the nearer part to the caudal than the anus.

II. External propotions (length)

In both fleets, 1 male and 1 female blue whales, 7 male and 9 female fin whales were measured on length of each part of body. And foetus were measured as many as possible (scores of foetuses).

We would like to study on this question only, separately from this report. It is conceptionally as an established theory that the anterior of the body occupies larger perecentage and the posterior part smaller percentage with an increase of body length (age). But here is only shown the data.

Table 10

MEASUREMENT OF EXTERNAL PROPORTIONS

Whale serial number	Measurement of external proportions in meter										
	1	3	5	6	7	8	9	10	11	12	13
Fin whale male											
H—39	18.06	omitted	3.85	7.50	0.90	4.10	omitted	5.00	8.05	7.07	1.44
H—25	19.20	3.50	3.70	7.75	0.80	4.50	0.93	5.55	8.75	8.65	1.39
H-158	19.50	3.30	3.78	7.90	0.85	4.60	0.90	5.35	9.25	8.60	1.55
N-927	19.68	3.66	4.04	8.31	0.97	4.22	omicted	5.41	8.76	7.80	1.24
H-219	20.42	3.80	4.05	8.40	0.85	4.86	1.00	5.95	9.25	8.90	1.40
H-127	20.53	4.05	4.25	8.65	0.85	4.70	0.98	5.70	8.75	8.70	1.45
Fin whale female											
N—85	18.54		3.68	7.52	0.94	4.39	omitted	5.26	8.13	0.58	1.02
H—15	20.62	3.95	4.25	8.60	0.74	4.52	1.03	5.55	8.96	9.00	0.65
N-795	21.41	4.34	4.47	8.94	0.99	4.65	omitted	5.74	9.14	omitted	0.66
H 264	21.45	3.80	4.48	8.60	0.92	5.25	0.99	5.90	10.00	9.25	0.60
H-540	21.50	3.95	4.40	8.90	0.95	5.10	omitted	6.1.	9.70	9.40	0.70
N—86	21.51	4.27	4.72	9.24	1.07	5.84	omitted	6.02	9.96	9.01	0.63
H—68	22.25	4.45	4.80	9.45	0.95	5.15	1.12	6.15	9.85	9.65	0.65
H—21	22.30	4.20	4.80	9.20	0.98	5.28	1.08	6.10	9.85	9.40	0.63
H-105	22.65	4.90	5.10	9.90	0.98	5.15	1.10	5.90	9.25	9.60	0.60
N-783	23.04	4.70	4.95	9.91	1.09	5.18	omitted	6.40	10.16	omitted	0.71
Blue whale male											
N—79	24.71	4.72	5.33	omitted	1.30	5.38	omitted	6.73	10.46	9.78	1.50
Blue whale female											
N-831	24.87	4.67	5.13	10.01	1.27	5.61	omitted	6.98	10.90	omitted	0.61

Whale serial number	Measurement of external proportions in meter										
	14	15	16	17	18	19	20	21	23	24	25
Fin whale male											
H—39	0.35	0.58	1.60	2.10	2.20	0.50	omitted	omitted	omitted	1.75	omitted
H—25	0.45	0.85	1.80	2.25	2.40	0.53	omitted	2.10	2.42	omitted	omitted
H-158	0.43	1.16	1.75	2.52	2.55	0.48	4.80	omitted	omitted	1.58	2.14
N-927	0.38	1.32	1.96	omitted	2.46	0.56	2.21	2.21	omitted	omitted	omitted
H-219	0.50	1.10	1.82	2.51	2.64	0.54	omitted	2.34	2.63	1.80	2.00
H-127	0.40	1.55	1.75	2.55	2.60	0.58	omitted	2.05	2.63	1.75	omitted

Fin whale female											
N—85	0.46	1.02	2.26	omitted	2.31	0.51	omitted	1.83	omitted	omitted	2.16
H—15	0.44	1.20	2.13	2.75	2.85	0.59	5.25	2.35	2.55	1.95	omitted
N-795	0.48	0.79	2.46	omitted	2.06	0.63	omitted	2.84	omitted	omitted	omitted
H-264	0.75	0.92	1.90	2.70	2.80	0.54	5.55	omitted	omitted	omitted	2.06
H-540	0.40	1.35	1.90	2.40	2.55	0.58	5.20	2.08	2.69	1.90	omitted
N—86	0.41	1.24	2.36	omitted	2.51	0.53	omitted	2.54	omitted	omitted	omitted
H—68	0.40	1.15	2.20	2.75	2.85	0.65	5.60	2.70	2.90	1.75	omitted
H—21	0.45	1.15	2.20	2.52	2.60	0.59	omitted	2.20	2.70	2.06	2.35
H-105	0.55	0.85	2.86	2.78	2.96	0.68	omitted	2.54	1.96	2.13	omitted
N-783	0.48	1.19	2.89	omitted	2.34	1.07	omitted	2.21	omitted	omitted	omitted
Blue whale male											
N—79	0.23	1.12	3.35	omitted	3.55	0.76	omitted	2.84	omitted	0.71	omitted
Blue whale female											
N-831	0.20	0.63	2.97	omitted	3.07	0.89	omitted	2.87	omitted	omitted	omitted

III. External proportion (weight)

The gross weight of foetus (for each whale) has been stated in the paragraph

Table 11

WEIGHT OF DIFFERENT PARTS

Whale serial number	Body length in feet and fathesbys naked by	Weight of different parts						Actual weight of parts
		Blubber	Ventral grooves	Meat	Bones	Internal organs	Othe.s	
Fin whale male								
H—25	62-lean	5.843	3.830	19.600	7.002	3.532	0.579	40.386
N-927	65-normal	8.895	1.505	17.355	8.027	3.817	8.756	48.355
H-127	67-lean	6.510	3.950	21.559	8.401	4.540	0.649	45.609
H-219	67-normal	7.400	4.975	22.840	7.686	5.899	0.564	49.361
Fin whale female								
N—85	61-normal	6.790	2.200	16.529	5.910	2.285	3.657	37.371
H—15	68-normal	8.713	4.624	22.064	8.012	5.120	0.853	49.386
N-795	70-normal	9.754	3.698	23.266	9.800	5.169	8.644	60.331
H-540	71-lean	7.898	5.215	25.180	8.669	5.350	0.776	53.088
N—86	71-normal	8.173	4.484	20.792	9.514	4.036	6.460	53.459
H—21	73-lean	9.152	6.710	24.237	10.012	6.173	0.850	57.134
H—68	73-normal	7.790	5.545	28.305	10.675	5.364	0.850	58.529
H-105	74 normal	11.639	6.610	25.814	8.911	5.320	0.928	59.222
N-783	79-normal	10.292	4.069	21.446	9.132	4.268	8.281	57.488
Blue whale male								
N—79	81-lean	15.197	4.188	21.414	16.691	6.321	10.309	76.912
Blue whale female								
N-831	82-normal	20.276	6.210	29.240	16.188	9.404	15.433	99.666

of foetus. On the weight of mature, 1 male and 1 female blue whales and 4 male and 8 female fin whales were weighed.

As this intends to be published in the separate paper like the length of body proportions, here is only shown the following principal data.

PARASITES

I. External parasites.

Table 12

PARASITES

External parasites

	Male		Female	
	No. of infected whales	% for total	No. of infected whales	% for total
BLUE WHALE				
Cyamus	14	3.5	4	1.7
Coronula sp.	1	0.2	2	0.8
Conchoderma sp.	0	0	0	0
Pennella sp.	1	0.2	1	0.4
Diatom film	51	13.0	26	10.8
FIN WHALE				
Cyamus	37	7.6	9	1.7
Coronula sp.	10	0.2	4	0.8
Conchoderma sp.	1	0.0	0	0
Pennella sp.	1	0.0	2	0.4
Diatom film	147	30.1	134	25.5

As each whale was investigated on the infection rate of whale lice, diatom film, Coronula, Conchoderma and Pennella, it was shown above.

II. White scars.

On each individual, the number of white scars and ratio between new and old scar were observed. It is thought that the number increases with the age of whales so the increased number by body length is shown. P is it. And it is thought that the older it is, the more increases the percentage of C, namely, those with more white scars for years prior to last year than for this year. So the percentage of C is put in the following table with the number of A,B and C.

Table 13

	MALE						FEMALE					
	a	b	c	Total	P	% of c	a	b	c	Total	P	% of c
Blue whale												
70	2	0	1	3	1.3	33	0	0	2	2	2.5	—
71	0	3	1	4	2.0	—	0	1	1	2	2.5	—
72	1	5	3	9	2.0	33	0	1	1	2	2.0	—
73	2	4	8	14	2.1	57	0	1	3	4	2.0	—
74	3	4	15	22	2.3	68	3	1	2	6	1.5	33
75	2	3	16	21	2.9	76	1	4	4	9	2.2	44
76	1	3	29	33	2.7	88	2	4	4	10	2.3	40
77	2	7	42	51	2.9	82	1	3	5	9	2.0	56
78	4	8	42	54	3.1	78	3	5	10	18	2.6	56
79	5	6	50	61	3.2	82	1	5	16	22	2.5	73

80	3	1	30	34	3.1	88	2	4	16	22	3.0	73
81	31	1	23	27	4.1	85	3	3	17	23	3.1	74
82	5	4	22	31	3.3	71	1	3	15	19	2.9	79
83	0	0	11	11	3.4	100	0	2	21	23	3.2	91
84	2	1	8	11	3.2	77	0	1	10	11	3.4	91
85	0	0	2	2	3.5	100	2	0	13	15	3.0	87
86	0	1	0	1	4.0	—	0	3	16	19	3.5	84
87	0	0	1	1	4.0	—	1	1	11	13	3.1	85
88								0	3	4	3.0	—
89												
90							0	0	3	3	3.7	—
91							0	0	2	2	4.0	—
Fin whale												
58	0	2	0	2	1.0	—						
59	1	2	2	5	1.8	40	0	0	2	2	2.0	—
60	2	1	1	4	2.0	—	0	1	0	1	2.0	—
61	2	5	5	12	1.8	42	0	3	1	4	1.5	—
62	2	3	15	20	2.3	75	1	5	2	8	1.3	25
63	1	8	15	24	2.3	63	3	7	3	13	2.0	23
64	3	17	28	48	2.5	58	1	7	4	12	1.6	33
65	8	14	47	69	2.6	68	3	5	6	14	1.9	43
66	4	19	62	85	2.7	73	2	8	13	23	2.4	57
67	5	11	42	58	2.9	72	4	9	9	22	2.1	41
68	2	9	43	54	2.9	80	1	20	25	46	2.2	54
69	1	11	47	59	2.8	80	4	9	37	50	2.4	74
70	1	3	27	31	3.5	87	2	14	50	66	2.8	76
71	0	0	10	11	3.2	91	2	7	58	67	2.8	87
72	0	0	6	6	3.3	100	3	7	54	64	3.1	84
73							4	5	40	49	3.1	82
74							2	1	29	32	3.4	91
75							0	3	17	20	3.2	85
76							2	0	19	21	3.3	91
77							0	1	4	5	3.0	80
78							1	0	0	1	5.0	—
79							0	0	2	2	3.5	—

THICKNESS OF BLUBBER

This year, thickness of blubber was measured at two points. Namely, the point No. 1 was on a vertical line from the dorsal fin where it intersected the horizontal cut side of the body and the point No. 2 was on the vertical cut near the earhole, where it intersected the middorsal line.

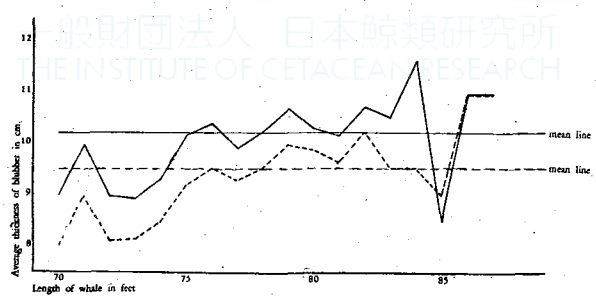


Fig. 21a. Variations of thickness of blubber in different length of whales. (Male Blue whale)

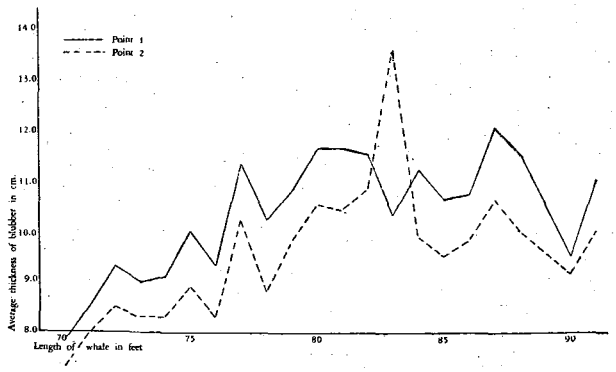


Fig. 21b. Variations of thickness of blubber in length of whales.
(Female Blue whale)

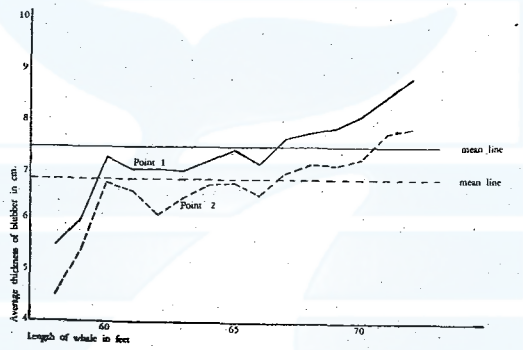


Fig. 21c. Variations of thickness of blubber in length of whales.
(Male Fin whale)

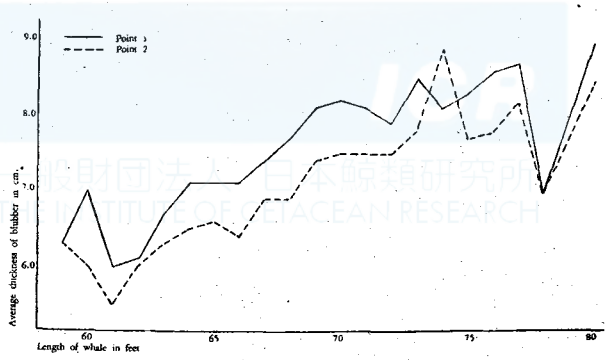


Fig. 21d. Variations of thickness of blubber in length of whales.
(Female Fin whale)

Fig. 21a to Fig. 21d show the mean thickness of blubber by body length and sex. With an increase of body length the blubber becomes thicker.

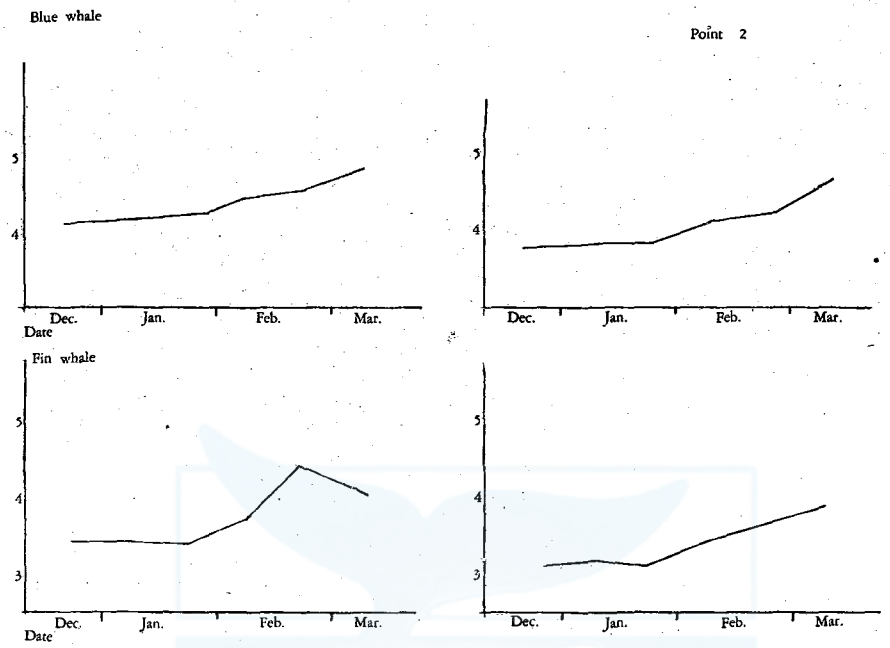


Fig. 22a. Thickness of Blubber. (Male whale)

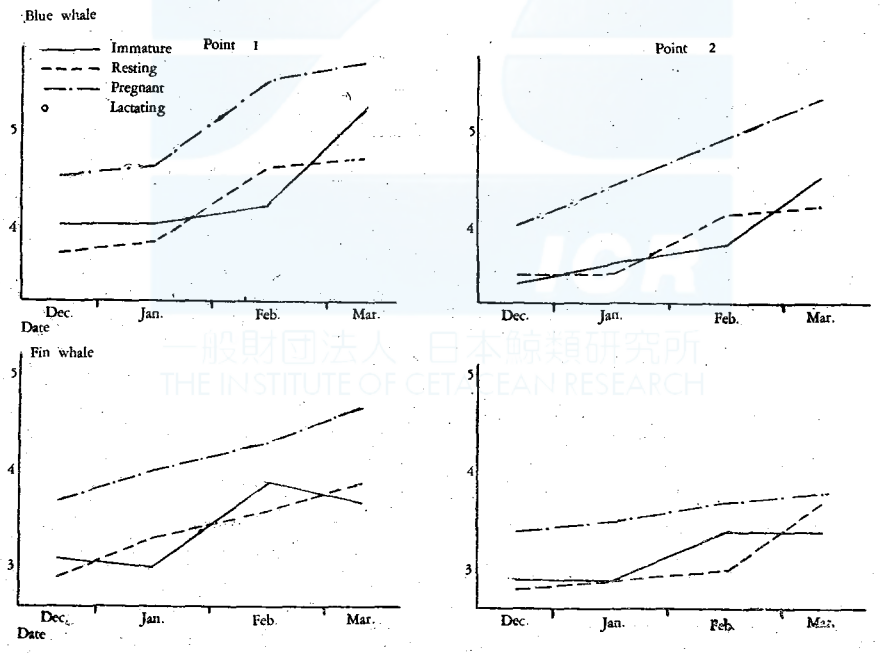


Fig. 22b. Thicknsss of Blubber. (Female whale)

Table 14

week	Blue whale male			Blue whale female			Fin whale male			Fin whale female		
	No. of whales	Point 1.	Point 2.	No. of whales	Point 1.	Point 2.	No. of whales	Point 1.	Point 2.	No. of whales	Point 1.	Point 2.
		cm.	cm.		cm.	cm.		cm.	cm.		cm.	cm.
1st	33	10.5	9.6	36	10.3	9.2	17	7.0	6.5	12	7.4	6.8
2nd	16	9.2	8.8	14	10.1	9.0	11	6.6	5.5	10	7.4	6.8
3rd	22	9.0	8.0	8	10.2	8.1	21	6.6	6.0	32	6.9	6.3
4th	22	9.4	8.8	20	9.2	9.1	26	6.4	6.2	13	7.0	6.5
5th	69	9.6	8.8	28	10.3	9.5	30	6.8	6.2	28	7.6	7.0
6th	27	9.2	8.3	25	10.4	10.0	17	6.5	5.9	32	7.8	6.8
7th	37	9.4	8.8	19	10.8	9.5	49	7.0	6.3	35	8.0	7.0
8th	4	9.8	8.5	12	11.0	10.5	85	7.2	6.7	92	7.5	7.1
9th	49	10.4	9.6	23	12.4	10.5	58	7.5	6.8	87	7.9	7.0
10th	47	10.4	9.6	13	11.4	10.6	29	8.0	6.9	27	8.6	7.7
11th	24	11.1	10.6	13	11.1	10.6	62	8.3	7.3	63	8.4	7.8
12th	17	11.0	10.4	6	12.5	11.6	42	8.1	7.6	40	8.6	8.1
13th	22	12.2	11.8	13	12.0	10.8	41	7.9	7.5	53	8.8	8.1
14th	11	11.4	10.8	10	12.5	11.5						
15th	1	11.0	11.0									

No of whales: Number of whales examined.

1st week.....15th Dec.~21sth Dec.

2nd week .....22nd Dec.~28th Dec. etc.

There are large variations in one or two examples, so called "minor example", where lean of fat examples make the curve disturb. But it was without modification, as it was.

Then, the monthly variation was studied. The figures for each month were the average percentage of the blubber thickness for the body length of the whales caught in each month.

It is whatever species or sex may be that from December to March, the blubber gradually increases its thickness, There are some fin whales which show decrease in March but it is due to more numerous, immature whales than in other months. As you can understand in other tables, immature whale shows low percentage.

Though same with it, instead of percentage for body length, averaged thickness of blubber in each week, regardless of body length is in the following table. They were classified into each species and sex.

These, too, proves the thickness of blubber increases week by week.

1st week 15th Dec. to 21st Dec.

2nd week 22nd Dec. to 28th Dec. etc.

FOOD

This time, too, krill was a staple food. The usual investigation on it was as shown in Table 15 (blue whales) and Table 16 (fin whales).

Owing to the new whaling ground east of 180°, the relation between the present catch and krill seems to be so interesting that it will be stated on the paragraph of whales by whaling region. So it is omitted here. Generally speaking more belong to the small sized one or so called "S" and we have had specialists examine on the sample whether all of them were *Euphausis superba* or another species.

The principal creatures mixed in the present krill are as follows.

2 whales (fin whales only) had fed squids.

9 whales had fed the skipper-like fish (two for blue whales and 7 for fin (whales)

1 whale had fed the luminous fish (1 blue whale)

None which had fed large sized Teleosteis or jelly fish as seen last year, could, be found.

Feeding time of whales

One of the feedings when we were looking at flensing was that the stomachs

Table 15 Stomach contents (Blue whale)

Name of fleet	Half-months	No. of stomach examined	No. of stomach with krill	No. of stomach empty	% of stomach with krill	No. with much krill (R.)	No. with moderate krill (rr)	No. with little krill (r)	No. with very little krill (r)	Type of krill					
										L	M	S	X	?	
Hashidate-maru fleet	December	44	31	13	70	8	5	11	7	15	15	1	0	0	
	January	50	17	33	34	3	0	4	10	3	9	4	1	0	
		48	11	37	23	0	4	3	4	3	1	6	1	0	
	February	30	17	13	57	3	8	4	2	3	11	5	0	0	
		45	16	29	36	3	4	6	3	1	4	11	0	0	
	March	52	30	22	58	4	11	7	8	0	9	21	0	0	
		22	13	9	59	0	3	6	4	0	10	3	0	0	
	Total	291	135	156	46	21	35	41	38	23	59	51	2	0	
Nisshin-maru fleet	December	81	59	22	73	10	14	20	15	6	26	27	0	0	
	January	39	24	15	62	2	9	7	6	0	7	17	0	0	damage stom ach × 1
		98	43	55	44	3	9	12	19	0	1	42	0	0	
	February	63	39	24	62	4	18	11	6	0	4	35	0	0	
		40	25	15	63	5	4	3	13	0	15	10	0	0	
	March	18	8	10	44	2	1	3	2	0	7	1	0	0	
		0	0	0	0	0	0	0	0	0	0	0	0	0	
	Total	339	198	141	58	26	55	56	61	6	60	132	0	0	

Table 16 Stomach contents (Fin whale)

Name of fleet	Half-mouths	No. of stomach examined	No. of stomach with krill	No. of stomach empty	% of stomach with krill	No. with much krill (R)	No. with morderate kill (rrr)	No. with little krill (rr)	No. with very little krill (r)	Type of krill				
										L	M	S	X	?
Hashidate-mare fleet	December	27	19	8	70	0	3	5	11	2	16	1	0	0
	January	51	22	29	43	2	2	5	13	5	1	15	1	0
		40	12	28	30	0	0	6	6	0	4	8	0	0
	February	153	84	69	55	14	28	19	23	25	47	12	0	0
		72	43	29	60	10	12	14	7	1	3	39	0	0
	March	82	44	38	55	4	13	15	13	0	23	21	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	425	224	201	53	30	58	63	73	33	94	96	1	0
Nisshin-maru fleet	December	33	23	10	70	3	4	5	11	3	9	11	0	0
	January	67	41	26	63	3	8	16	14	0	15	26	0	0
		94	48	46	51	2	8	18	20	0	0	48	0	0
	Eebruary	190	104	86	55	21	20	39	24	0	3	101	0	0
		100	50	50	50	7	10	17	16	0	4	46	0	0
	March	101	61	40	60	19	17	16	9	0	38	23	0	0
	Total	585	327	258	56	55	67	111	93	3	69	254	0	0

damage stomach × 2.

of the whales flensesed in the night were often vacant.

As most of the whales which were flensed in the night were those which were caught in the afternoon the day before. So we considered if the whales often took their food in the morning and showed the existence of the content in their stomach by time when they were caught (every one hour)——namely the percentage of the number of examples with krill in their first stomach for all examples at that time (Fig. 23).

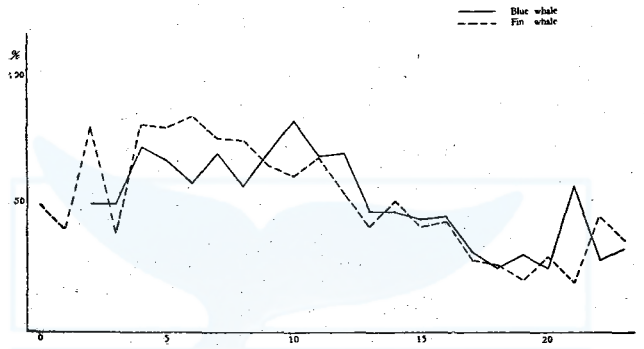


Fig. 23.

As result, with a clear peak it is thought more whales take their food in the morning. If they took their food two or three times a day, the curve should have two or three peaks. It is consequently, thought that they take their food once a day.

Kinds of things should be, however, taken into consideration for it.

(1) Though it is safely considered that F and fff mean scarce difference between feeding time and time when the whales were caught, ff and f may show the earlier time than latter time.

As time-relation is unknown from F to ff and that it can apply to all times, ff and f also were treated as feeding at that time. And as to f and r, the possibility of refluence from the second stomach is thought in case of whale's death.

(2) Essentially, this study should be made on the time when the whales have been discovered. For there is a short or long hour of chasing before the time when the whales have been caught and they have probably no spare time to feed in chasing. This, too, can apply to every time and the chasing hours had to be inquired catcher boats separately. So it was not taken into consideration.

(3) Even though the time and month is same, it differs meteorologically between December and February and between Long. 60°S and Long. 70°S. Therefore, is

it good to treat in the same way? We think it too should be corrected but we left it neglected.

(4) It may show the different condition of krill floating in the water rather than the whale's habit to feed in the morning.

BALEEN

Among all the whales which both fleets caught and processed, we brought the right and left one of the longest baleen (nearly at the middle part of the series).

Kinds of studies concerning it are under preparation at present to publish in the separate reports.

Here is shown the length of the external edge of the longest right and left baleen, measured on board of the Hashidate-maru in processing. The number of

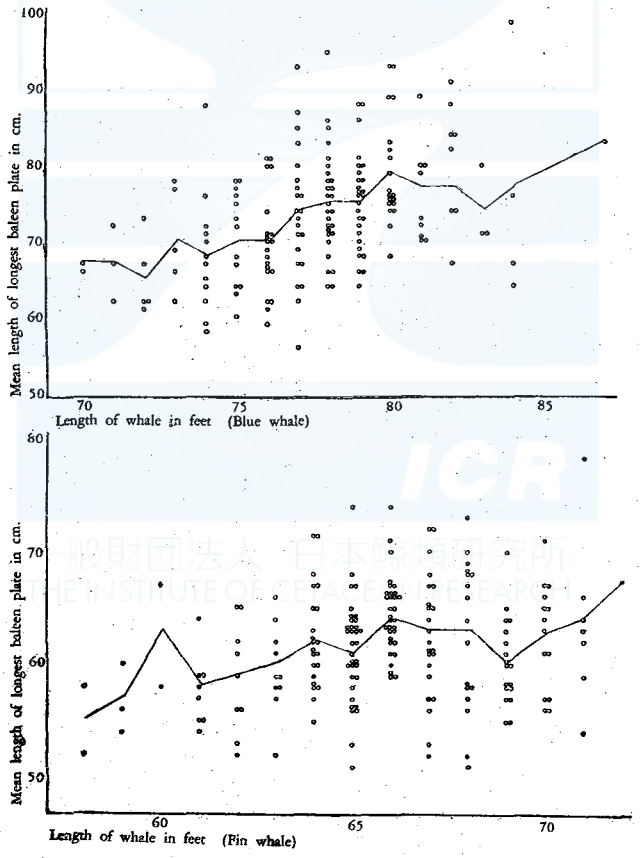


Fig. 24a. Body length and longest baleen plate. (Male whale)

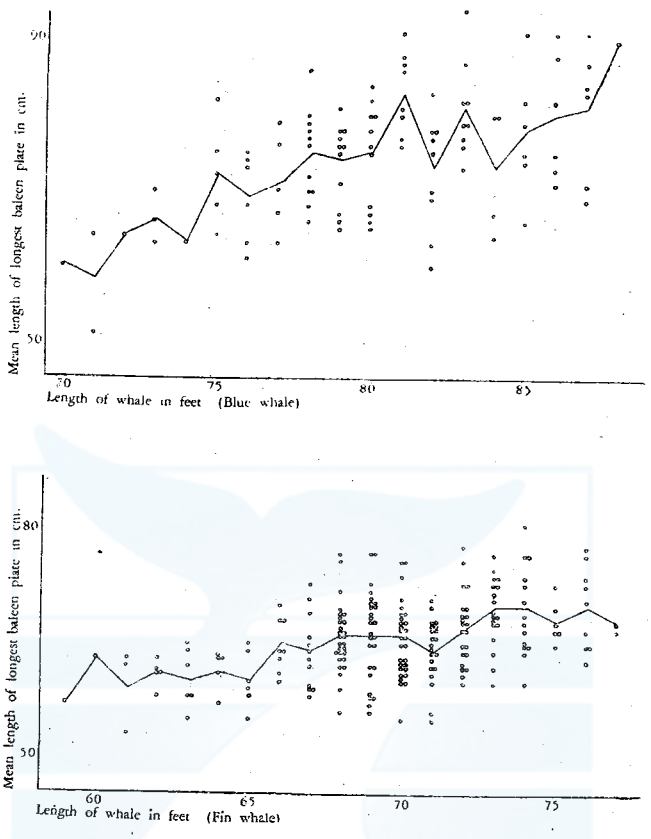


Fig. 24b. Body length and longest baleen plate. (Female)

baleen plate depends not only on species but also on individuals. We could find even in difference of a few plates by right and left baleens. However we could draw the conclusion that the increase of number of plates can hardly be thought in proportion to age.

And yet, it is probably truth that the length increases with age though the length shows a large variation.

The following graphs show the relation between the length of baleen and the body length on the whales processed on board of the above "Hashidate-maru" (Figs 24 and 25)

They show well the above fact but as data concerning age they are inferior to other data (number of corpora lutea and weight of testis), we think.

SUMMARY

The summary of various factors from catch by the Japanese whaling fleets for the

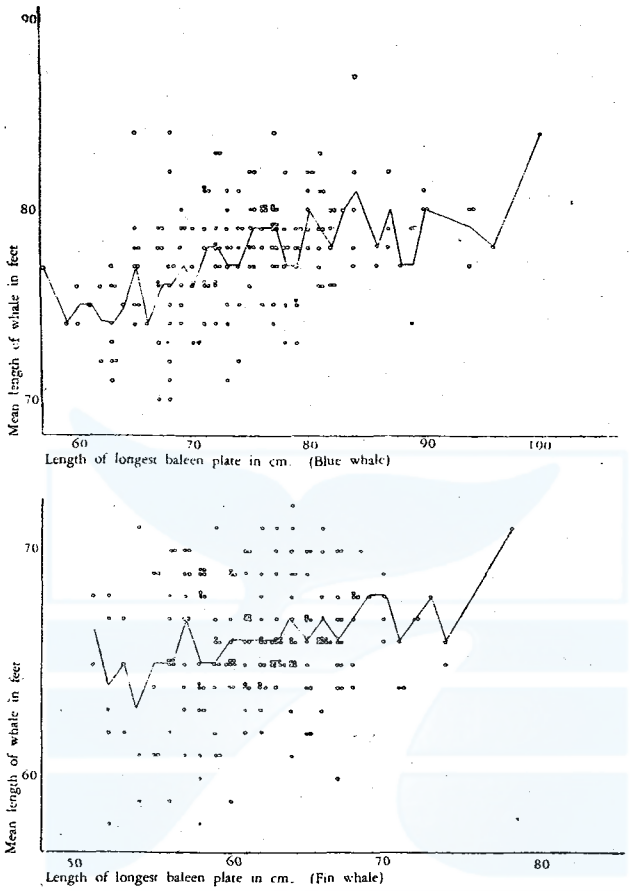


Fig. 25a. Mean length of whales in length of baleen plate.

1948/49 season is as follows.

	Average Body Length		
	male	female	total
Blue whale	78.12 ft.	81.04 ft.	79.21 ft.
Fin whale	66.24	70.22	68.25

The average body length of the whales caught in this whaling expedition is as seen above and the Japanese whaling fleets operated with more care than last year, so that there was no violation concerning the body length.

The body length showed generally a decrease, as compared with that of last year (only blue male whales increased 0.24 feet). This may give us a general trend that it is decreasing year after year.

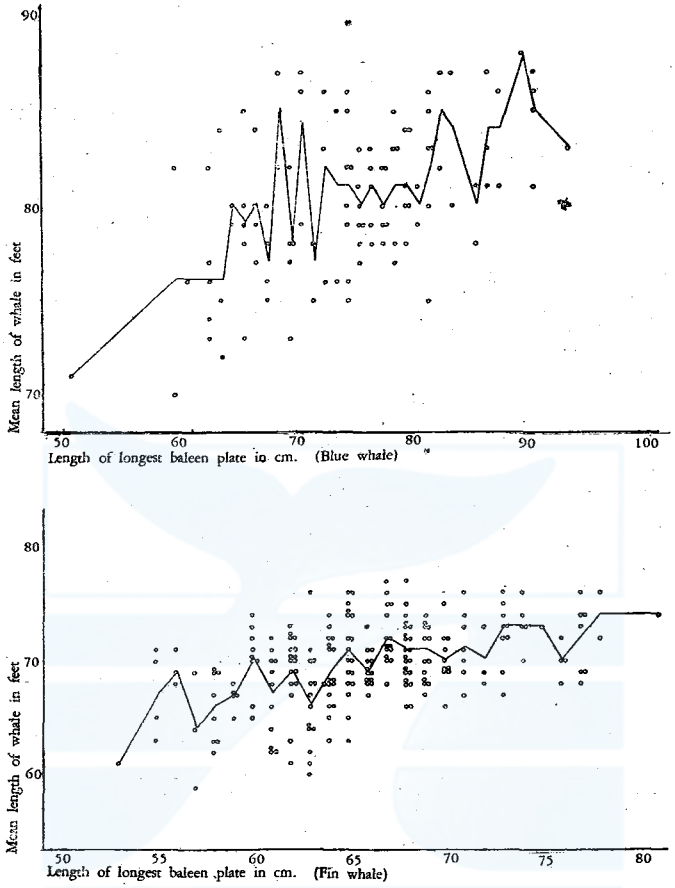


Fig. 25b. Mean length of whales in length of baleen plate.

The mature body length by species and sex is as follows.

Sexually mature body length:

	male	female
blue whale	75 feet	78 feet
fin whale	62 feet	67 feet

Physically mature body length:

	male	female
blue whale	79 feet	89 feet
fin whale	69 feet	75 feet

These almost agree with data last year and in Discovery Reports.

Percentage of pregnanct whales is as follows.

blue whale	42.6 %	for total mature famales
fin whale	36.3 %	

On blue whales, it is hopeful for their resources that there is little monthly variation in spite of lower percentage than last year.

It is very difficult to judge the sex with body colour and it is inaccurate also to judge age with body colour, we think. But it is thought that the distinctness of white flecks on blue whales means something concerning age. (Of course its accuracy is questionable)

We drew the data concerning age from white scars, but we wonder whether it is right or not. It is finally same as last year. To our great pity, baleen, external proportion, and relation between crystalline lens in the eyeballs and age will appear elsewhere..

THE END

LITERATURES

N.A. Mackintosh, A.R, C.S.M. Sc., and J.F.G. Wheeler, M.Sc.:
Southern Blue and Fin whales
Discovery Reports Vol. I

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Japan Whaling Fisheries Association:
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Whale composition caught in the Antarctic
Bulletin of the Japanese Society of Scientific
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Vol. 9 No. 2

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APPENDIX I

A study on krill and whale composition by whaling region

In the present expedition, the schedule was that: both fleets were to make the first operation from Long. 150°E. to Long. 160°E. where the good catch had been shown in the earlier stage last year and after the opening of the entrance to the Ross Sea, they were two go southward and to chase whales with a good oil yield in the Ross Sea. Cut they arrived at the whaling ground and began their operation to find that though the whales from Long. 150°E. to 160°E. were big, their group was thin and not good. So they operated moving eastward, at the same time for the purpose of scouting the entrance to the Ross Sea.

Though operation began on Dec. 15, a week later than last year, catch during December ended in medium and that the future of scouting whales was not so much hopeful. In January, both fleets could not find the entrance to the Ross Sea at all, notwithstanding their extraordinary efforts for scouting it. The whales caught were young, small and few in number. During January, both factory ships were chasing fairly large groups of fin whales eastward beyond Long. 180°E.

Contrary to the expection, though it would not last long, in this area they were blessed with so rich catch of fin whales in reality that they could complete the scheduled amount of production, leaving the entrance to the Ross Sea unknown at last. (It is wondered, if it did not open up this year.)

The whaling season being over, (of course during the season too) we considered to find that there had been no operation in the area of west longitude beyond Long. 180°E. for the past including the pre-war years. We found that there were far smaller sized krills and more difference on the whale groups than the operation regions for the past. This is the reason why we tried this study.

First of all, we divided the operating grounds by both fleets into the following four regions.

The 1st region: the area surrounded by the four points:

144° 0′ E	63°30′ S
165° 0′ E	65° 0′ S
144° 0′ E	65° 0′ S
165° 0′ E	65° 0′ S

The 2nd region: the area surrounded by the four points

165° 0′ E	65° 0′ S
179° 0′ E	68° 0′ S
179° 0′ E	68° 0′ S

The 3rd region: the area surrounded by five points.

Scott Island	
169°30′ W	Latitude of Scott Island
178°30′ E	69° 0′ S
169° 0′ W	71° 0′ S
169°30′ W	71° 0′ S

The 4th region; the area surrounded by the four points.

165° 0′ E	61° 0′ S
171°30′ E	69°20′ S
178°30′ E	69° 0′ S

Their seasonal information is as follows.

	the Hashidate-maru	the Nisshin-maru
1st region	15 Dec. — 1 Jan.	15 Dec. — 29 Dec.
2nd region	2 Jan. — 12 Jan. and 15 Jan.	30 Dec. — 14 Jan.
3rd region	29 Jan. — 12 Feb.	11 Mar. — 15 Mar.
4th region	13 Jan. — 27 Jan. (except 15 Jan.) and 13 Feb. — 26 Mar.	15 Jan. — 10 Mar.

We thought to unite the 2nd and 3rd regions but separated them partly because of the about mentioned whaling condition and partly because of seasonally some separation between them. We think the 2nd and 3rd regions depended on the different pack ice lines in the adjacent waters of Balleny Island.

Mainly we compared the 1st region with the 4th one, and with the 2nd and 3rd one for conference.

Tables AI and AII show the size and amount of krill by the whaling region and whale species.

The data were calculated by the fleet but they were collected and studied on the whales caught by the Japanese fleets. But we explained the interesting data separately.

1. The size of krill is put in the lower column of percentage. (It shows the percentage of L. M. S. and X for L+M+S+X, by region, excepting the empty stomach)

In the first region, blue whales showed 48.2% for M, 28.9% for S and 22.9% for L. Naturally dominant type of krill was M. However, if we separate it by fleets, the Hashidate-maru in the more western of the 1st region shows 48.4% for L, 48.4% for M and 3.2% for S, in the equal dominancy for L and M. On the contrary, the Nisshin-maru in the farther eastern region shows 10.5% for L, 84.2%

Table A I

Blue whale unknown=damage stomatch×1.....2nd. region

		R	rrr	rr	r	Total	% in total	% in L+M+S+X
L	1	7	2	7	3	19	17.0	22.9
	2	1		3	1	5	6.6	13.2
	3		1			1	3.8	7.1
	4	2	2			4	1.0	2.0
M	1	7	11	13	9	40	35.7	48.2
	2	2	2	6	6	16	21.1	42.1
	3	2		4	3	9	34.1	64.3
	4	10	24	9	11	54	0.31	27.3
S	1	4	6	6	8	24	21.4	28.9
	2	1	4	6	6	14	22.4	44.7
	3		3	1		4	15.4	28.6
	4	11	35	43	49	138	33.0	69.5
X	1							
	2							
	3							
	4			1	1	2	0.5	1.0
O	1					29	25.9	
	2					38	50.0	
	3					10	46.2	
	4					220	52.6	
Total	1	18	19	26	20	83	74.1	
	2	4	6	15	13	83	50.0	
	3	2	4	5	3	14	53.8	
	4	23	61	53	61	198	47.4	

for M and 5.3% for S.

Fin whales showed 65.8% for M, 23.7% for S and 10.5% for L. M was the dominant type.

In the 2nd region, blue whales showed 44.7% for S 42.1% for M and 13.2% for L and fin whales showed 61.7% for S, 26.7 % for M and 10.0% for L. The dominant type changed to S, though M was fairly large.

In the 3rd region, M was 64.3% for blue whales and 48.7% for fin whales, S: 28.6% and 21.9% and L: 7.1% and 29.5% respectively. However, separated them by fleet, though the Nisshin-maru moved from the sourth region westward to the 3rd region and it was the last stage of the whaling season, blue whales

Table A II

Fin whale unknown=damage stomach×2.....4th region

		R	rrr	rr	r	Total	%in total	% in L+M+S+X
L	1		2	1	1	4	7.3	10.5
	2	2		2	2	6	5.5	10.0
	3	5	7	4	7	23	14.1	29.5
	4	4	2		2	8	1.2	2.1
M	1	2	3	8	12	25	45.2	15.8
	2	2	5	6	3	16	14.5	26.7
	3	6	16	5	11	38	23.3	48.7
	4	20	29	24	10	83	12.1	22.1
S	1	1	1	1	6	9	16.4	23.7
	2	1	6	11	19	37	33.5	11.1
	3	1	2	9	5	17	10.4	21.9
	4	41	52	102	89	284	41.5	75.7
X	1							
	2			1		1	0.9	1.7
	3							
	4							
O	1					17	30.7	
	2					50	45.5	
	3					85	52.2	
	4					307	45.0	
Total	1	3	6	10	19	38	69.3	
	2	5	11	20	24	60	54.5	
	3	12	25	18	23	78	47.8	
	4	65	83	126	101	375	55.0	

showed 100.0% for M, namely all M and fin whales showed 82.6% for M and 17.4% for S. However, owing to the moving westward for 2 weeks out of the whaling season in the 4th region, its season was earlier and did not agree with that of the Nisshin-maru.

Blue whales showed 50.0% for S, 37.5% for M and 12.5% for L and fin whales showed 41.8% for L, 34.5% for M and 23.6% for S. Its dominant type was L.

In the 4th region, blue whales showed 69.7% for S, 27.3% for M, 2.0% for L and 1.0% for X and fin whales showed 75.7% for S, 22.1% for M and 2.1% for L. Even if they were separated by fleet, this tendendy was equal and in

natural the dominant type was S.

2. As to quality, the percentage of whales with stomach full of food for the total is as follows.

	blue whales	fin whales
1st region	74.1%	69.3%
2nd region	50.0%	54.5%
3rd region	53.8%	47.8%
4th region	47.4%	55.0%

The amount of food in stomach is as follows, supposing 4/4 for R, 3/4 for rrr, 2/4 for rr and 1/4 for r and the average for them multiplied by number of each whale and added and divided by total whales by region.

	blue whales	fin whales
1st region	2.4/4 (rr)	1.8/4 (rr)
2nd region	2.0/4 (rr)	2.0/4 (rr)
3rd region	2.4/4 (rr)	2.3/4 (rr)
4th region	2.2/4 (rr)	2.3/4 (rr)

On an average, they fed much to the extent of nearly a half of their stomach and if we compare this with the above mentioned percentage of whales with stomach full of food, it can be safely thought they are, the quantitative data by region. Thus, we can see there was more krill in the 1st region than in others and only as to the percentage of whales with food in their stomach, the 3rd region showed the larger percentage, though the 2nd too, fairly large. It was nearly as much in the 4th region as in the 3rd one, far less than in the 1st one, we think.

After the above synthetic studies, it can be safely said that the more westward it goes, the bigger the size of krill becomes and the larger its quantity is.

The absolute majority of krill in the 4th region was S mixed with so small sized one as we wondered if it was another species (under investigation now) and it lasted for a long time but its quantity was not so large.

In Balleny region, (the 2nd and 3rd regions) M was the dominant type and though the larger sized one than it was often found, its quantity was small.

In connection with the above, as the body length and maturity seemed to be different by region, examined roughly their constitutions. They are shown in Table AIII (blue whales) and A IV (fin whales)

On blue whales

Both male and female, the 1st region showed the longest and the 4th, 3rd and 2nd one came after. The order of their sexual maturity was 1, 4, 3 and 2 similarly. But the order of the weight of their testis was 3, 4, 1 and 2. And that

Table A III

Blue whale Male

	1	2	3	4
Body length (average)	78.9 feet (58)	77.5 feet (48)	77.9 feet (11)	78.1 feet (274)
Sexual immature	1	11	1	20
Sexual mature	57	37	10	254
% of mature	98.3	78.7	90.9	92.7
Weight of testicles (average)	32.4 kg	26.8 kg	39.1 kg	36.5 kg
Physical mature	25	27	4	88
Physical mature	33	21	7	186
% of mature	56.9	43.8	63.5	67.9
Physical maturity	na (4.0)	na (3.6)	aa (4.9)	aa (4.6)

Blue whale female

	feet	feet	feet	feet
Body length (average)	82.4 (54)	78.8 (29)	80.8 (13)	81.0 (144)
Sexual mature	2	5	5	25
Sexual mature { Resting	52 { 28	16 { 13	8 { 4	119 { 67
Sexual mature { Pregnant	{ 24	{ 3	{ 4	{ 52
% of mature	96.3	55.2	61.5	82.6
% of pregnant in total mature	46.5	18.8	50.0	43.7
Number of Corpora lutea	10.0	3.7	4.5	8.0
Physical immature	35	27	9	100
Physical mature	19	2	4	44
% of mature	35.2	6.9	30.8	30.6
Physical maturity	nn (3.0)	nn (1.9)	nn (2.5)	nn (2.8)

Sex ratio

Male	58	48	11	274.
Female	54	29	13	144
% of male (ratis)	51.8	62.3	45.8	65.6

of % of physical mature was 4, 3, 1 and 2 for male and 1, 3, 4 and 2 for female. That of average number of corpora lutea, too, was 1, 4, 3, and 2.

In the physical maturity, by vertebral column the number of NN, Nn, na, aa, aA and AA, multiplied by NN=1, Nn=2, nn=3, na=4, aa=5, aA=6, and AA=7 and added and then divided by total number of whales were put in the parenthisis and were translated into the above marks. (The marks such as N, n, a, A and their combinations are the same as explained in the paragraph of "ossification of vertebrae" in this report.) They seems to be approximate to the average in the region,

Table A IV

Fin whale male.

	1	2	3	4
Body length (average)	66.4 feet(31)	66.3 feet(57)	65.7 feet(77)	66.2 feet(323)
Sexual immature	4	3	5	12
Sexual mature	27	54	72	311
% of mature	87.1	94.7	93.5	96.3
Weight of testicles (average)	14.7 kg	16.6 kg	18.3 kg	19.8 kg
Physical immature	14	24	31	116
Physical mature	17	33	46	207
% of mature	54.8	57.9	59.7	64.1
Physical maturity	na (4.0)	na (41)	na (4.3)	na (44)

Fin whale female

Body length (average)	70.2 feet(24)	71.1 feet(53)	69.9 feet(56)	70.1 feet(361)
Sexual immature	2	5	10	14
Sexual mature { Resting	22 { 10	48 { 26	76 { 47	316 { 212
Sexual mature { Pregnant	{ 12	{ 22	{ 29	{ 105
% of mature	91.7	90.6	88.4	87.8
% of pregnant in total mature	54.5	45.8	38.2	33.1
Number of Corpora lutea	10.7	13.0	9.2	8.5
Physical immature	12	17	48	216
Physical mature	12	36	38	145
% of mature	50	67.9	44.1	40.2
Physical maturity	na (3.8)	aa (4.6)	na (3.5)	nn (3.3)

Sex ratio

Male	31	57	77	323
Female	24	53	86	361
% of male (ratis)	56.4	51.8	47.2	47.2

though they may be not so appropriate.

The pregnant ratio was in its real figure lower in the 4th region than 1st one but can't it safely be said that the former should better, if we take the season into consideration? It is notable that it is 18.8% in the 2nd region in connection with the fact that there were more younger whales on the whole.

Sex ratio is 51.8% in the 1st region and 65.6% in the 4th region, showing the considerable difference.

And pale spots seemed to have some features but it was not noted because of the individual's subjective data included. At that time, only the whales in the

1st region seemed very big and large. It was probably all the more distinctive dues to more numerous whales of small size in the 2nd region. Somebody says the whales in the 4th region are of South American species but can it be true? We expect the further study on it.

On fin whales

On male, gradually, from the 1st to the 4th region the body length becomes smaller and the weight of testis is reverse. Accordingly, we can say that there were more numerous mature males in the 4th region though they were small in length.

On the percentage of physical matures also, the same result was obtained as on the sexual maturity.

Sex ratio was 56.4% in the 1st region, dropping to 47.2% in the 4th region.

On female, the 2nd region showed the longest body length and the 1st, 4th and 3rd region follow it. And the order of number of corpora lutea was 2, 1, 3 and 4 and that of % of sexual mature was 1, 2, 3 and 4. That of % of physical mature was 2, 1, 3 and 4 and the pregnant ratio dropped gradually from the 1st to the 4th region. This is probably natural from the seasonal point of view. Gradually as compared the 1st region with the 4th one, it can be said that male showed the quite same trend as blue whale and the whales in the 4th region are smaller in body length but more numerous matures that those in the 1st region.

We can safely say that with similarity in the body length, there are more females of mature both sexually and physically in the 1st region than in the 4th one.

In short, it seems to us that between the group in the 1st region and the group in the 4th region, there is a local difference. We can see the above mentioned difference on figures.

APPENDIX II

On the Relation between the Weight of Anterior Hypophysis and the age of whales.

On anterior hypophysis, an organ closely related to sexual glands, physical maturity and metabolism of fat, an investigation was planned in this expedition. The Nisshin-maru fleet, Taiyo Gyogyo K. K. happened to undertake its commercializing and took it up on individuals, so its weight and size were measured.

Here is a statistical study on the weight of anterior hypophysis and the body length in sexual and physical mature inferring from it.

(1) Weight of anterior hypophysis in each body length.

It was plotted by blue and fin whales, in each body length in Fig. A-1 and Fig. A-2 with for female and for male. Fig. A-3 shows these average.

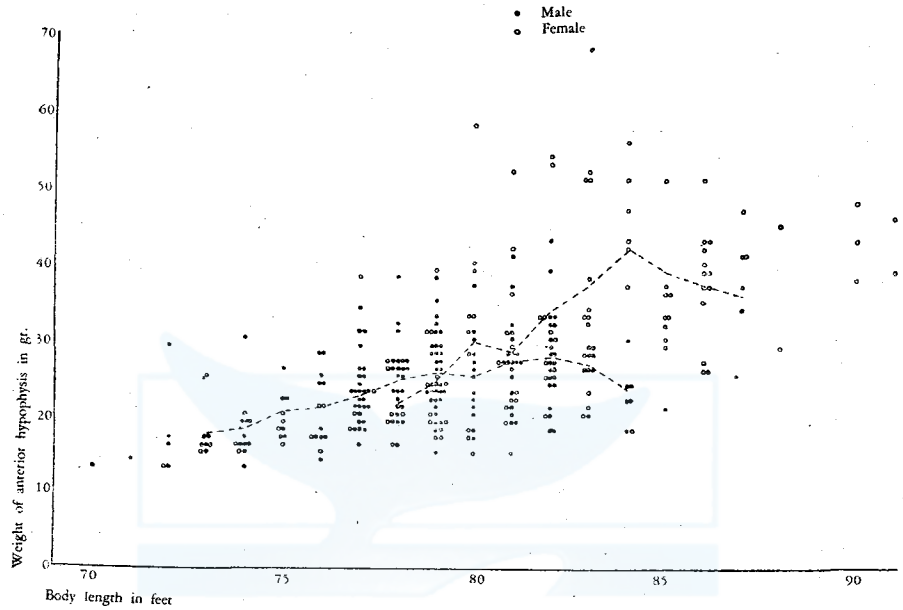

Fig. A-1. Blue whale.

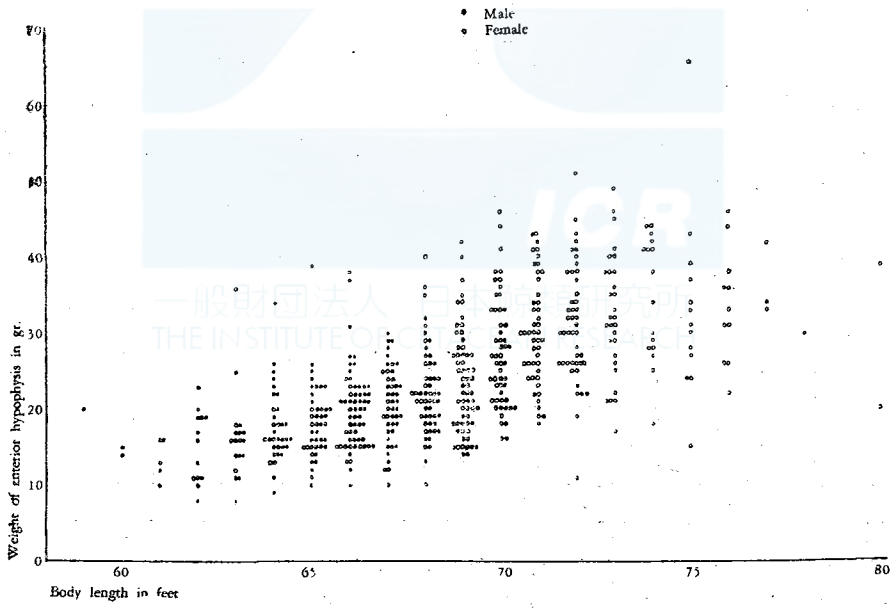

Fig. A-2. Fin whale.

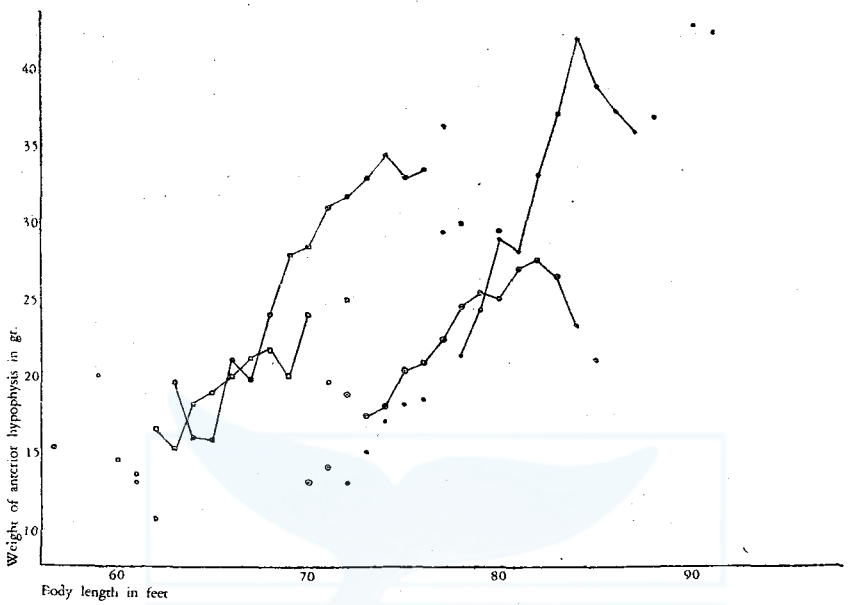

Fig. A-3

Blue whale male shows remarkable increase of weight between 74 and 75 feet in body length and fin whale male between 63 and 64 feet. But, as compared to the average weight curve of testicles in each body length, even whales longer than 75 and 64 feet show more increase of weight. On female, there is a remarkable increase of weight between 81 and 84 feet for blue whales and between 67 and 69 feet for fin whales.

These large increases of anterior hypophysis may be considered to show the sexual maturity. These shall be studied afterwards.

What is common to both blue and fin whales is: On longer whales than a certain body length, anterior hypophysis of female is heavier than that of male and on shorter ones, reversely, that of male is heavier. The longer the body length becomes, the more remarkable becomes the difference of anterior hypophysis weight between female and male. Its boundary line in body length is 80 feet for blue whales and 68 feet for fin whales.

(2) Its relation to the sexual maturity.

In addition to the relation between the sexual glands and the body length in the above report, we studied on the relation between the weight of anterior hypophysis and the sexual glands here. We can get (1) the anterior hypophysis weight in sexually maturity and indirectly (2) the then body length from it.

Male:

a. As we call whales more than 10kgs for blue whales and 5kgs for fin whales in total weight of the right and left testis, the sexual mature, we can make the percentage of sexual maturity into graph by anterior hypophysis weight. It is Fig. A 4. But 1 gr unit lessened so many instances that 3 gr unit was used. A grs in the figure includes (A−1) and (A+1) grs. For instance, 16, 17 and 18 grs were together calculated as 17 grs.

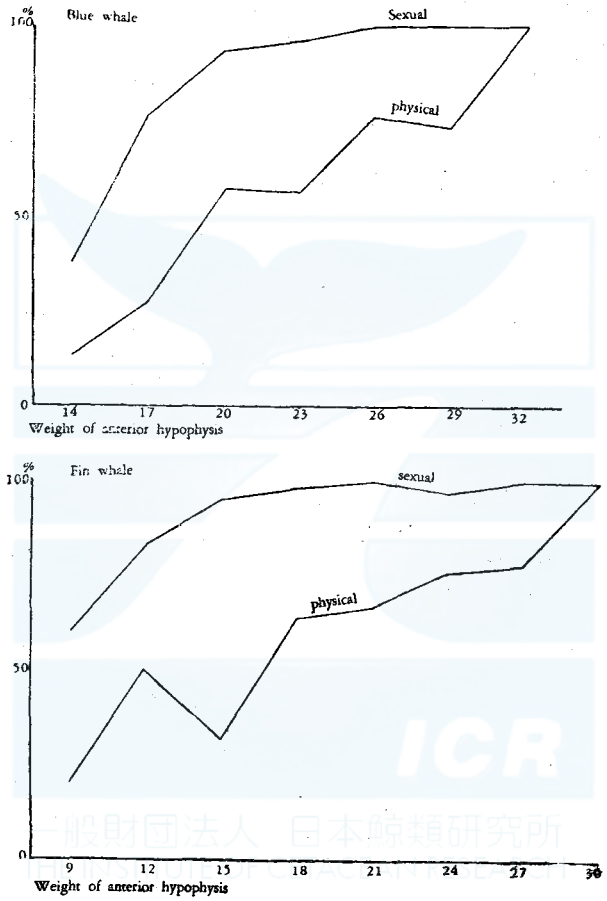

Fig. A-4

If the anterior hypophysis weight, with which more than 75% of whales are mature, is the boundary line of sexual mature, it can be safely thought that it is 17 grs for blue whales and 12 grs for fin whales.

b. In Fig. A-3 rarity of instances can not show how long whales are with anterior hypophysis 17 grs for blue whale and 12 grs for fin in weight. Approximately it is 73 feet for blue and 62 feet for fin whales.

Exactly the average body length of all blue whales with anterior hypophysis 17 grs in weight was found 74.8 feet, rearly 75 feet. The average body length of 3 fin whales with 12 grs anterior hypophysis in weight was found 64 feet and, when including whales with 11 grs and 13 grs, the average was 64.2 feet, namely about 64 feet.

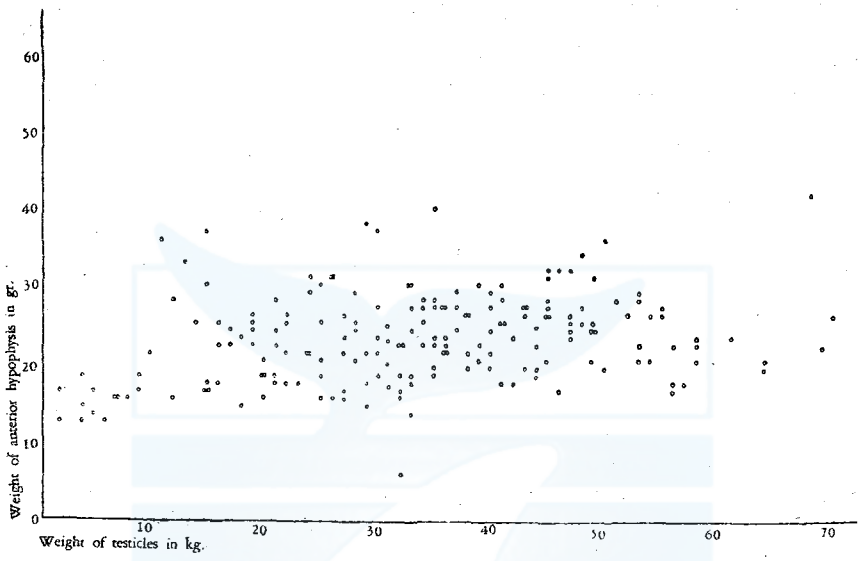

Fig. A–5 Blue whale.

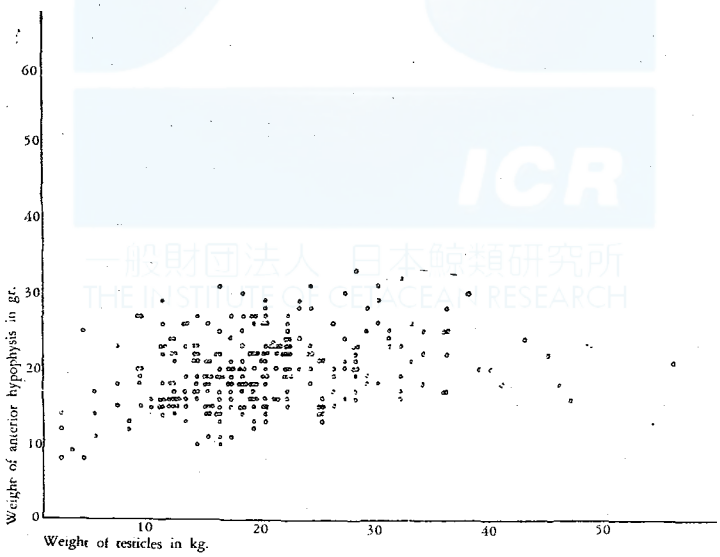

Fig. A–6 Fin whale.

c. Next, the weight of anterior hypophysis was plotted in each weight of testis. Fig. A-5 is of blue whales and Fig. A-6 is of Fin whales. fig A-7 is the average weight of anterior hypophysis in every 10 kg of testis weights were (fin whales less than 10 kg in testis weight were divided into two classes, 1—4 kgs and 5—9kgs).

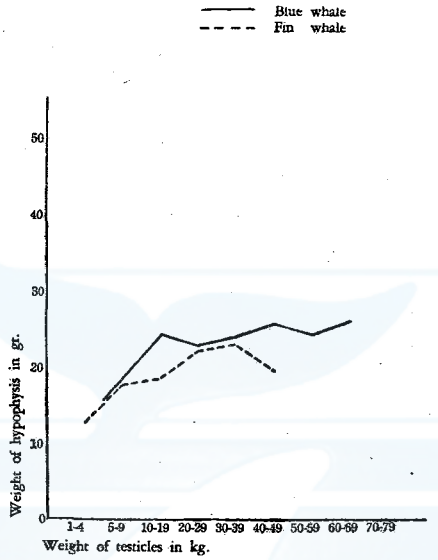

Fig. A-7

About when the sexual glands reach maturity, the increase of anterior hypophysis weight is remarkable.

Female:

a. Fig. A-8 shows the sexual maturity curve by weight of anterior hypophysis' as sexual immature for 0 in number of a corpora lutea and mature for more than 1. In this figure too, 3 grs was 1 unit: 6, 7 and 8 grs were treated as 7 grs. Namely it shows the percentage of sexual mature for all individuals with anterior hypophysis (a−1), a and (a+1) grs in weight. It is 23 grs in weight of anterior hypophysis for blue whales and 20 grs for fin whales of which more than 75% are mature.

b. This body length is 78 feet for blue whales and 66 feet for fin whales, from Fig. 3.

As done in male, the average body length of female blue and fin whales with anterior hypophysis 23 grs and 20 grs in weight respectively was calculated 80.1 feet—90 feet for the former and 66.4 feet=66 feet for the latter.

c. In Fig. A-9 and Fig. A-10, the weight of anterior hypophysis by number of

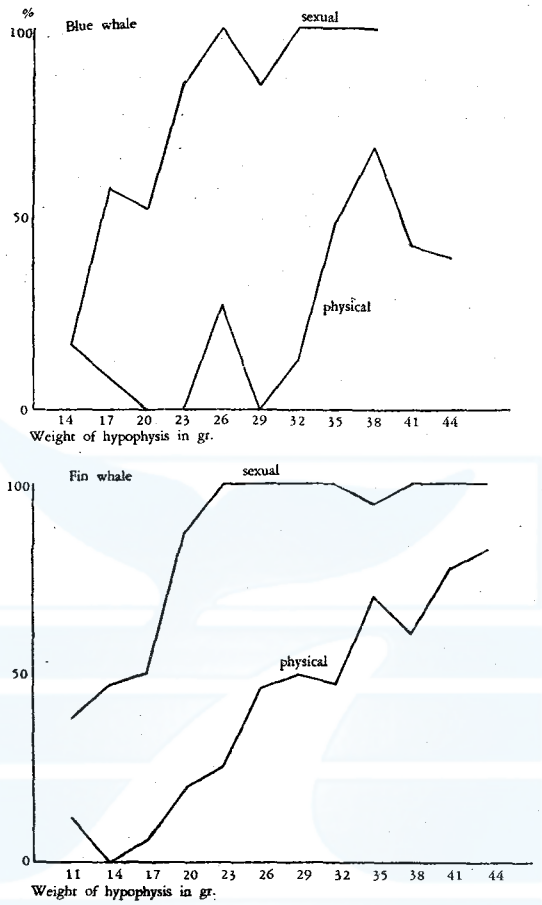

Fig. A-8

corpora lutea was plotted in blue and fin whales. Their average was collected in Fig. A-11 by every 5 or 10 in number of corpora lutea. This shows the remarkable increase of the weight of anterior hypophysis in the stage from 0 to 1—5 in number of corpora lutea. And its weight does not seem to increase in both blue and fin whales with more than 11 in number of corpora lutea and this stage seems to us of physical maturity.

(3) The relation to physical maturity

Ankylosis is observed at thoracic and lumbar regions of vertebrae. Whales with anylosis in either of them are considered physically mature. The percentage of physical mature for number of examples, a grams in weight of anterior hypohpysis is shown in Figs. 4 and 8, together with the percentage of sexual mature·

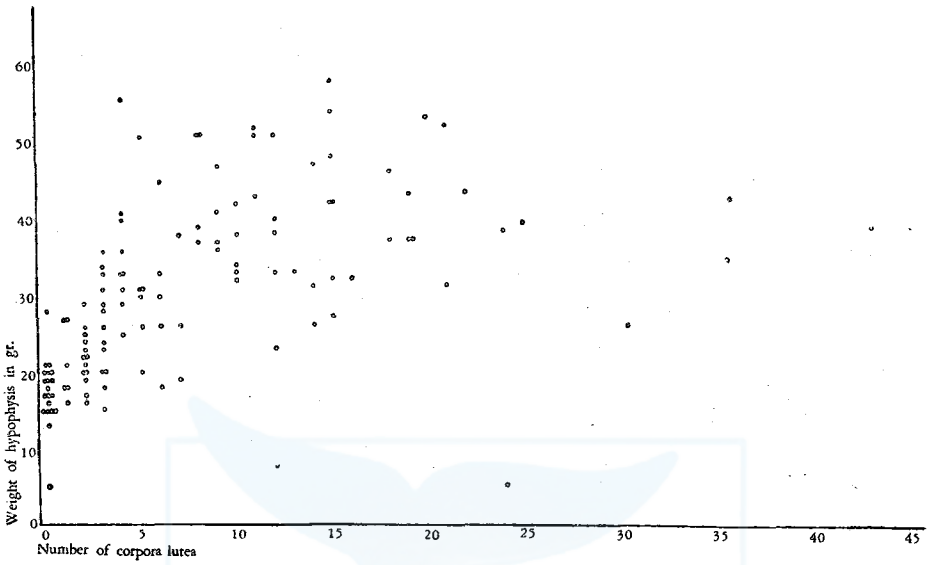

Fig. A-9 whales

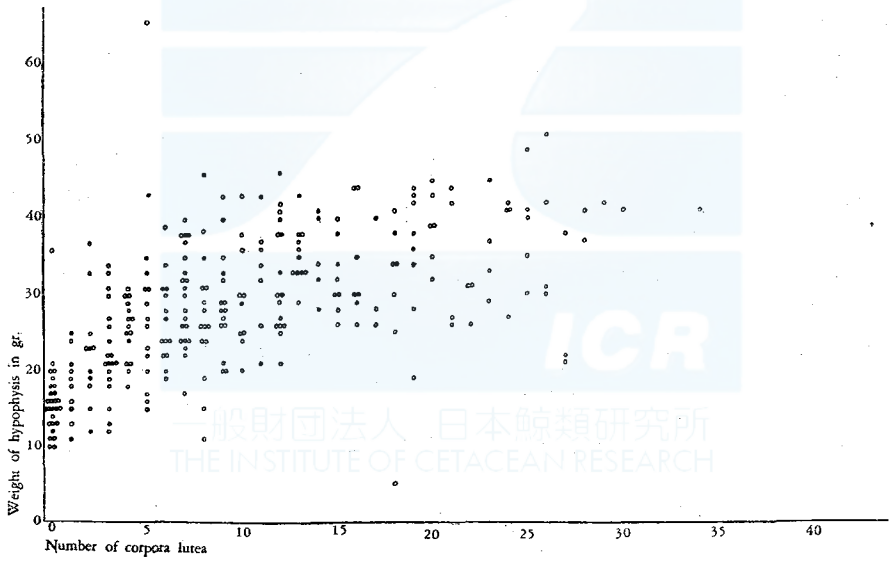

Fig. A-10 whales

3 gr unit was taken and a grs includes (a−1) and (a+1) grams.

Male

Judging from Fig. A-4, the weight of anterior hypophysis in physical mature is 26 grs for blue whales and 24 grs for fin whales. The body length is 80 feet for blue whales and 68 feet for fin whales from Fig. A-3. The average body

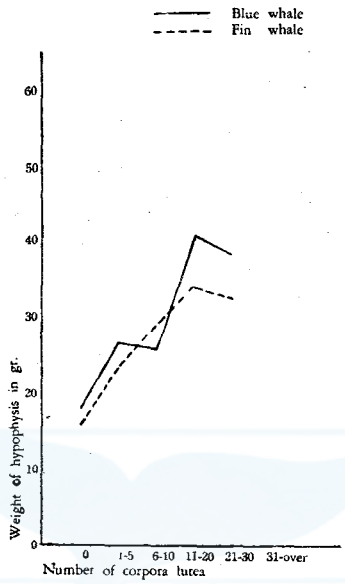

Fig. A-11

length calculated on the individuals with 26 grs in weight of anterior hypophysis for blue whales and 24 grs for fin whales is respectively 79.3 feet and 77.9 feet.

Female

Fig. A-8 does not show an increase of % of number of physical mature in proportion to the increase of weight of anterior hypophysis. According to some literature, whales of 11 in number of corpora lutea may be concidered physically mature. In this report, too, proves it and from Fig. A-9 and Fig. A-10 the average weight of anterior hypophysis with 11 in number of corpora lutea is 39 grs for blue whales and 33 grs for fin whales. (When instances, are few, then include those of more and fewer by 1 in number of corpora lutea than them) In Fig. A-11, it is 40 grs for blue whales but only for reference for this graph contains those of number of corpora lutea near 20. The body length in the stage of 39 grs in weight of anterior hypophysis for blue whales and 33 grs for fin whales is respectively 84 feet and 71 feet, judging from Fig. A-3. Directly averaged length is 84.4 feet and 72.4 feet each. Let's sum up the results of (2) and (3). The first figures mean the weight of anterior hypophysis, the second, mature body length inferred from the weight of anterior hypophysis, and the third in parenthises, the mature body length calculated directly from the sexual glands and the body length.

	sexual maturity			physical maturity		
blue male	17 gr	75 ft	(75 ft)	26 gr	80 ft	(79 ft)
female	23	78	(77)	36 ?	84 ?	(88)
fin male	12	64	(62)	24	68	(69)
female	20	66	(66)	33 ?	72 ?	(75)

(4) It is said that anterior hypopsis has a close relation to fat metabolism. Therefore, among male and female, blue and fin whales, in body length with the most numerous examples in it the relation between thickness of blubber at point No. 1 and the weight of anterior hypophsis was plotted in Fig. A-12. There, dots

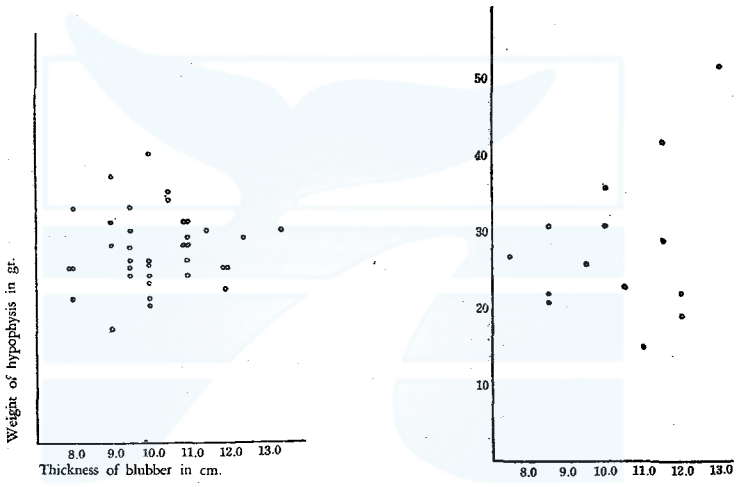

Fig. A-12. Blue whale male, 79 feet. Blue whale female, 81 feet.

mean the average of more than 5 examples. A definite parallel relation between them seems not to be drawn from it.

(5) Conclusion

We think we may draw the rough conclusion as follows.

1. In the early age, anterior hypophysis of males is heavier than that of female but over 80 feet for blue whales and 68 feet for fin whales, female show heavier anterior hypophysis and difference between male and female becomes remarkable with an increase of body length.

2. In the stage of sexual maturing, the increase of weight of anterior hypophysis is notable and then the weight is:

	Male	Frale
Blue whales	17 gr	23 gr

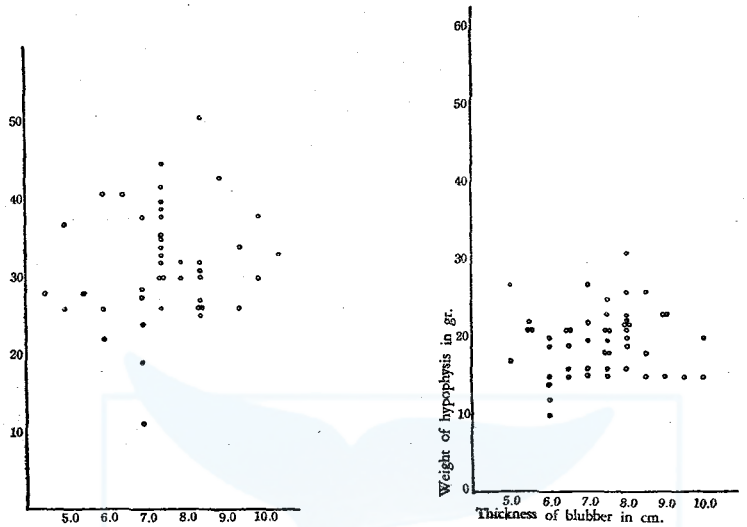

Fig. A-13. Fin whale male, 66 feef. Fin whale femall, 72 feet.

Fin whales	12 gr	20 gr

The body length inferred from the weight of anterior hypophysis is:

	Male	Female
Blue whales	75 feet	78 feet
Fin whales	64 feet	66 feet

This agrees nearly with the following body length in sexual mature directly rom the sexual glands:

	Male	Female
Blue whales	75 feet	77 feet
Fin whales	62 feet	66 feet

3. The weight of anterior hypophysis in the stage of physically maturity is as below, and after that does not increase so much.

	Male	Female
Blue whales	26 gr	39 gr?
Fin whales	24 gr	33 gr?

The body length calculated from the weight of anterior hypophysis is:

	Male	Female
Blue whales	80 feet	84 feet?
Fin whales	68 feet	72 feet?

The body length calculated directly from the ankylosis of vertebrae and body

length is:

	Male	Femal
Blue whales	79 feet	88 feet
Fin whales	69 feet	72 feet

On female, there is a rough similarity.

6. The relation between the weight of anterior hypophysis and the thickness of blubber at point No. 1 is not definite.