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The edition of authors' separates from the present volume was 250, of which 100 were for the authors, 100 for the Library exchange list, and 50 were placed on sale with the Librarian. Of several of the articles an additional 100 copies were ordered by the authors.

The distribution of the Bulletin in signatures has been discontinued.

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AMERICAN MUSEUM OF NATURAL HISTORY.

VOLUME XIII, 1900.

**Article I.—THE MOUNTAIN CARIBOU OF NORTH-
ERN BRITISH COLUMBIA.**

By J. A. ALLEN.

The Museum has recently received, through the liberality of Mr. James M. Constable, a series of specimens of the Mountain Caribou of northern British Columbia, recently described by Mr. Ernest Seton-Thompson, under the name *Rangifer montanus*.¹ Mr. Seton-Thompson characterized the species from a mounted specimen in the museum of the Canadian Geological Survey at Ottawa, "taken in the Illecillewaet watershed, near Revelstoke, Selkirk Range, B. C., in 1889." The specimens here described were taken by Mr. A. J. Stone during his recent expedition to British Columbia and the Northwest Territory in the interest of the American Museum of Natural History, under the patronage of Mr. Constable. They were killed in the Cassiar Mountains, about sixty miles south of Dease Lake, September 15-26, 1897. It was then too late in the season to get them further than the trading house at Dease Lake till the following spring, and owing to other accidental delays they did not finally reach the Museum till November, 1899, more than two years after they were collected.

Mr. Stone, writing to me of these specimens, under date of June 30, 1898, from Fort Simpson, N. W. T., says: "In a conversation with you while in New York in April, 1897, you expressed a belief that there existed a third variety of the Caribou in the Northwest, but I could not flatter myself with reaching them so easily." He further refers to its large size, and says he

¹ The Ottawa Naturalist, Vol. XIII, No. 5, August, 1899, pp. 129, 130.
[March, 1900.]

considers them to be as much larger than the Woodland Caribou of Canada and Maine, as the latter is larger than the Barren Ground Caribou. It happened, however, that while this fine series of six specimens was en route to the Museum, the species was described and named, as above stated. Although there are various important discrepancies between the measurements given



Fig. 1. *Rangifer grænlændicus*, ♂ ad., No. 10197, Holsteinborg, Greenland; Prof. L. L. Dyche. $\frac{1}{2}$ nat. size.

by Mr. Seton-Thompson from a mounted specimen and those taken from specimens in the flesh by Mr. Stone, there is apparently no good reason for not considering the two forms as

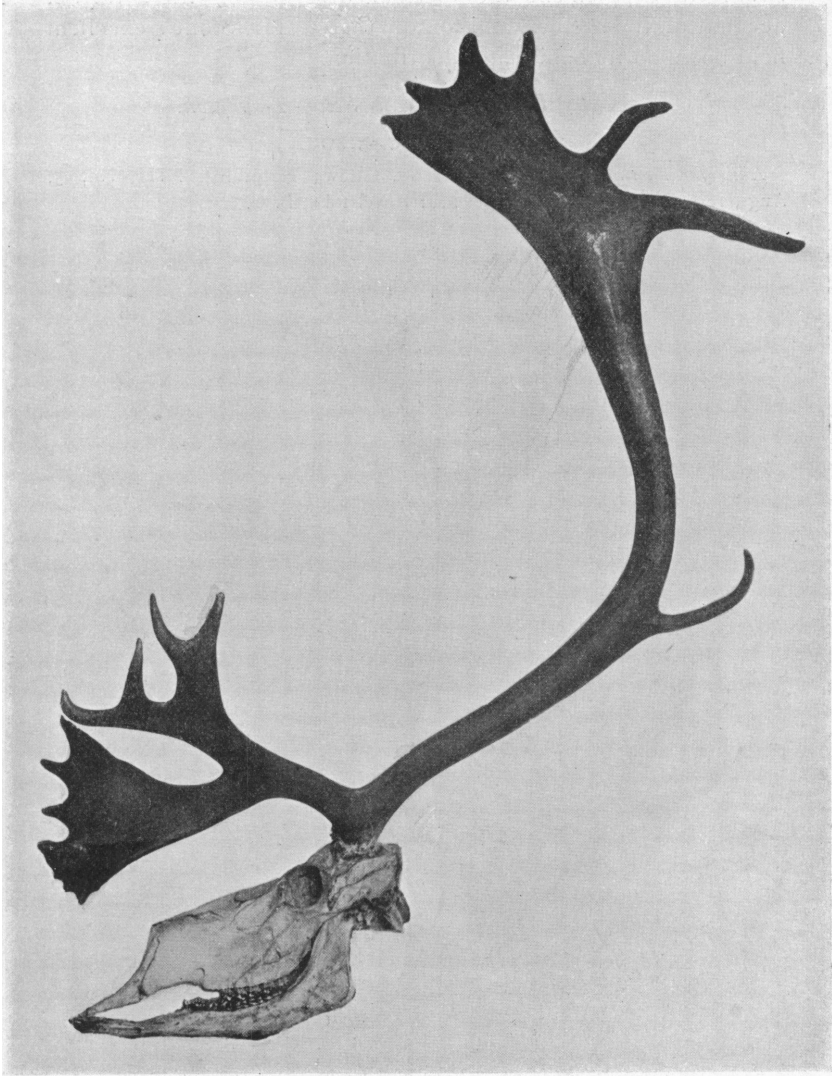


Fig. 2. *Rangifer montanus*, ♂ ad., No. 15714, Cassiar Mts., B. C.; A. J. Stone. $\frac{1}{3}$ nat. size.

specifically identical, the discrepancies in measurements being doubtless due to the faulty taxidermy of the mounted specimen.

With Mr. Stone's series of specimens before me, it seems desirable to supplement the original description with a further account of the species, and to add thereto Mr. Stone's excellent field notes on its habits and distribution.

***Rangifer montanus* Seton-Thompson.**

MOUNTAIN CARIBOU.

Rangifer montanus SETON-THOMPSON, Ottawa Naturalist, XIII, No. 5, Aug., 1899, 129. Selkirk Range, near Revelstoke, B. C.



Fig. 3. *Rangifer montanus*, ♂ ad., Cassiar Mts., B. C.; Coll. A. J. Stone. $\frac{1}{3}$ nat. size.

Adult Male, in September. — General color above clove-brown, darkest on the head, back; thighs, and lower edge of the sides of the chest, and still darker, blackish brown, on the breast and limbs; muzzle, including the whole end of the nose and front border of the lower lip, silvery grayish white, succeeded by a broad band of blackish brown, which fades posteriorly on the sides of the head and below into the general color, but extends broadly over the front part of the head to the eyes; neck all round brownish gray, lighter on the sides than above, becoming nearly white in front; the gray color of the sides of the neck extends posteriorly over the anterior part of the shoulders, and is continued as an ill-defined broad band on the sides of the chest; ventral surface, from the chest posteriorly, grayish white, passing into pure white posteriorly and on the inside of the thighs; rump patch white, large and sharply defined; tail above centrally dark brown like the back, broadly edged and tipped with white; a narrow band of pure white borders the hoofs; ears externally dark brown, mixed with gray and edged with blackish; internally much lighter, becoming light gray at the inner base. In one specimen there is a broad band of whitish gray above and below the eye, forming an imperfect eyering; but this seems exceptional, and is probably a remnant of the summer coat, the majority of the specimens having the eye region dark like the adjoining parts of the face.

The female does not appear to differ materially from the male. The young of the year, however, is much lighter than the adult, having the whole ventral area white, and the whole neck and the sides much lighter; the dark color of the upper parts is lighter and restricted in area to the middle of the back from the shoulders posteriorly; the tail is all white except at the base above.

Measurements.—The following are the collector's measurements taken from the freshly killed specimens before skinning, to which are added, for comparison, the measurements of the type specimen, from a mounted example, as given by Mr. Seton-Thompson.

	No. 4 ¹ ♂ ad.	No. 5 ♂ ad.	No. 6 ♂ ad.	No. 7 ♂ ad.	No. 8 ♀ ad.	No. 9 ♀ juv.	Type, ♂ ad.
Total length.....	2083	2057	2210	2172	1930	1499	2413
Tail.....	152.4	152.4	152.4	152.4	177.8	114.3	127
Height at shoulder.....	1321	1270	1346	1397	1245	991	1081
Hind limb to hip.....	1295	1334	1245	1359	1145	965	....
Length of hind foot.....	610	635	635	597	597	522	660
Fore leg to elbow.....	597	584	610	646	521	432	....
Width of chest.....	326	326	368	368	305	229	....
Depth of chest.....	775	787	787	749	711	610	....
Ear ² from crown.....	....	....	140	140	....	....	190.5
“ “ notch.....	....	....	115	120	....	....	....

¹ Collector's numbers. No. 6 = Mus. No. 15714; No. 8 = Mus. No. 15715; No. 9 = Mus. No. 15716. The original measurements, given in inches, are here reduced to millimetres.

² Measurements from dry skins, exclusive of hair.

Skull. — In addition to its large size, the skull of *R. montanus* is peculiar in the unusual elongation of its facial portion. The antlers are similar in length and proportions to those of the Barren Ground Caribou, but more massive, with the palmated portions much broader and heavier. (See Figs. 1-6.)

COMPARATIVE MEASUREMENTS OF SKULLS OF CARIBOU.

	<i>R. montanus.</i>		<i>R. grænlandicus.</i>			<i>R. terranova.</i>
	♂ ad. ¹	♀ ad. ²	♂ ad. ³	♂ ad. ⁴	♀ ad. ⁵	♀ ad. ⁶
Basal length	420	360	364	375	305	350
Tip of premaxilla to tip of nasal..	125	100	109	115	84	88
Tip of premaxilla to alveolus of first premolar	148	126	122	121	99	114
Length of nasals.....	123	122	94	111	97	124
Greatest orbital breadth	152	156	168	164	152	157
“ anteorbital breadth (above m ²).....	127	113	117	115	106	93
“ zygomatic breadth.....	148	136	144	141	126	126
Mastoid breadth.....	149	116	128	126	101	112
Palatal breadth at m ¹	73	62	72	61	56	54
Distance between tips of paroccipital processes	89	80	72	64	63	77
Depth of skull between antlers...	112	86	102	94	77	82
Length of upper toothrow (crown surface).....	99	97	89	98	81	92
Diastema (canine to pm ⁴).....	72	59	60	55	52	55
Distance between antlers just below burr.....	78	53	45	64	57	61
Distance between outer edge of antlers just below burr.....	135	95	125	116	84	102
Length of mandible, incisive border to angle.....	330	280	283	280	256	255
Angle to condyle.....	109	102	106	106	83	95
“ tip of coronoid.....	148	137	146	148	115	128
Depth of mandible at m ³	38	31	35	32	28	29
Length of lower toothrow.....	103	103	105	97	96	97
Diastema	130	108	99	100	87	95
Antlers, length of main beam....	1235	405	1246	1000	400	580
“ distance apart at point of palmation.....	875	146	973	860	255	335
“ distance between tips of front tine.....	790	—	687	655	320	194
“ breadth of points at tip of main beam.....	415	100	315	278	65	320
	555	—	410	575	—	—

¹ Collector's No. 7, ♂ ad., Cassiar Mts., northern British Columbia, Sept., 1897, A. J. Stone.

² Museum No. 15715, ♀ ad., Cassiar Mts., northern British Columbia, Sept., 1897, A. J. Stone.

³ No. 10197, ♂ ad., Holsteinborg, Greenland, Prof. L. L. Dyche.

⁴ No. 10195, ♂ ad., Holsteinborg, Greenland, Prof. L. L. Dyche.

⁵ No. 14236, ♀ ad., Northern Greenland, Lieut. R. E. Peary.

⁶ Adult ♀, Humber River, Newfoundland.

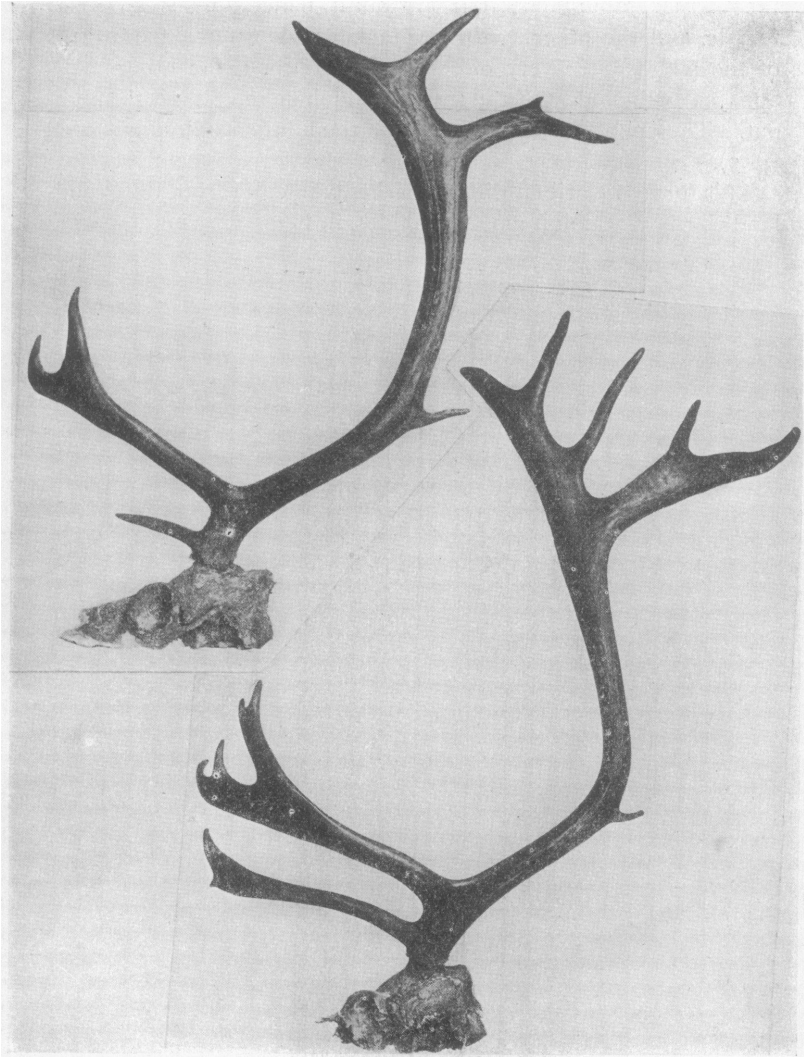


Fig. 4 (upper figure). *Rangifer montanus*, ♂ ad., Cassiar Mts., B. C. ; Coll. A. J. Stone. $\frac{1}{3}$ nat. size.

Fig. 5 (lower figure). *Rangifer montanus*, ♂ ad., Cassiar Mts., B. C. ; Coll. A. J. Stone. $\frac{1}{3}$ nat. size.

Of the six specimens of *R. montanus* collected by Mr. Stone in the Cassiar Mountains, four are adult males, one is an adult female, and the other a yearling female. The female and three of the males agree very closely in coloration; the other male, apparently the oldest of the series, is much paler colored throughout. The young female differs from the adults as already stated (p. 5).

This form of Caribou differs markedly in color from the Woodland Caribou, which it most resembles, in being very much darker

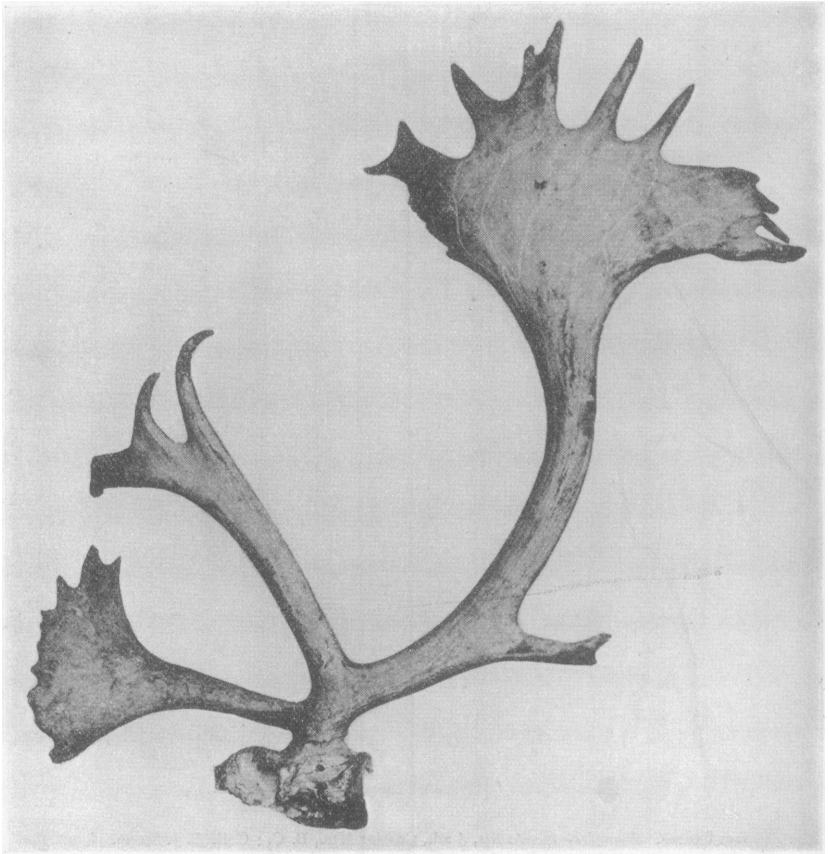


Fig. 6. *Rangifer montanus*, ♂ ad., Ho-tai-luh Mts., Cassiar District, B. C. Antlers unusually developed. Coll. A. J. Stone. $\frac{2}{3}$ nat. size.

throughout, in its larger size, longer and heavier antlers, and in the large size of the white rump patch, which is practically obsolete in the other forms of the genus, or, at least in the lighter forms, very indistinctly defined. This patch, measured across the base of the tail, has a breadth of 250 mm., but is divided through the middle by the dark band, 50 mm. wide, that passes down the tail, the white patch being thus separated into two areas, each with a transverse width of 100 mm.

The most remote ally of *R. montanus* is *R. terrænovæ*, not only geographically but in coloration and structural characters. *R. montanus* has the facial portion of the skull elongated and slender, in contrast with the short, thick skull of *R. terrænovæ*. In *R. montanus* the antlers are very long, yet heavy and massive in comparison with those of *R. grælandicus*; in *R. terrænovæ* the antlers are still more massive, but much shorter than in *R. montanus*. The differences in the skull and antlers of these three forms are well shown in the accompanying illustrations.

Unfortunately there is lack of material for satisfactory comparison of the different forms of this genus. While the Museum has mounted specimens of *R. caribou*, *R. terrænovæ*, *R. grælandicus*, and *R. montanus*, and additional skins and skulls of most of them, the skulls are in few cases comparable, being either more or less imperfect or very unlike in age. For the use of a fine series of adult male skulls of the Newfoundland Caribou, from which the accompanying photographs were taken, I am indebted to Mr. A. C. Humbert of this city; unfortunately these heads were mounted before I was able to measure them. The female skull of the Newfoundland Caribou here figured (kindly loaned to me by Mr. J. Rowley) has unusually large antlers for a female, and in this respect is not quite normal.

Doubtless when series of specimens of Caribou from different parts of Alaska, including the tundra district west of the Mackenzie Delta, and from different parts of the Northwest Territory, are brought together, it will be found that the Caribous of the region north of the United States are differentiated into quite a number of well-marked local forms as yet undescribed. This is the opinion of Mr. Stone, who has observed them at various different points, and has obtained much information respecting their distribution, as set forth in his paper on the large mammals of the

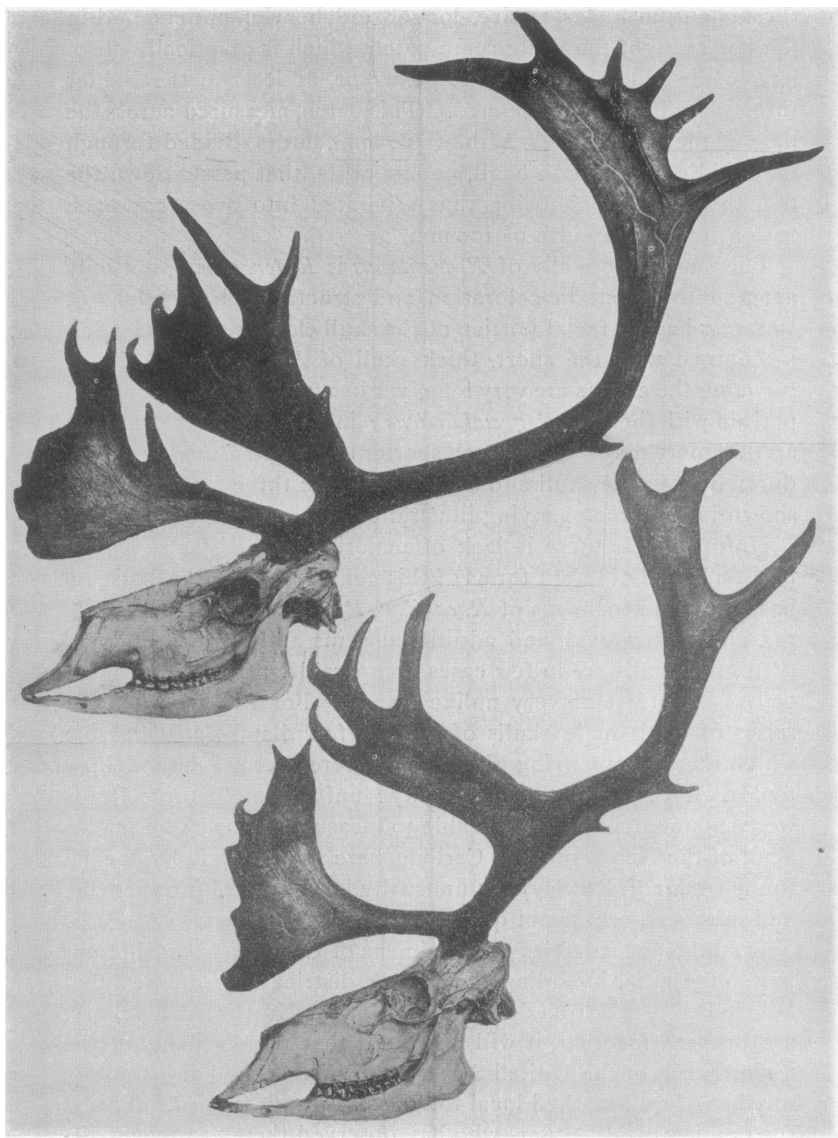


Fig. 7 (upper figure). *Rangifer terranovae*, ♂ ad., Humber River, Newfoundland. Coll. A. C. Humbert. $\frac{1}{3}$ nat. size.

Fig. 8 (lower figure). *Rangifer terranovae*, ♂ ad., Humber River Newfoundland. Coll. A. C. Humbert. $\frac{1}{3}$ nat size.

North (*postea*, Article V). The present form, *R. montanus*, appears to inhabit about the same section of country as the dark form of the Mountain Sheep (*Ovis stonoi*), and, as regards coloration, is a parallel form.

As a contribution toward a better knowledge of our Caribou I present herewith a series of illustrations of the skulls of three

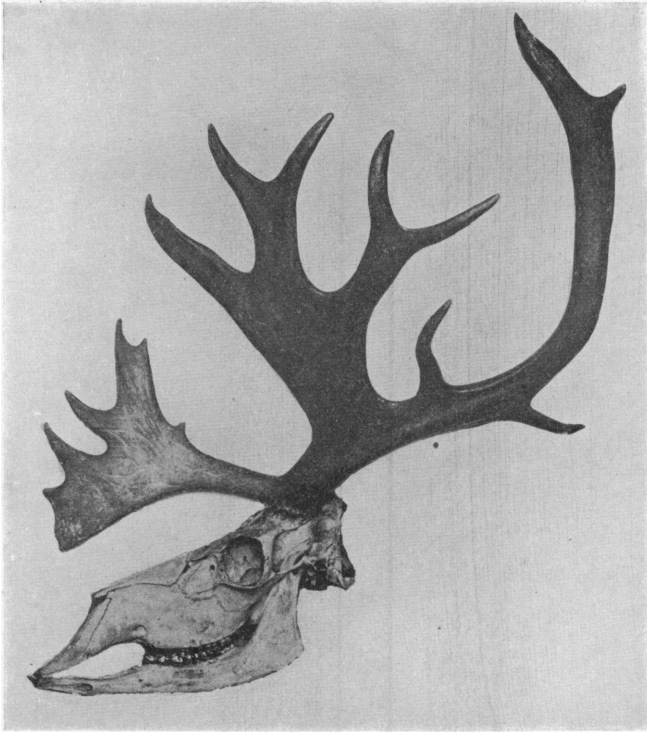


Fig. 9. *Rangifer terranovæ*, ♂ ad., Humber River, Newfoundland. Coll. A. C. Humbert. $\frac{1}{3}$ nat. size.

of the forms, namely, *Rangifer montanus*, *R. grænländicus*, and *R. terranovæ*, all photographed to the same scale, by my assistant Mr. John Rowley, Chief of the Department of Taxidermy. The series of *R. montanus* includes four adult males and an adult female, and an additional pair of weathered antlers. The series of *R. terranovæ* includes three adult males and an adult female,

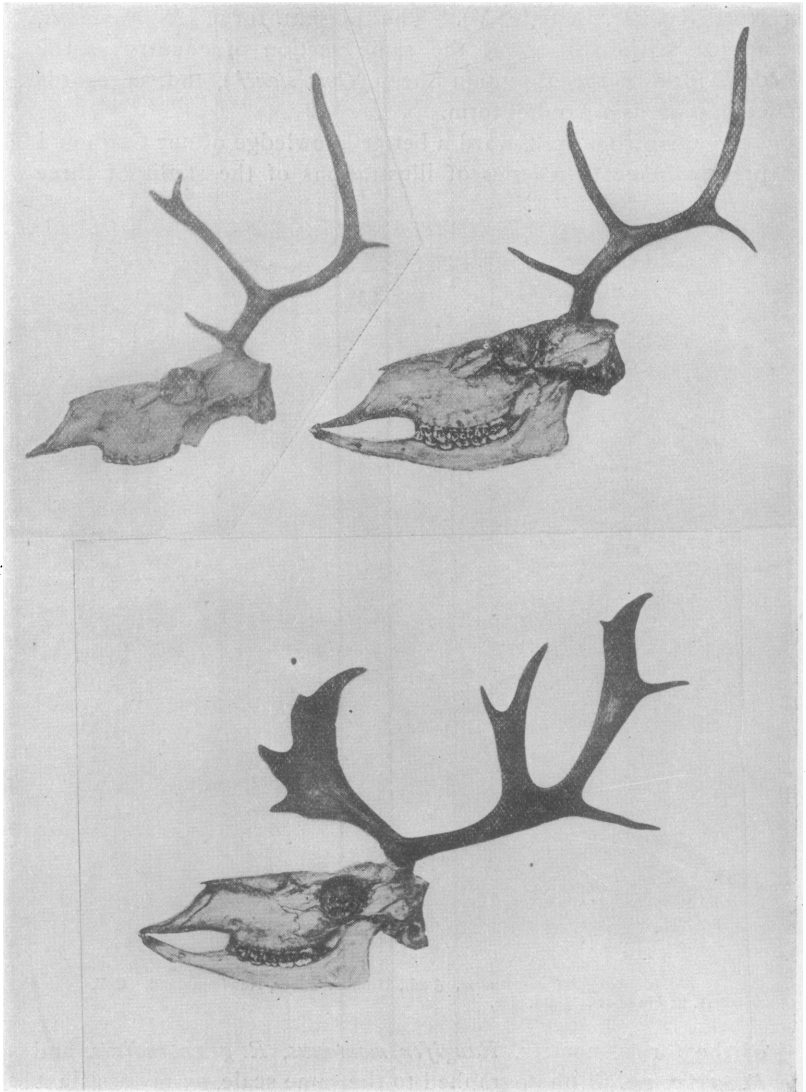


Fig. 10 (left upper figure). *Rangifer grænlandicus*, ♀ ad., No. 14236, North Greenland; Lieut. R. E. Peary. $\frac{1}{3}$ nat. size.

Fig. 11 (right upper figure). *Rangifer montanus*, ♀ ad., No. 15716, Cassiar Mts., B. C.; A. J. Stone. $\frac{1}{3}$ nat. size.

Fig. 12 (lower figure). *Rangifer terranove*, ♀ ad., Newfoundland. Coll. F. D. Pelton. $\frac{1}{3}$ nat. size.

the latter with exceptionally large antlers. Photographs of only two examples of *R. grænlandicus* are given, an adult male and an adult female, but both are typical, well developed specimens, as shown by the Museum series of this species.

Beginning with *R. grænlandicus*, the specimen shown in Figure

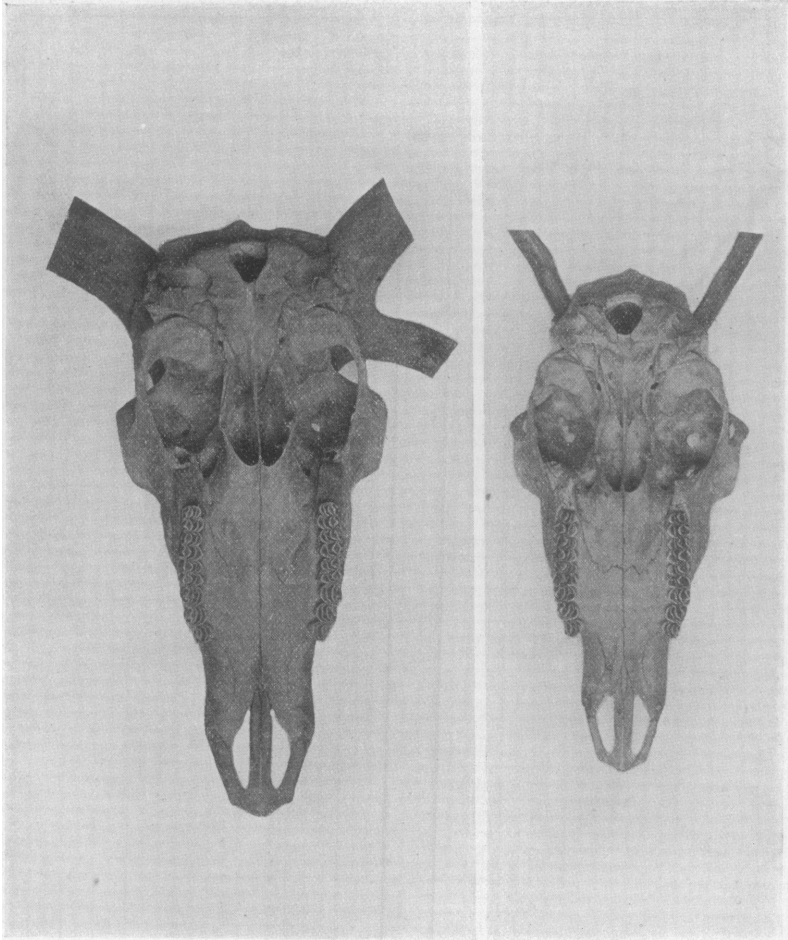


Fig. 13 (left figure). *Rangifer grænlandicus*, ♂ ad., No. 11097, Holsteinborg, Greenland; Prof. L. L. Dyche. $\frac{1}{2}$ nat. size. From same specimen as Fig. 1.

Fig. 14 (right figure). *Rangifer grænlandicus*, ♀ ad., No. 14236, North Greenland; Lieut. R. E. Peary. $\frac{1}{2}$ nat. size. From same specimen as Fig. 10.

1 is strictly comparable with the specimen of *R. montanus* shown in Fig. 2. While the general form of the antlers is the same in both, they are much thicker in the beam, and heavier in the pal-mated parts in *R. montanus*. The skull is also much larger and heavier, and quite different in the frontal outline.

In Figures 3, 4, and 5 are shown other examples of antler in

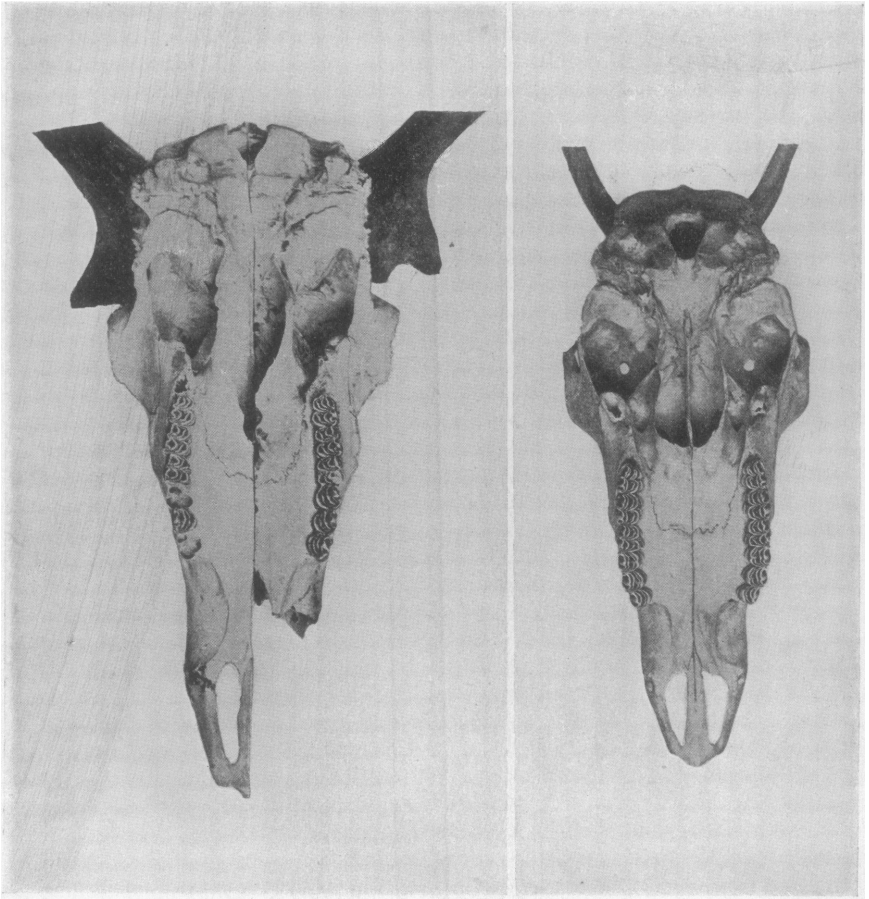


Fig. 15 (left figure). *Rangifer montanus*, ♂ ad., No. 15714, Cassiar Mts., B. C.; A. J. Stone. $\frac{1}{2}$ nat. size. From same specimen as Fig. 2.

Fig. 16 (right figure). *Rangifer montanus*, ♀ ad., No. 15716, Cassiar Mts., B. C.; A. J. Stone. $\frac{1}{2}$ nat. size. From same specimen as Fig. 11.

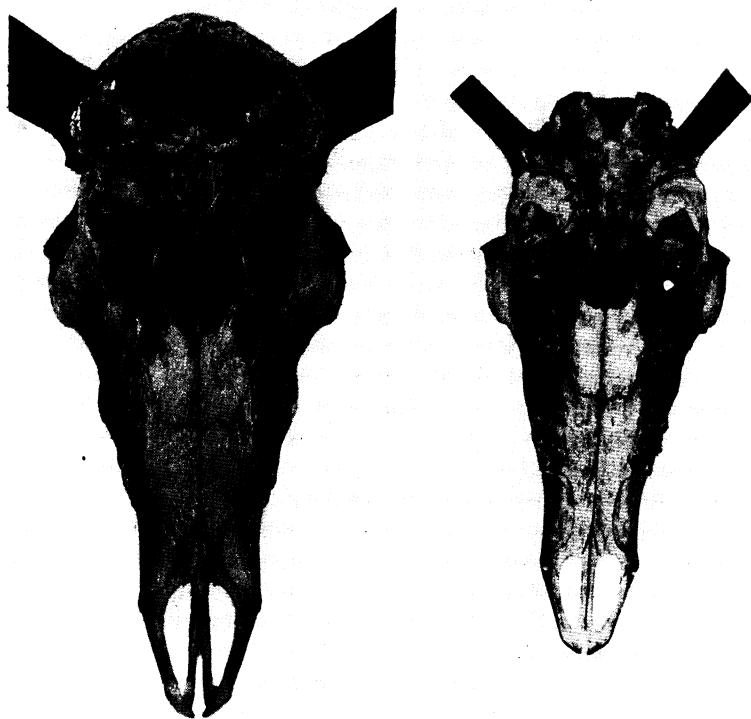


Fig. 17 (right figure). *Rangifer terranova*, ♂ ad., Humber River, Newfoundland. Coll. A. C. Humbert. $\frac{1}{2}$ nat. size. From same specimen as Fig. 7.

Fig. 18 (left figure). *Rangifer terranova*, ♀ ad., Humber River, Newfoundland. Coll. F. D. Pelton. $\frac{1}{2}$ nat. size. From same specimen as Fig. 12.

R. montanus. All are from practically adult males, but the smaller and lighter forms doubtless represent younger animals than the one shown in Fig. 2.

The antler presented in Figure 6 represents doubtless an unusually heavy development of antlers in *R. montanus*. The pair was found by Mr. A. J. Stone, in 1896, in the Ho-tai-luh Mountains, a western spur of the Cassiar Mountains, in northern British Columbia, and hence within the range of *R. montanus*; this pair was saved by Mr. Stone on account of its unusual size and form.

Figures 7 to 10 represent variations in the antlers of *R. terrænovæ*. Fig. 7 may perhaps be taken as typical, and as strictly comparable with Fig. 1, *R. grælandicus*, and Fig. 2, *R. montanus*. In the heavy palmation and relative shortness of beam, *R. terrænovæ* is strikingly different from the other two forms, and the skull is relatively short and heavy. I have previously given a figure of the male antlers of this species (this Bulletin, VIII, pl. x), which shows the heavy branching of the antlers characteristic of this species.

Figures 10 to 12 illustrate the skulls of females of the same species. Fig. 10 represents the skull of an adult female of *R. grælandicus*. Fig. 11 shows an average female skull of *R. montanus*—the only one thus far examined, but it is apparently an average, normal example. Fig. 12 represents a skull of *R. terrænovæ*, with unusually large antlers, but otherwise normal. A more normal antler of the female of *R. terrænovæ* has previously been figured in this Bulletin (Vol. VIII, pl. xi, Fig. 2).

As a further contribution to this subject I add views of the ventral aspect of the skull of both male and female of the same three species. All were photographed by Mr. Rowley to a uniform scale, so as to make them strictly comparable. The scale is larger, however, than in the series of figures (Figs. 1-12) of the antlers already given.

Figure 13 represents an adult male of *R. grælandicus*, and Fig. 14 a female of the same species.

Figures 15 and 16 give corresponding figures of male and female skulls of *R. montanus*. The striking difference in size is at once noticeable, as is also the greater facial elongation of the skull in *R. montanus* as compared with *R. grælandicus*.

Figures 17 and 18 show male and female skulls of *R. terrænovæ*. Compared with the skulls of *R. montanus*, the latter are obviously longer and broader, and differ in details of conformation. The great size of *R. terrænovæ* as compared with *R. grælandicus* is too evident to call for comment. There are also obvious differences between the two latter species in respect to various details of proportion and structure.

The following notes on *Rangifer montanus*, as observed in life, are from a letter from the collector, Mr. A. J. Stone, dated Fort Simpson, N. W. T., June 30, 1898.

“These large and beautiful animals,” he says, “range through almost the same kind of country as that occupied by the Mountain Sheep [*Ovis stonoi*]. They traverse the very high muskeg valleys that separate the mountain ridges, while the sheep generally pass around them. They range in the mountains wherever the sheep do, with the exception of the most rugged paths shut in by steep rocky cliffs. They rarely visit the timber, and when they do, remain there for only a short time. During severe storms in winter they sometimes wander into the edge of timber, but do not seem to find there the food they desire. Their favorite winter feeding ground is the top of high, bold mountain ridges, which they frequently cross by well beaten paths through the high passes, but seldom descend to low ground. In winter they will paw through the snow for food, but usually seek feeding grounds from which the snow has been blown by the winds.

“The rutting season I find to be almost identical with that of the Moose, or from the last of September to the last of October; the calves are dropped in May. They do not seem to be as prolific as the Moose, only one calf being produced at a birth. The calves grow with great rapidity, far outstripping the growth of our domestic animals, but they do not acquire flesh as rapidly as the domesticated calf. I also find that the breeding season is somewhat irregular. I saw in September two calves that appeared to differ two months in their ages.

“The velvet is shed from the antlers in the males about the first of September, the old males shedding first, and the younger ones later, according to age and condition. The females shed the velvet about a month later than the males, the barren females shedding first, and those with calves and the younger animals later.

“In spring and summer these animals follow the snow line well into the mountains, and here their habits are much like those of the Mountain Sheep. The old males seek the more secluded retreats, where they remain in quiet and rapidly take on flesh. The females remain behind where the elevated tablelands are of greater extent, and are the first to work their way back, in September, to the bald ridges already mentioned, where they are joined by the males. In September and October they may be seen crossing the muskegs from one mountain ridge to another.”
[*March, 1900.*]

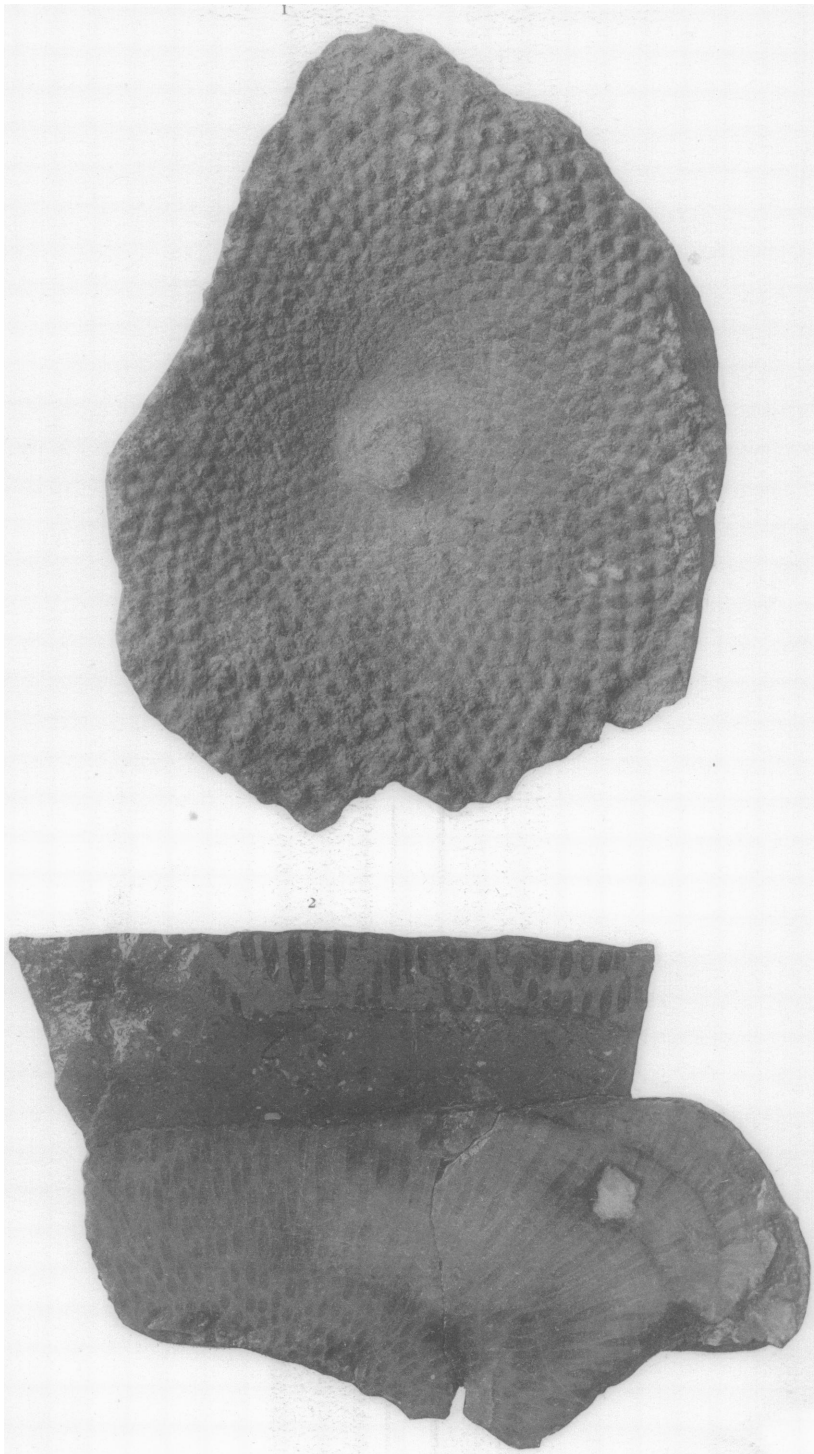
“Their fastest gait is a trot, and they are rarely seen to leap, and then for only two or three jumps. Their motion is peculiar, and very unlike that of the Moose. They stand very erect on the legs when trotting, and move in such a way as to give the appearance of great rigidity to their limbs. Their movements are not graceful, nor yet clumsy, reminding one of a pack horse, trotting under a heavy load; they do not travel as rapidly as the Moose. When trotting they carry the head several inches lower than the back, and straight in front, the nose slightly elevated, and the antlers erect, giving the effect of extreme rigidity. If they wish to look to the right or left they almost invariably stop and turn the entire body in a direct line with head and neck.

“I had no means of weighing any of these animals, but by carefully estimating the meat that came from a large male, and allowing for the gross weight, I was led to conclude that its live weight was about 700 pounds. I believe that full grown males in the fall, when fat, will weigh from 550 to 750 pounds, and that the females will range in weight from 400 to 550 pounds.

“The Indians are very fond of the contents of the stomach that has not yet received its second mastication!; they mix it with the blood of the animal and boil all together into a kind of pudding.”

EXPLANATION OF PLATE I.

- Fig. 1. *Receptaculites pearyi* Whitf., p. 19.
" 2. *Heliolites perelegans* Whitf., p. 21; also showing a vertical section of
R. pearyi on the top.



ARCTIC FOSSILS.

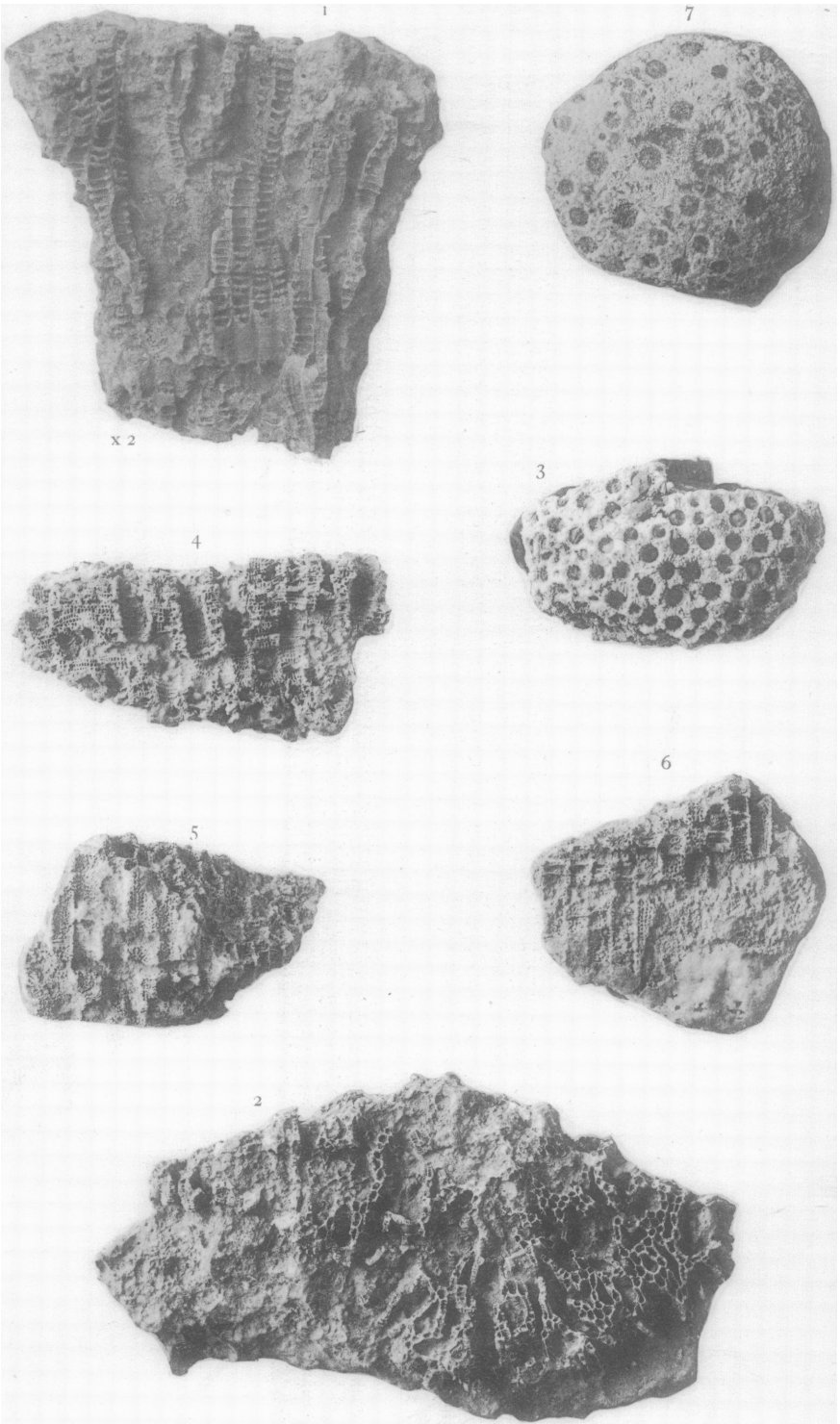
EXPLANATION OF PLATE II.

Halysites agglomeratiformis Whitf., p. 20.

- Fig. 1. Enlargement to 2 diameters of a vertical section showing the tabulæ.
“ 2. View, natural size, of the under surface.

Colopæcia borealis Whitf., p. 20.

- Fig. 3. View of the top of a small colony.
“ 4. Vertical section of a weathered fragment with thick intercellular spaces.
“ 5. Section having no intercellular substance, but numerous mural pores.
“ 6. Vertical section showing mural pores.
“ 7. Top view of a small, convex colony with excessive intercellular spaces.



ARCTIC FOSSILS.

