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Material on the ecology of the larga of the Commander Islands.* S.V. MARAKOV.

The Commander larga occupies a peculiar position among the larga of the Far East. This is a large form with a very pronounced settledness. By its nutrition and reproduction, but also by its behavior it differs to a certain extent from the larga of the Sea of Okhotsk and in respect to some details it is close to the common seal.

*-----
Two forms of seals, which belong to the genus Phoca in its narrow interpretation,- the common larga(which rarely occurs there) and its insular relative, which reproduces on the shore, occur on the Commander Islands.

The seal, being dealt with here and which the author calls the Commander larga is the pagophobic form of the genus Phoca, that differs sharply from the "ice"(pagetodic) larga. This is the local Commander population of the island seal, which became known recently as a separate species Phoca insularis sp.n., described by A. N. Belkin(2) for the Kuril Islands.

Having again examined the morphological-taxonomic(in the main craniological) characters of the form described by A.N. Belkin, the author of these lines comes to the conclusion that the island or insular seal is nothing but a special(Pacific) form of the common seal (Phoca vitulina L.), almost identical with the latter(K. Chapski).

The weight of the largest specimens (females), according to our data, reached 133 kg, the length of the body (Lc, zoological) -197 cm.

Some data on the weight and measurement of the females of the Commander larga are adduced in table 1.

Table 1.

Measurements and weight of the females of the larga of the Commander Islands

Approximate age, years	Weight, kg	Zoological length, Lc, cm	Axillary circumference, cm	Thickness ** of subcutaneous fat, mm
Young one				
Детеныш	15,6	92	52	17
1	—	114	88	—
2	—	135	95	30
3	35,6	120	76	35
3	—	124	86	35
3	68,0	150	98	35
3	—	133	95	30
3	—	162	104	45
4-5	—	151	112	55
4-5	97,0	158	114	65
5-6	—	159	112	30

The rounded upper angles of the occipital orifice was ^(foramen) / 127 regarded as ^a characteristic feature, which distinguishes the larga from the common seal (15). However among the Commander larga most frequently specimens with clear angular outlines of the occipital orifice were observed (fig. 1). Separate skull measurements of the larga, collected by us in 1962 on Ostrov Medny (Medny Island=Copper Island) are adduced in table 2.

The coloration of these seals is distinguished by a predominant dark "background" over which small (diameter is 1-3 cm) light coloured rings and, less frequently, spots are scattered. Exceptionally spotted specimens are rarely encountered, approximately in 10% of the

In the middle of the chest between the front flippers.

cases(fig. 2) *.

We assume that the Commander larga on the basis of its morphological characters is related or allied to the Kurilian insular seal described by A.N. Belkin(2).

Fig. 1. Occipital foramen of the skull of the Commander larga(photo by the author).

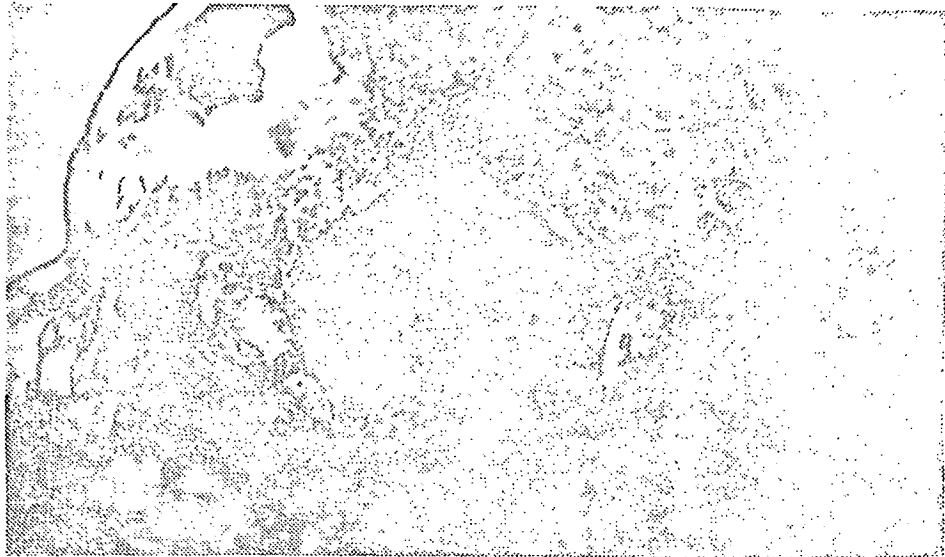


Рис. 1. Затылочное отверстие черепа командорской ларги (фото автора)

Fig. 2. A spotted coloration is rare among the Commander larga(photo by the author).

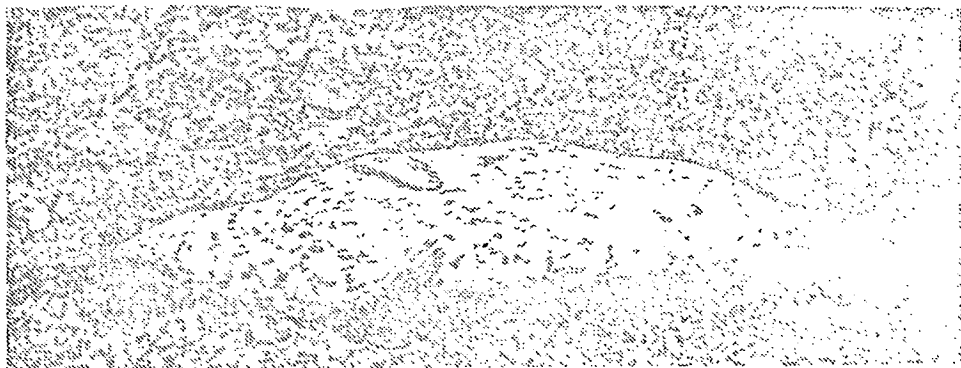


Рис. 2. Пятнистая окраска — редкая среди ларг Командорских островов (фото автора)

* These "exceptionally spotted" specimens, evidently, belong to the other(pagetodic)form, i.e. to the typical larga, which, according to latest data, is a separate species(Remark by the editor).

Некоторые промеры черепов ларги о. Медного, мм

name of measurement	Порядковый номер животных	Наименование промеров	S											
			1	2	3	4	5	6	7	8	9	10	11	12*
1. Condylbasal length	1	185,0	—	199,0	226,0	—	217,0	218,0	200,0	215,0	207,0	162,0	191,0	
2. Total length	2	186,0	—	199,0	226,0	—	217,0	218,0	200,0	215,0	207,0	163,0	191,0	
3. Basic length	3	161,0	—	177,0	196,0	—	—	195,0	176,0	192,0	—	146,0	169,0	
4. Length of facial part	4	89,0	87,0	89,0	95,0	89,0	91,0	94,0	85,0	95,0	86,0	68,0	80,0	
5. Length of the cerebral part	5	133,0	—	112,0	128,0	—	136,0	126,0	119,5	122,0	123,0	103,0	111,0	
6. Length of the nasal bones	6	38,0	40,0	40,0	—	42,0	45,0	45,0	40,0	41,0	43,0	35,0	43,0	
7. Maximal length of nasal bones	7	42,0	45,0	45,0	51,0	46,0	51,0	48,5	43,0	49,0	50,1	42,0	44,0	
8. Length of postpalatine notch	8	25,0	29,0	28,0	32,5	28,0	33,0	28,5	28,0	20,5	33,0	—	27,0	
9. width above canine teeth	9	86,5	38,0	38,0	42,0	37,5	40,0	43,0	39,0	44,0	38,0	32,0	32,0	
10. Zygomatic width	10	112,0	120,0	114,0	127,0	112,5	127,0	125,5	115,0	131,0	117,0	92,0	108,0	
11. Interorbital width	11	14,0	14,4	13,5	15,0	14,0	14,9	14,0	13,0	14,0	13,0	15,0	13,0	
12. Mastoid width	12	115,0	124,0	120,0	131,0	115,0	126,0	127,0	121,0	128,0	134,0	120,0	117,0	
13. height of skull in the region of the tympanic cavities	13	77,5	82,0	79	90,0	78,0	82,0	80,0	74,0	81,0	73,0	74,0	77,0	
14. Length of the upper row of molar teeth	14	42,0	43,0	44	48,0	43,0	47,0	48,0	47,0	51,0	45,0	48,0	44,0	
15. Length of the lower row of molar teeth	15	41,0	42,0	43,5	46,0	42,0	42,5	43,0	45,0	46,0	43,0	48,0	42,0	

* A male; all the preceding ones were females.

DISTRIBUTION AND ABUNDANCE.

The occurrence of seals (evidently, this larga) on the Commander Islands was observed by G. V. Steller and his fellow-travelers.. Sven Waxel(4) pointed out that "there is an extremely large number" of seals on the islands.

Prior to the establishment of permanent settlements on the islands there was little larga hunting there. The situation changed rapidly after the settling of Aleuts on the islands, when the numbers of seals there rapidly decreased. Thus N. Grebnitski(5) wrote that the larga had become almost extinct; as a result of this he was compelled to declare a closed season from May 1 to September 1, i.e. for the entire season of the reproduction and growth of the young. In these years annually 80-100 animals were killed. Later these restrictions were disregarded; this led to a drastic reduction of the number of larga. This led N. Grebnitski(6) and N. Kulagin(10) to assume that the larga were even abandoning the islands.

The small number of the larga was noticed later by M. K. Suvorov(19). He, in particular, wrote that "the lay places (rookeries) of the ringed seals diminish and the number of animals at present is insignificant, especially on Ostrov Medny". A further decrease in the number of "ringed seals" was reported also by E. D. Ilyina(8), although there exist no data on "ringed seal" hunting during her stay on the Commander Islands. Below we adduce data of the hunting of "ringed seals" in the past on the Commander Islands, which were collected by us from various sources.

Apparently in the past century the larga of the Commander Islands numbered several thousand head..

The number of the larga was most drastically reduced in the early part of our century, when the hunting of the fur seal, of the Kamchatka beaver and of the blue fox declined and the inhabitants were compelled in order to provide for themselves to intensify the hunting of other species of animals.

The restoration of the larga populations on both islands later took place extremely slowly. During the Soviet period, especially in the 30's and 40's, when fur farming was established on the islands and when the shores were often visited by people, who hunted larga at any opportune moment, the number of these generations was sharply reduced. The only rookery preserved in those years on the North-western tip of Ostrov Medny, due to "forbidden territory" had about 100 head(1). Unfortunately there exist no statistics on larga hunting for this period, but judging by the data gleaned from enquiries, the casual kill per year did not exceed 20-30 animals.

According to I. Barabash-Nikiforov(1) the larga on the Commander Islands are represented by "settled" and migrant specimens.

Table 3.

Some data on "ringed seal" hunting on the Commander Islands.*

Year	"Ringed seals" killed		Total
	Bering Island	Ostrov Medny	
1889	42	112	154
1896	49	22	71
1907	66	40	106
1916	54	14	68
1923	30	8	38
1929	11	8	19
1940	11	2	13

* It is possible that this number contains als the casual killing of individual ringed seals.

Its "settledness" there is undoubted: This seal is encountered there in relatively constant numbers throughout the year. It can be admitted that at times migratory seals stop there, since off and on single specimens were encountered at a distance from the shores. According to the observations by S.S. Grigoryev, an Aleut hunter, the number of "ringed" seals on Ostrov Medny increased shortly after the end of the Great Patriotic war. Perhaps this increase was due to the larga, which came from Kamchatka where hunting it was being intensified.

During our work on the Commander Islands from 1952 to 1962 the number of the larga, in particular on Ostrov Medny, was considerably increased. In connection with this several "nursery" rookeries were formed and the population-density on the entire shore of the island increased. The growth in the number of the larga on the Commander Islands was caused, in our opinion, firstly, by an increase in the herd of sea lions, which the local populace always prefers to hunt, but secondly, by a curtailing of the work on the year-round "feeding" (Podkormka) of polar foxes in connection with which the visits by humans to the hunting grounds decreased considerably in number.

The total number of the larga on both islands at present exceeds 1500 head. On Ostrov Medny the largest rookeries (with from 100 to 300 animals), on which the larga reproduce and use during the remaining part of the year, are situated on the northwestern tip - on the "Koshka", on the inaccessible, by land, shore of Zabobrovaya Bay, in Stolbovaya Bay and Zapalata Bay. Furthermore, there occur also smaller congregations (of several tens of specimens in the

Palata, Lebyazhya and Sen'kino bays. Small groups of 3-5 specimens and single animals are encountered along the entire shore. On Bering Island the larga occur primarily on the stretch from Cape Waxell to Cape Monati(on the eastern side) and from Cape Monati to Gladskovskaya Bay(on the western side). The largest number of them was counted by us in Kazarma Bay(200 head).

The total number of larga on Bering Island amounted to 600 head. Outside the indicated limits the larga is encountered comparatively seldom. Individual seals were observed by us infrequently in Nikol'skaya Bay, on Cape Yushin, in Sarannaya Bay and in other places.

HABITATS.

The larga-rookery on the north-western tip of Ostrov Medny is situated on the sandy "Koshka", which during high tide is almost completely covered by water. The remaining rookeries of this island are situated on the rocky ledges of the shore, or on rocks protruding above the water(Zabobrovaya, Zapalata bays). Most of the larga rookeries on Ostrov Medny are situated in the spray-zone or above it. On the other hand, the rookeries on Bering Island are not constant and are, to a considerable extent(with the exception of the rookery in Kazarma Bay), related to the littoral. The larga do not frequent the strand of the entire eastern shore of Bering Island; they adhere to the region of the Barrier reef.

The food-biotope of the larga on the islands are the near-shore shallow waters, which are overgrown with sea kale, primarily with wing-kelp. Even when frightened from the rookery the animals scatter along the shore and do not go far into the sea. Thus the

main cycle of the vital activity of the larga here is restricted by a one-mile strip.

We have not observed essential moves of the larga in the area of the Commander Islands. The places of its concentrations are relatively stable throughout the year; after having been frightened the seals soon return to the former places.

PECULIARITIES OF REPRODUCTION.

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When comparing our observations made on the Commander Islands with the data contained in the literature of the 30's-40's one could assume that the gestation period of the larga varies. In those cases when the larga, during the whelping period, is connected with ice (for instance, in the Sea of Okhotsk) and the pup passes through the "whitecoat" stage, gestation lasts nine months. However, in settled populations, which stay in the areas of non-freezing shores (in particular at the shores of the Commander Islands), where "whitecoats" are encountered extremely rarely, gestation, evidently, lasts 10-11 months.*

We observed the activity of sexually mature larga and the nuptial playing on the Commander Islands in June-July, but the birth of the young- until the end of June. Offspring in the "whitecoat" garb were not encountered by us; but the hunters S.S. Grigoryev and V.I. Khabarov on rare occasions, primarily in May, observed larga "whitecoats"

---*--- Actually gestation (including the delay of the implantation of the of the blastocyst) in the pagetodic form (the larga proper) lasts 11 months. It is the same also in the pagophobic forms, including also the Commander form (Remark by the editor).

in the area of Labobrovaya Bay. However, since 1952 we have not heard that any of the hunters had encountered a newborn pup or a foetus in "whitecoat"(juvenile) fur. Nevertheless facts of a comparatively early detection of pregnant larga with a foetus in a smooth-haired spotty fur ^{are known}. Such a fully developed foetus was extracted from a female larga by I.P. Tomatov, an inspector of seal conservation, in the early part of April.

Apparently the moult in the case of the Commander larga takes place within the uterus(intra-uterine), which is confirmed by the detection of samples of juvenile hair in the rectum of newborn larga pups. Under the conditions on the Commander Islands the moult, which transpires during the embryonic period, undoubtedly is of advantage to the offspring of the larga, for here the pup is literally compelled to enter the water immediately after being born.

The following data(table 4) throw light upon the age-composition and upon certain differences in the Commander population due to age.

These data confirm the supposition voiced by M.M. Sleptsov(18) that the measurements of the sexually immature females vary from 96 to 139 cm, those of sexually mature females vary from 145 and more.**

There should be no disruption in the size of the body, which characterizes the sexually mature and sexually immature specimens, in a population. The occurrence of it in the table is due to the small number of specimens at the disposal of the researcher. Concerning the reference to M.M. Sleptsov, it is not convincing for the same reason and also because of the fact that the data of the author mentioned pertain to the "ice" form and not to the insular form(remark by the editor).

Table 4.

Measurements and weight of puerperous and non-puterous lar-
ga from the Commander Islands

Number of specimens	Generative condition of female	Zoological length cm	Axillary circumference	weight, kg	Thickness of subcutaneous fat or blubber, mm
9	Non-puterous	114-135	75-95	35.6-54.5	30-56
10	Puerperous	150-197	98-125	68.0-133.2	30-65

NUTRITION

The material on the nutrition of the larva of not only this area, but also of other places of the Far East is very scant. Many authors (14, 15, 2, 22) point to the larva as a mainly ichthyophagous seal. According to the data by S. F. Naumov(19) the larva feeds most intensely upon fish in summer, during the feeding period, but during the remainder of the year its activity in the search of food is ¹³²reduced and crustaceans occur in the food. Almost all authors mention a concentration of larva near salmon streams and even in their estuaries.

According to I.I. Barabash-Nikiforov(1) in winter and in early spring the stomachs of the larva on the Commander Islands contain mainly molluscs, including cephalopods, crabs and gephyrea, but also small crustaceans. Infrequently fragments of algae are detected. In spring and summer, in the opinion of the same author, the food of the seals contains atka fish(mackerel), lumpfish and gobies.

F. Wilkie(23) points out that on Amchitka Island the stomach of a larva killed in March contained cephalopod molluscs and lumpfish.

We have not conducted special research in respect to the nutrition of the larga. However, the data in literature show that in summer the larga feeds upon lumpfish, "eight-line"(perhaps"bars".Tr.) hexagrammids, but also upon salmonids. The latter are extremely rarely encountered in the stomachs.

It is very noteworthy that we never encountered larga-concentrations near the estuary of salmon rivers. Very indicative is the fact of the absence of larga(individual specimens are very rarely observed here) in Sarannaya Bay in the estuary of the river of the same name, which is the largest migratory salmon river of the Commander Islands. Furthermore, comparatively close(10 km) throughout the year from 50 to 100 larga stay on Cape Lonki. Therefore one cannot accept the definition of the local larga as a companion of the " area of Salmonidae"(21).

It can be assumed that on the Commander Islands there is everywhere a sufficient supply of fish in summer and that this abundance of food stops the larga from going in search of salmon. It is true, that in most of the other places of the littoral zone of the Pacific and, in particular, in the sublittoral, there is an abundance of food objects in summer. In connection with this it is necessary to approach with closer attention the question of determining the actual loss caused by the larga to salmon-fishing in its various habitats.

SOME FEATURES OF BEHAVIOR

In a number of works(15, 13, 14) the larga is characterized as a very wary seal.

This is confirmed also by our observations on the Commander Islands. There the larga is the most wary of all animals. Apparently its sight and hearing are better developed than in other seals and it quickly notices danger. Furthermore, the larga takes advantage of warning signals uttered by other animals (gulls, murre, fur seals and polar foxes). It is almost impossible to approach larga resting in an open area, if gulls are resting near them.

The larga, when frightened from the rookery, swim for a while near-by, eyeing the disturber of the peace and soon disperse along the shore. However, if the offspring remained on the shore the females usually remain in the vicinity, uttering long groans that resemble the vernal cry of the bittern.

In places, where the larga are not being bothered for years, they are more "trusting" or rather curious. This was observed repeatedly by us in Zapalata and Zabobrovaya bays. The young ones are usually less wary, at times they, with curiosity, watch a human being that has appeared and often become his victim.

INTERSPECIFIC INTERRELATIONS

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The larga is a constant member of the biocoenosis of the Commander Islands. Therefore, first of all it is necessary to ascertain its effect and interrelations in respect to the species most valued by us, such as the Kamchatka beaver (*Enhydra lutris*) and the fur seal.

According to observations(9) it is said that "the Kamchatka beavers do not like the company of seals". It is true we have not heard in the area of the Commander Islands that the Kamchatka beaver is

being pursued by seals. But the following fact is known: In 1954 into an enclosure where *Enhydra lutris* were kept on Bering Island a *Phoca hispida* was released. It began to chase the "kalan" (*Enhydra lutris*), who rushed about in the basin and the seal soon had to be removed. Apparently, the larga, larger than the "akiba" (ringed seal) was able to attack the "kalan" more aggressively. S. D. Pereleshin(16) reports a case when a large seal pursued a "kalan" for a long distance along the shore of Urup Island and stopped the chase only after the "kalan" had met with its "kinsmen". Of course, there also exist data of an opposite nature. According to stories told by the hunters S.K. Ladygin and A.F. Pan'kov, a larga enmeshed in a net together with a "kalan" was attacked and even bitten by the latter.

When observing "kalan" and "larga" in places of their joint habitat we always noticed their tolerance of each other, although we never noticed that the "kalan" and larga made use of the same resting places simultaneously.

The larga also live well with fur seals and sea lions: Small groups of them are encountered in the area of a fur seal rookery; at times these seals rest side by side with fur seals. On the other hand, any "hostile manifestations" towards the larga by the sea lions have not been noticed by us. According to E. A. Fikhomirov(20) the occurrence of seals in the nutrition of large sea lions is not such a rare phenomenon.

Blue foxes invade the rookeries of the larga, especially during the whelping period. Apparently the foxes are attracted by the

placentae and the possibility to feast upon dead pups. According to the observations by S.L. Golodov the foxes at times tear to pieces also the live pups of ringed seals. The larga, according to our observations, usually leave for the water, when a fox appears. Perhaps this is a confirmation of what was said above about the attacks of polar foxes upon the offspring of seals.

I think that with an increase in the number of the larga its interrelations with the fur seal and the "kalan" (especially with the latter) can change and assume the nature of a direct negative action. In connection with this it must be borne in mind that the larga is a predator and that literature contains reports concerning attacks by it upon warm-blooded animals(15, 13). Furthermore, the larga can represent a danger also in the epizootological aspect. It is true, the questions of its diseases have hardly been investigated. There exist only a few data on the helminthoses of the larga. According to S. L. Delamur(7) and M.M. Belopol'skaya(3) 22 species of helminths were detected in this seal. Of them more than 7 species are common to the larga, the fur seal and the sea lion. It is characteristic that all the larga examined by M.M. Belopol'skaya were infected with helminths.

Since the larga maintains a fairly regular contact with the "kalan" and the fur seal by using the same resting places and the same foods, one cannot but regard it as undesirable in these places by reason of spreading helminthous diseases, which often are of serious consequences(7) and as a competitor of the "kalan" in respect to resting places and in winter in respect to food.

Of the enemies of the larga on the Commander Islands, besides the blue fox and partly the "kosatka" (bagrid catfish or killer whale? Tr.), one can point to the rarely appearing sea-eagles. However, at present none of these animals inflicts any serious harm upon the larga. The larga is a coastal denizen of the shallows and reefs; for this reason it is not readily accessible for the "kosatka". The polar fox cannot reach most of the resting places. Sea-eagles do not occur on the Commander Islands during the whelping period of the larga.

Commercial exploitation. At present there exists no organized larga-hunting. It is being hunted in winter by hunters, who hunt the polar fox. From time to time special excursions are made to the rookeries, primarily to Zabobrovaya Bay and to the Severo-Zapadnaya Okonechnost (Northwestern Point). The difficulty of hunting larga has been mentioned by a number of researchers (13, 17, 14).

As already mentioned, the larga is an extremely wary animal and rarely lets a human approach to within gun-shot.

At present larga on the Commander Islands are killed mostly with shots from small-bore rifles. It has been demonstrated that their effective fire differs little from that of a carbine. At the same time the seals are less frightened by shots from it and swim for a longer time near the shore from which they were frightened.

As a rule, all the females, which were killed "on the water" in spring and in the early part of summer, remain afloat. Of the males and the young almost one half sinks. According to testimony by hunters on Ostrov Medny (Medny Island) and our own observations pregnant females and those that recently gave birth to offspring can be

recognized easily, because besides the head also the back shows above the water. A well-aimed shot at a larga on the water is determined in this way: An animal instantly killed without time to cause a splash submerges in the water and sinks or remains on its surface. However, in the event of a miss or of wounding the larga, frightened by the shot or wounded dives with a great splash.

When shooting at larga on the water many of them sink and in a deep place they cannot be retrieved even from a boat. According to our data in one case when 31 larga were killed 17 were brought in; in another after killing 45 specimens only 25 were retrieved (fig. 3).

Fig. 3. Killed larga of the Commander Islands (photo by the author).

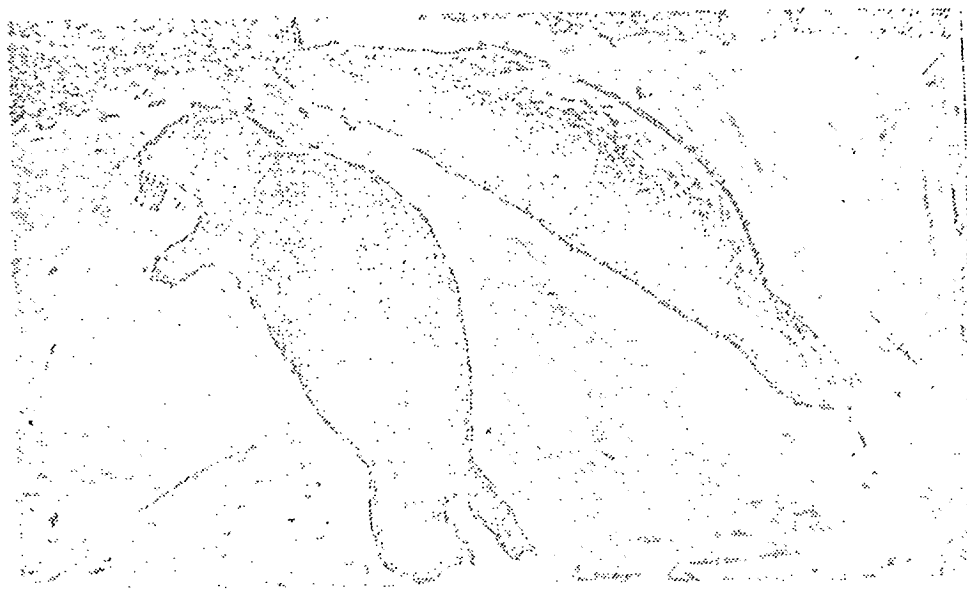


Рис. 3. Убитые командорские ларги (фото автора)

According to our data the year of the maximal yield of larga ¹³⁵ was 1959/60, when 62 specimens were killed on Ostrov Medny and 27 specimens on Bering Island. At present the yield could be easily increased to 100 head per year.

One should make mention of one aspect in relation to larga-

hunting on Ostrov Medny. The concentrations of seals occur in the immediate vicinity of the concentrations of "kalan" (*Enhydra lutris*) and therefore one must exercise utmost caution during the sealing operations (slaughter); here one cannot at all make use of nets and traps.

The larga is of commercial or industrial interest as a source of raw material for leather and fur and of a high-calorie product to feed fur-bearing animals (meat, fat and subproducts).

On the Commander Islands at present the larga skins are used for "podvoloki" on skis (to prevent skidding. Tr.) but the meat and fat are used as food or fed to the dogs.

A total extermination of the larga on the Commander Islands (in view of a possible unfavorable effect upon the "kalan" and the fur seal) is not advisable.

An excessive exploitation of the largest resting places of this seal can in a short time disperse or exterminate it completely.

SUMMARY.

The larga-population of the Commander Islands is represented, in the main, by the pagophobic form and consists at present of 1500 head. It differs from the larga of the Sea of Okhotsk by its morphological and ecological peculiarities. They are large seals with a fur of spots and rings. Exclusively spotted specimens are rarely encountered.

The larga of the Commander Islands are of the "settled" kind and always stay in the coastal zone. Their diet is characterized

by a large share of invertebrates and a rare occurrence of salmonids. On the Commander Islands the larga do not concentrate at the estuaries of salmon rivers.

The reproduction of this population differs from that of the pagetodic larga. Gestation lasts about 11 months. The "white-coat" garb is lost in an intra-uterine manner. The newborn pups wear the "final" garb.

The yield of the larga of the Commander Island can be increased to 200 head. The killing must be done with a small-bore rifle. On Medny Island, when hunting larga, caution and discretion must be exercised, since its biotopes and the biotopes of the "kalan" (*Enhydra lutris*) coincide.

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