RYUKYUAN WHALING IN 1961

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In accordance with the invitation from the United States Civil Administration of the Ryukyu Islands, the author had been engaged in the biological investigation of the Ryukyuan whaling from March 24 to April 4, 1961.

The scientific study of the composition of whales and the survey on the migration routes are reported mainly in this paper.

OUTLINE OF THIS WHALING SEASON

The whaling of this year started in the first week of January, and the catch was started with the sperm whale. Though the humpback whale was caught in the middle of January, this species of whales are very scarce at that time.

Even in February the water volume of 20°–22°C which is the suitable temperature for the humpback whale did not appear in the main whaling ground but existed in the Miyako area. So the smaller type catcher boats caught no whales in February. This phenomenon is considered as follows. According to the weather reports in Far East Asia, the Chinese Continent had some copious rains with deluges in the summer of 1960. The author pointed out in his report of the Ryukyuan humpback whaling in 1959 that the Chinese Continent had brought in the summer of 1958. In that case the decrease of cold water from these Chinese rivers might probably cause a higher temperature around the Ryukyuan Island. The reverse phenomenon occurred this year. There is a fact of some floating ice draft in the Korean Channel to the southward, which the author believes was caused by the Tsushima warm water caurrent that seemed to have weekened this year.

The time of year for the migration of the humpback whale, however, seemed to have made no great difference from the average year. That time was pointed out by author in his report of 1960 i. e. about 10th of January.

There is, so to speak, a marching column in the migration of whales. The order of migration of humpback whale in the Ryukyuan waters is as follws. The first is some groups of immature male, second is immature female. Then the main groups i. e. the mature male and female come. Shortly after there are some lactating females mixed in these main groups. This lactating female delivered a calf this season and was

actually lactating at the time. These actually lactating groups are the last to leave these waters. The males which arive after the main groups are almost mature.

There were very small number of immature males caught in the catch of this season. Taking the above mentioned consideration, the immature male migrated away from the Miyako area to the north-east direction in January. The catcher boats found and caught the immature females at the time of their migration in the southern parts of the whaling ground. It is considered that their migration was affected by the colder water mass of the East China Sea. In Fig. 1 the above mentioned facts are shown as average body length, sex ratio and composition of sexual conditions in each month. These figures fit in well with the same figures of the previous years. In May of this season one mature female was caught, but the figure does not include this whale.

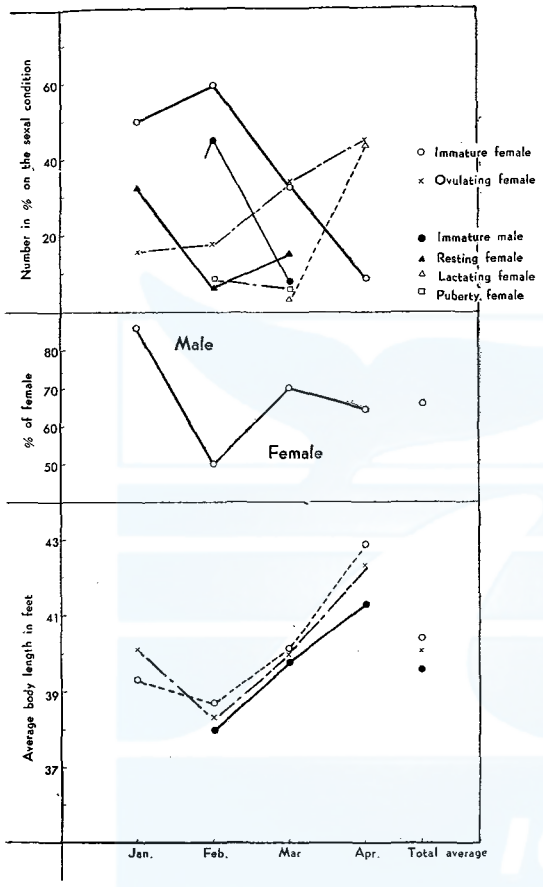

Fig. 1. Average body length, sex ratio and composition of sexual conditions in each month.

Nine sperm whales were caught in the beginning of this whaling season, but in a later period only a small effort was paid to the sperm whale whaling, because efforts were concentrated in the humpback whale whaling.

No other species of whales were caught.

COMPOSITION OF WHALES CAUGHT

In Table 1 is given the size distribution of the humpback whales caught according to their physical condition on 90 whales including 31 males and 59 females.

TABLE 1. SIZE DISTRIBUTION OF HUMPBACK WHALES CAUGHT ACCORDING TO PHYSICAL CONDITIONS

Body length in feet	Male			Female							Total	Grand total
	Immature	Mature	Total	Immature	Puberty	Mature						
						Ovulating		Resting	Lactating	Sum		
						First	Multipola					
34	1		1									1
35	3		3	5							5	8
36	1	1	2	8							8	10
37	1	2	3	4							4	7
38		3	3	3	2	1		1		2	7	10
39		3	3	1	1	1				1	3	6
40		2	2				2		1	3	3	5
41		4	4				3	2	1	6	6	10
42		4	4				1	2	2	5	5	9
43		3	3				1	2		3	3	6
44		1	1				4		1	5	5	6
45		2	2				3			3	3	5
46							1		1	2	2	2
47							3	1		4	4	4
48												
49												
50							1			1	1	1
Total	6	25	31	21	3	2	19	8	6	35	59	90
Average length	35.3	40.6	39.6	36.4	38.3	38.5	44.0	42.1	42.5	43.0	40.4	40.1
						43.5						
Sex ratio			34.4								65.6	100.0
Matulity rate	19.4	80.6	100.0		40.6					59.3		
Rate of ovulating						60.0				100.0		
Rate of lactating									17.1	100.0		

The male whose testis weight on either side is 2.0 kg is defined as mature. The number of immature males is fewer in comparison with the previous years. The reason that the immature males were scarce is as above stated.

The classification of physical conditions in females was the same as in the previous investigations. The female whose ovaries contain neither new nor old corpus luteum is defined as immature. In these immature females whose Graafian follicle was more than 30 mm in diameter was defined as puberty. The mature females are divided into three stages; the ovulation stage where the female has a new corpus luteum (sometimes two or more new corpora lutea were found), the resting stage where the female has some old corpora lutea and her Graafian follicle is less than 30 mm in diameter, and the lactating stage when they are found to be capable of secreting milk in the mammary glands and did not have any new corpus luteum or a Graafian follicle more than 30 mm in diameter.

TABLE 2. OCCURRENCE OF BODY COLOR OBSERVED

Period	Sex	Grade of body color			
		1	2	3	4
January	Male	1	0	0	0
	Female	5	1	0	0
February	Male	11	1	0	0
	Female	10	0	0	0
March	Male	13	0	0	0
	Female	29	1	0	0
April	Male	6	0	0	0
	Female	11	0	0	0
May	Male	0	0	0	0
	Female	1	0	0	0
Total	Male	31	1	0	0
	Female	56	2	0	0
	Animal	87	3	0	0
% of occurrence		96.7	3.3		

It is impossible to classify the ovulation stage into the ovulation and the pregnant stages in these breeding areas, because of the very small embryo. The rate of ovulation is used for the pregnancy rate in this report. The ovulation rate therefore, always shows a higher percentage than the actual pregnancy rate.

On the maturity rate in the female, the higher percentage figure is concerned with the migration time of this season.

Table 2 shows the occurrence of the white pattern distribution on the abdominal side according to four stages in the same standard in the previous investigations. There is no significant difference in comparison with the previous seasons.

In Table 3 is given the frequency of occurrence of blood types. The classification of the blood types was made by investigater Mr. Kazuo Fujino of our Institute as in the case of the last year by using the same serum as in 1960. The occurrence between Type 1 and Type 3 were more similar to the 1959 data than the 1960 data. This matter is also shown in the other results of the biological investigation of this season. It may be suggested that the same groups of the humpback population do not migrate every year to this whaling ground.

TABLE 3. FREQUENCY OF OCCURRENCE OF BLOOD TYPES COMPARED WITH THE DATA IN 1959 AND 1960

Blood type	Occurrence					
	1959		1960		1961	
	Number	%	Number	%	Number	%
1	1	1.0	2	2.35	1	1.7
2	4	4.0	8	9.4	2	3.3
3	7	7.0	2	2.35	5	8.3
4	87	87.0	73	85.9	52	86.7
2 or 3	1	1.0	0	0.0	0	0.0
Total	100		85		60	

No tested samples because of hemolysis	26
Number of samples collected	86
Number of whales caught	90

TABLE 4. SIZE DISTRIBUTION OF SPERM WHALES CAUGHT IN 1959, 1960 AND 1961

Body length in feet	Number of mature male			
	1959	1960	1961	Sum
37	1		1	2
38	2	3	3	8
39	1	3	2	6
40		3	1	4
41	3	3	1	7
42		1		1
43		1		1
44				
45			1	1
Total	7	14	9	30
Average length	39.3	39.9	39.4	39.6

Immature male and female whales were not caught in each season.

Thickness of blubber, stomach contents and parasite, etc. were investigated, but the data giving the effective suggestions on composition of whales or on migration routes were not available.

Composition of the sperm whale caught in this year was made in Table 4 with the same data of previous two years. They were matured young males classified by testis weighing and did not accompanied with

females. They are not the main group of this species, but usually the forerunners of their migrating column.

CONSIDERATION FOR THE STOCK OF THE HUMPBACK WHALE

The ear plugs that have the most suitable data on the age determination for baleen whales were collected from 92% of the catch of this

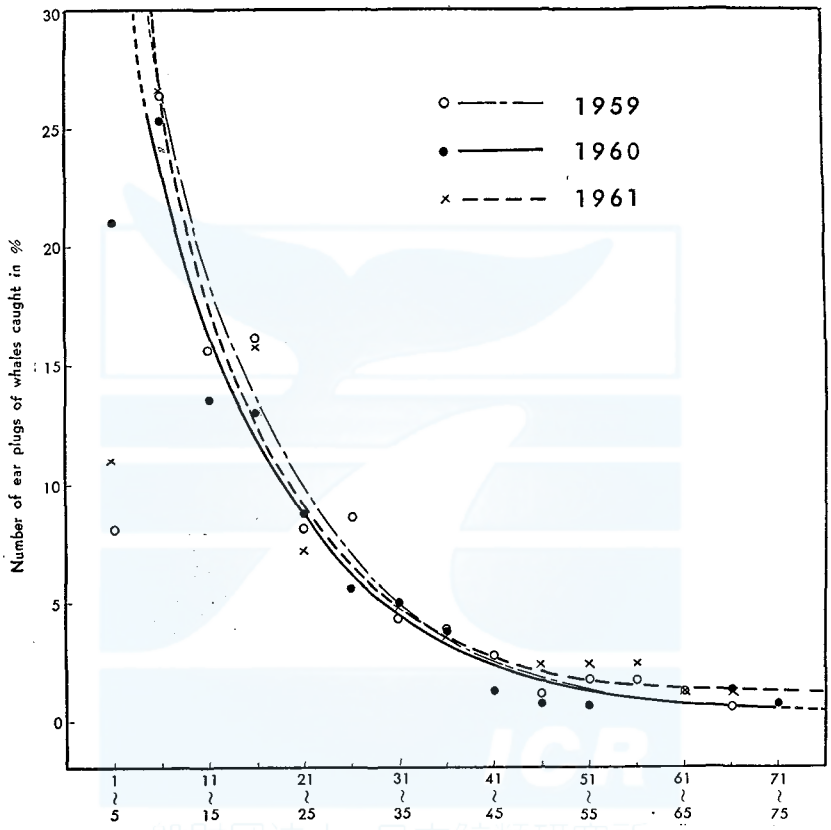

Fig. 2. Survival curve from the ear plug lamination survey of the humpback whales caught in Okinawa 1961.

year. In Fig. 2 the frequency of the number of ear plug laminations was shown as a survival curve. The same curves of the previous two years are shown in the same figure for comparison. These three curves are very well in accord. Basing on the agreement of these curves the stock of the humpback whales did not suffer heavy damages through the whaling.

These curves must be separated into male and female and the gathering of the class of ear plug lamination numbers must be done more carefully, but since the data were scanty this method had to be accepted. These

results, however, are enough to study some of the tendencies of the stock. The mortality curve that should be calculated from the survival curve was omitted here.

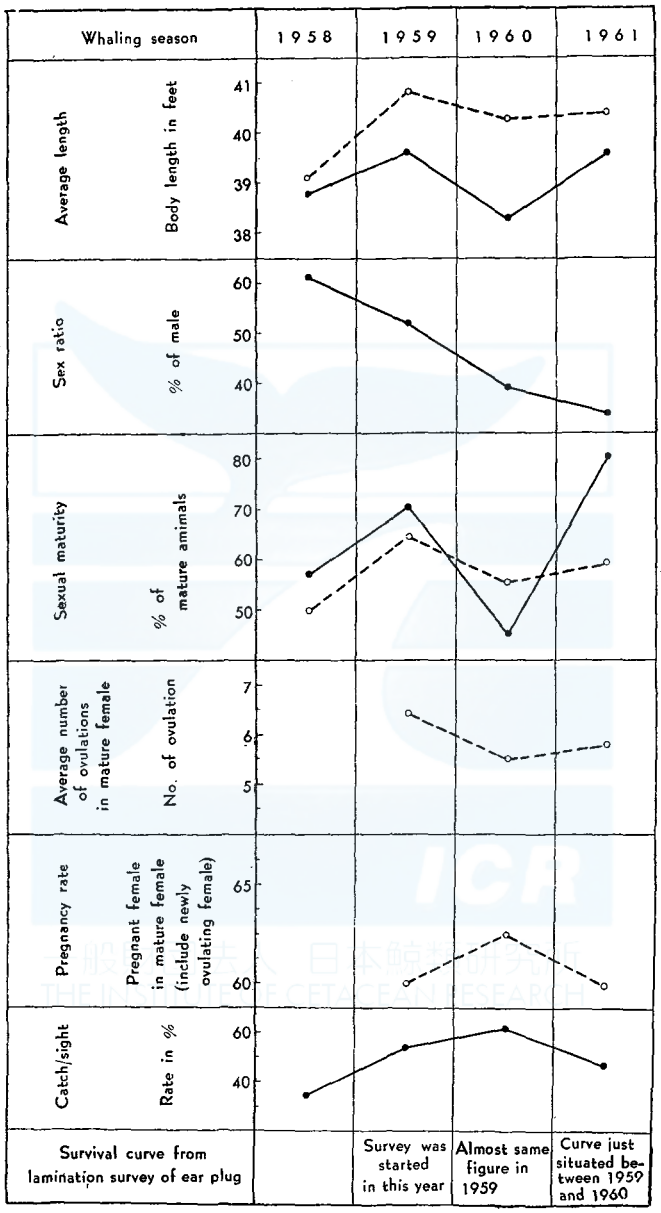

Fig. 3. Data of interpretation on the movement of the humpback whale population.

The annual variations of the above mentioned results are shown in Fig. 3.

In the case of decrease in stock, the following phenomena are observed usually.

1. Decrease of average body length.
2. Decrease of male in sex ratio.
3. Decrease of sexual maturity rate.
4. Decrease of average ovulation number in mature female.
5. Decrease in survival curve.
6. Increase of sight catch ratio.
7. Increase of pregnancy rate in mature female.

According to Fig. 3 the stock of the humpback whale seems to be stable except in the item 2. It is considered that the effect of the present whaling do not cause considerable decrease in the stock.

Also in this season one of the whale marks that were marked in the Aleutian waters was recovered. This fact bear witness to the fact that the humpback whales in the Ryukyuan waters are closely connected with the stock of all North Pacific. By the observation of the Japanese whaling fleet operating in the Aleutian waters more than 300 of the humpback whales are found every season. Nevertheless the catch is decreasing annually. That is caused by the bad weather and the strong winds. The second reason, it must be acknowledged, is that the humpback whales are intelligent enough to change their migration routes because of the increase in the catching intensity.

MIGRATION ROUTES OF THE HUMPBACK WHALES

This is a very difficult problem, and in a word it still remains unexplained. For information, however, the author enumerates some evidences as the following.

1. The whale marks tagged in the Aleutian waters are recovered in the Ryukyuan waters every season and the total number of recoveries reached six marks.

2. Numerous humpback whales are observed between February and March and also in October in the waters of the Midway and the Hawaii Islands.

3. From January to March many humpback whales are observed in the Ogasawara waters (area of Bonin Is.). Whale marking on the humpbrck whales was carried out in March 1961 by the Fisheries Agency of the Japanese Government in the Ogasawara waters.

4. The number of humpback whales caught in the Japanese coastal whaling were very scarce after the World War II.

SUMMARY

Some considerations and results are made hereinafter based on the data already mentioned above.

1. The number humpback whales caught in this year has decreased compared with the last year. The colder waters of the East China Sea, that was caused by the downpour in the summer of 1960, obstructed the migration way of the humpback whales.

2. The number of humpback whales sighted have not decreased in comparison with the last season, but the weather and the strong winds have obstructed the successful catch. The next reason is the factor depended on the catcher boat.

3. Judging from the results of the biological survey the stock of the humpback whales did not suffer heavy damages through whaling. As is shown by the recoveries of the whale marks, the migration groups of the Ryukyuan waters are closely connected with the stock in the Aleutian waters i. e. all the North Pacific stock. It is considered, therefore, that the data of investigation shows the increase and the decrease of the North Pacific stock.

4. It is still unknown where the migration routes of the humpback whales are. Further investigation is necessary to solve this problem. It seems that the whale marking on the humpback whales in the Ogasawara waters by the Japanese Government is a very valuable action.

5. As was mentioned above, the stock of the humpbak whales is considered as a fairly stable condition. It is suitable to give the highest limit of the number of catch as the quota.

6. Though small in number the sperm whales are caught every season. The author does not consider that the actual scouting of this species is carried out. The Ryukyuan Whaling industry should not rely on the catch of the humpback whales only, but try to catch other species of whales also in order to decrease the catch of the humpback whales.

7. The water temperature around the Okinawa Island, the author believes, is dependent on the climatical precipitation on the Chinese Continent. Close study of the weather of the last year on the Chinese Continent will be, therefore, essential in deciding the most suitable time for starting the whaling season and the direction of scouting the whales.

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