that it arose from any change in the degree of saturation, with respect to the magnetism in the needle itself, as, in that case, the time of completing the 100 vibrations would have been diminished instead of increased. The great range in the temperatures in which the summer and winter experiments were made, (which in some of them was not less than 110° Fahrenheit, and in most of them 90°,) appears at first to suggest itself as a simple and natural cause for this variation, but if this is the case, it seems to take place chiefly at temperatures below Zero.

OBSERVATIONS of the IMMERSIONS and EMERSIONS of JUPITER'S SATELLITES.—OBSERVATORY, *Winter Island*, 1821—2.

DATE.	Immersion or Emersion	Mean Time at Observatory.	Mean Time at Greenwich.	Longitude of Observatory in Time	REMARKS.
1821.		H M S.		H. M. S.	
December 18	Em. 1st Satellite	10 10 48.1	9 42 16	5 31 32.9	Weather calm and clear—good observation
„ 20	„ „ „	6 6 37	11 38 9	31 32 0	Weather calm and clear—rather hazy
„ 27	„ „ „	8 2 38.6	13 31 6	31 27.1	Fine and clear
1822.					
January 3	„ „ „	9 58 39.2	15 30 5	31 25 8	„
„ 5	„ „ „	4 27 20.5	9 59 4	31 43.5	„
„ 12	„ „ „	6 29 12	11 55 5	31 52	„
„ 18	„ 3d „	5 27 16.5	10 58 10	30 58.5	„
„ „	„ 2d „	9 30 54.5	13 2 16	31 11.5	„
„ 19	„ 1st „	8 19 40.5	13 51 8	31 27.5	„
„ 25	Imm 3d „	6 23 11.5	12 53 26	29 44.5	„
February 4	Em. 1st „	6 40 27.9	12 12 12	31 44.1	Rather hazy—but distinct and steady
„ 11	„ „ „	8 37 15	14 8 10	30 55	In different observation—tremulous from the wind
„ 19	„ 2d „	9 12 6.4	14 43 40	31 33.6	Calm and clear—good observation
„ 27	„ 1st „	8 57 37	12 29 58	31 16	Uncertain to three or four seconds—very tremulous
MEAN, Long. Observatory, Winter Island by 1st & 2d Satellites				H.M. S. 5 31 31.5	Or 82° 52′ 52″.5 W. in space

OBSERVATIONS of the IMMERSIONS and EMERSIONS of JUPITER'S SATELLITES.—OBSERVATORY, *Island of Igloolik*, 1822—3.

DATE.	Immersion or Emersion.	Mean Time at Observatory.	Mean Time at Greenwich.	Longitude of Observatory in Time.	REMARKS.
1822		H. M. S.	H. M. S.		
October 6	Imm. 1st Satellite	10 29 32.6	15 55 53	5 26 20.4	Fine and clear—good observation
November 16	„ 2d „	9 53 25	15 19 46	21	Rather hazy—but distinct and steady
December 9	Em. 1st „	5 45 0.7	11 11 37	36.3	Fine and clear
1823.					
January 24	„ „ „	6 14 29.7	11 40 22	52.3	„
February 23	„ „ „	8 26 37 5	13 53 32	54 5	„
				H. M S.	
MEAN, Long Observatory, Igloolik				5 26 36.9	Or 81° 39′ 15″.5 W. in space.

Longitude of Observatory at Winter Island by Jupiter's Satellites	H m s 5 31 31 5	Captain Parry's Longitude by Lunar's	H m. s. 5 32 40.1
Do. at Igloolik	5 26 36.9	Do.	5 27 36
Difference of Meridians by Jupiter's Satellites	m s 4 54.6	By the Lunars	m s 5 4.1

It will appear from the above comparison, that there is a very considerable difference between the longitudes of each Winter Station, as determined by the lunar observations of Captain Parry, Messrs. Hooper and Ross, (from which the charts were constructed,) and my own determination deduced from the eclipses of Jupiter's Satellites; thus, the lunars were no less than 17′.10″ to the westward at Winter Island, and at the next Winter Station at Igloolik, they were 15′ (in space) more to the westward, than by the eclipses, and they make the difference of longitude a little greater. The chronometrical determination of the difference of the meridians, is probably more accurate than either, from the number of the chronometers, and the interval (between leaving Winter Island, and the time of making the first observations at Igloolik) being not more than 25 days, and upon returning to Winter Island, 26 days;

the following are the results, leaving out those chronometers whose rates, from their irregularity, were not to be depended upon.

By 11 Chronometers in the Fury, taking a mean of last *fortnight's* rates	m. s. 4 53.85	Proceeding from Winter Island to Igloolik, interval 25 days.
By the same, taking a mean of the last *months'* rates	4 48.62	
By 2 Chronometers in the Hecla . . .	4 32.0	
By 6 ,, in the Fury	5 2.4	Returning interval 26 days
By 3 ,, in the Hecla	5 26 0	

By a mean of the determinations upon leaving and returning to Winter Island, the difference of longitude by the Fury's chronometer is $4^m\ 56'.8$, and by the Hecla's chronometers, $4^m\ 59'$. The difference between the meridians, therefore, by the chronometers, is $4^m\ 57'$ very nearly, which agrees within $1'.5$ of that by the eclipse of the satellites of Jupiter, which were observed with a 45 inch achromatic telescope, with a triple object glass by Dollond. The times of immersion and emersion are taken from the *Connaissance des Tems*, allowing $9^m\ 20'$ for the difference of the meridians of Greenwich and Paris. The only corresponding observation of the satellites I can find made upon a known meridian, is an immersion of the second satellite, which was observed at Greenwich, with a similar telescope, on the 16th of November, 1822, at $15^h\ 21^m\ 7'.4$ mean time; the same was observed by myself at the observatory at Igloolik, at $9^h\ 53^m\ 25'$, which makes the longitude $5^h\ 27^m\ 42'.4$ W. By comparing three observations made at Greenwich on the 8th, 22d, and 29th of October, 1822, the observed times are respectively 6, 17, and 6 seconds less than the times as computed from the almanack; by applying the mean of these (*viz.*, 10 seconds) as a correction to an immersion of first satellite on the 6th of October, the time of immersion on that day at Greenwich, is $15^h\ 55^m\ 43'$; the same was observed by myself at Igloolik, at $10^h\ 29^m\ 32'.6$ mean time at place, which makes the longitude $5^h\ 26^m\ 10'.4$. In the same way by applying a correction of -14 seconds to an emersion of the first satellite, on December 9th, 1822, the time of emersion at Greenwich on that day was $11^h\ 11^m\ 23'$, and the observed time at Igloolik was $5^h\ 45^m\ 0'.7$, the longitude by this being $5^h\ 26^m\ 22'.3$. The mean of the emersions of the first and second satellites gives the longitude of this place, $5^h\ 26^m\ 56'.4$, and by the emersions of the first satellite, $5^h\ 26^m\ 43'$, and by a mean of both immersions and emersions, it is

$5^h\ 26^m\ 49^s.7$, instead of $5^h\ 26^m\ 36^s.9$, as deduced immediately from the almanack, without applying any correction.

The great difference between the results obtained from near 10,000 lunar observations, and that from the eclipses of the satellite is remarkable, for though most of the lunar observations were taken at temperatures about – 30° Fahr., yet as nearly an equal number of them were made with stars both east and west of the moon, it appears from this circumstance, as well as from the experience and care of the observers, that it cannot well arise from errors of observations, at least so much as depends upon the apparent distances of the moon and stars. This difference became apparent during the first winter, (at Winter Island,) but from whatever cause it arises, it is certain that those observers, who continued their lunar observations with the sun and moon during the following spring and summer at the same place, obtained a very different result, agreeing very nearly with that which I had previously deduced from the eclipses of Jupiter's satellites. In those observations which are registered, although none of them were made after 30th of March, yet a mean of the December ones, including about 2500 observations, differ no less than 14 minutes from a mean of the last 2500 observations, made chiefly in the following March; the December observations making the longitude 83° 16′ W., and those in March, 83° 2′ W.; a mean of a great many observations in the following summer by different observers, both of the Fury and Hecla, gave the longitude 82° 52′, which is 10 minutes further to the eastward, and agreeing with eclipses of Jupiter's satellites, but differing from the December lunar observations, by 24 minutes of longitude.

The same circumstance occurred the following year; the lunar observations, consisting of near 3000 thousand made in the winter time, making the longitude 15′ more to the westward than the eclipses. In consequence of this, no opportunity was lost the ensuing summer, of obtaining lunar observations at the same place, by Lieutenants Reid, Palmer, and myself. The result of Lieutenant Reid's observations, is 81° 40′ 13″; Lieutenant Palmer's, 81° 40′ 12″; and my own, 81° 42′ 12″ W.; the mean of which is 81° 40′ 13″ W., or $5^h\ 26^m\ 41^s$; which agrees within a few seconds of the longitude determined by the eclipses. Those, however, who have corresponding observations upon a known meridian, will be best able to decide which is correct; and also of the following occultations of the moon in the Pleïades, taken principally with a view of a comparison with corresponding observations in other latitudes, to determine the figure of the earth by Cagnoli's method.

DATE.	Mean Time at Place	Star	REMARKS.
1822—March 26	H. M. S. 7 19 40	η Pleid.	Immersion in S part of Moon's dark limb—distinct and instantaneous. Observed at the observatory, Winter Island
1823—Jan. 21	8 17 21	Taygata.	Immersion in Moon's dark limb—doubtful to 2 or 3 seconds Observed at the observatory, Igloolik
„ „	8 20 6	Maia.	Ditto— distinct and instantaneous
„ „	8 42 49	120 Mayer	Ditto— doubtful to 2 or 3 seconds
„ „	8 44 30	119 „	Extremity of Moon's upper Cusp exactly in contact with
„ „	9 5 1	122 „	Immersion in Moon's dark limb—doubtful to 4 or 5 seconds
„ „	9 12 58.5	η Pleid	Ditto— very distinct and instantaneous
„ „	8 57 12	Taygata.	Emersion—tolerably distinct
„ „	9 22 52	Maia	Ditto— doubtful to 8 or 9 seconds
„ „	9 44 7	η Pleid.	Ditto— doubtful to 2 or 3 seconds.

Among other objects had in view during this Expedition, was the determination of the position of the planet Mars, by means of a reference to fixed stars near the path of its orbit, at the time of its opposition in February, 1822, in order to determine its parallax by a comparison with other observations; but I regret that I was not able to effect this, as the weather was not sufficiently clear as to render the stars visible when the wires of the micrometer were sufficiently illuminated to make them distinct.

A TABLE

Shewing the **RATES** of the **CHRONOMETERS** on Board the FURY, at different Periods during the Expedition.

Nos AND MAKERS.	The Maker's rates	In the River before sailing eight days interval.	At the Orkneys eight days interval.	From May 4th to July 18th	From July 18th to Oct 10th	Mean Rate during the Winter from October to April.	From May 4th to June 29th	Mean Rate during the Winter from November to April.	From May 13th to Aug. 5th.	From Aug 5th to Oct, 18th.	REMARKS.
	"		"	"	"	"	"	"	"	"	
No. 259, Fordsham & Parkinson	+0.42	going mean time.	+ 0.33	+ 0.59	− 1.9	+ 5 44	+10.18	+ 9 7	+10 14	+ 9.76	The rates of the three Pocket Chronometers by Arnold, as they were constantly employed in boat-service, as well as in making astronomical observations, and much exposed during the winter to very low temperatures, frequently lower than − 40° Fanrt., are not therefore registered. The range of temperature to which the others were exposed, (whose rates are here given) was in middle of summer, generally between + 66° and + 52°, and in the winter from + 60° to + 40°, seldom as low as + 32°.
„ 228, „ „	+4.0	+2.9	+ 3.1	+ 1.81	+ 2.1	+ 2 96	+ 3.28	+ 5.8	+ 8.49	+ 7.4	
„ 253, „ „	+0.03	−1.1	+ 0.6	− 1 87	− 6.05	− 8 47	− 6.18	+14.97	+17.41	+24.2	
„ 251, „ „	−2.0	+2.1	−31.8	−46.6	−80.2	−84.32	−82.17	−79.6	−76.7	−63.8	
„ 460, „ „	−1.0	−0.2	−12.3	−13.1	−28.5	−43.74	−42 25	−45 82	−44.3	−46.34	
„ 458, „ „	+1.1	−4.6	+ 3 05	− 0 08	− 1.8	− 9.24	−11.74	−14.61	−14.18	−14.0	
„ 405, Molyneaux and Cope	+2.93	+6.2	+ 8.8	+ 8.21	+12.7	+19.58	+19.03	+28 61	+30.16	+31.2	
„ 281, Finer and Noland	−2.5	−0.96	− 1.83	− 4.03	− 5.6	− 2.83	+ 5.56	+ 8.73	+ 8.63	+ 7 3	
„ 369, Arnold	−4.5	−4.4	− 6.72	− 7.43	− 4.9	− 1.75	− 1.66	stopt.	. .		
„ 326, „	+8.0	not on board.	+ 2.4	+ 3.0	+ 9.9	+16.31	+ 7.27	+10.1	+ 6.9	+12.24	

III

NATURAL HISTORY.

ZOOLOGICAL APPENDIX.

No. I.

ACCOUNT OF THE QUADRUPEDS AND BIRDS,

BY

JOHN RICHARDSON, M.D., M.W.S.

THE object principally kept in view in drawing up the following zoological notices has been, to give a popular account of the animals that frequent the coasts within Hudson's Straits, visited on the present voyage. That the many interesting facts scattered through Captain Parry's able narrative may be more readily found, the pages of that work are regularly referred to, and my friend Mr. John Edwards, Surgeon of the Fury, having, during the three successive voyages of discovery under Captains Ross and Parry, made copious and accurate descriptions of the subjects of natural history that came under his observation, a free use has been made of his notes, which were liberally submitted to me for that purpose. The excellent scientific papers of Joseph Sabine, Esq., in the Zoological Appendix to Captain Franklin's Narrative, and of Captain Edward Sabine, in the Supplement to the Journal of Captain Parry's voyage in 1819—20, and in the 12th Vol. of the Linnean Transactions, have been regularly quoted, together with some of the other riginal writers upon the zoology of the Arctic Regions.

The arrangement given in the *Règne Animal* of Cuvier is adopted in describing the Mammalia, and Temminck's *Manuel d'Ornithologie*, second edition, is followed in the account of the Birds.

The colours used in the descriptions are to be found in an excellent little work entitled, *Werner's Nomenclature of Colours*, by Patrick Syme; Edinburgh, 1821, now frequently referred to by several eminent naturalists and comparative anatomists of this country.

May 1, 1824.

MAMMALIA.

1. Ursus Maritimus. (*L.*) *Polar Bear.*

Ursus maritimus. *Supplement to Parry's First Voyage*, clxxxiii. *Appendix to Franklin's Journey*, 648.

Bear. *Parry's Narrative, Second Voyage*, pp. 61, 230, 324, 329, 372, 406, 512.

This animal, termed by the Cree Indians *waw-pusk*, by the Esquimaux *nannook* or *nennook*, and by the Greenlanders *nennok*, is remarkable for the enormous size that it attains, far above the other species of bear, and if some of the older navigators may be credited, sometimes exceeding all other known quadrupeds. Later observers state the maximum length at about thirteen feet, and those seen by the Expedition did not in general exceed seven or eight feet. Captain Lyon has given the dimensions of one which was considered to be unusually large, being 8 feet 7½ inches long, and weighing 1600lbs.* A female, which was attended by two cubs, was killed on the 31st of August, 1822, and was so small that two or three men were able to lift her into a boat, yet she must have attained the period at which she was capable of propagating her kind on or before the autumn of the preceding year.

The Polar Bear, being a frequent inmate of the menageries which travel through Great Britain, is generally known, so that a minute description is unnecessary; and it may be sufficient to mention that its long and very thick fur is every where of a yellowish white colour, but that the naked end of the snout, the tongue, the margins of the eye-lids, and claws are deep black; the lips purplish-black, and the interior of the mouth pale violet.

The character by which it is most readily distinguished from the three other species of the genus known to naturalists, is its long and thick neck, terminated by a narrower tapering and flattened head. In *l'Histoire Naturelle des Mammiferes*, where a comparison is instituted betwixt it and the brown bear, (*U Arctos,*) its distinctive characters are stated to be, its narrow head and long

* Private Journal of Captain Lyon in the Voyage of Discovery under Captain Parry, p. 14.

muzzle, not separated from the flat forehead by a depression, but forming with it a continuous line; the greater length of its body in proportion to its height; the length of its neck, the soles of its hind feet being equal in length to one sixth of its body; and, lastly, the length and fineness of its fur.

Figures from living or recent specimens of the Polar Bear are given in Marten's *Voyage to Spitzbergen*, and in Captain Cook's last voyage. The first has a strong resemblance to the rude attempts made by the Esquimaux to etch on the walls of their snow houses the forms of the animals with which they are familiar: the latter, though not accurate in all points, conveys a good general idea of the animal. It has been copied into Shaw's *Zoology*, and the third edition of Pennant's *History of Quadrupeds*. Correct drawings by Marechal and Lasteyrie of a young bear kept at Paris, are engraved in the *Menagerie du Muscum d'Histoire Naturelle*, and in *l'Histoire Naturelle des Mammiferes*.

Detailed accounts of the manners of these animals are to be found in Marten's work already quoted, and in the *Fauna Grœnlandica*, Othonis Fabricii. Pennant* has compiled an interesting article on the subject, from a great number of original writers, and many additional anecdotes may be collected from the more recent and excellent *Account of the Arctic Regions*, by Captain Scoresby.

It is still a question amongst naturalists whether the polar bear hibernates or not. In the journal kept by the seamen who wintered at Spitzbergen†, it is recorded, that at the commencement of winter, when the sun set, the bears disappeared, and the white foxes came about their huts; but that on the return of day-light, the bears again visited them, and the foxes retired. Considering this and similar facts to be conclusive, modern writers have expressed their belief that the polar bears become torpid in winter. Otho Fabricius, on the contrary, asserts that they go abroad in that season to seek their prey; and Hearne‡ states, more at length, that the males leave the land in the winter time, and go out on the ice to the edge of the water in search of seals, whilst the females burrow in the deep snow-drifts from the end of December to the end of March, remaining without food, and bringing forth their young during that period. "When they leave their dens in March, their young," says he, "which are generally two in number, are not larger than rabbits, and make a foot-mark on the snow no bigger than a crown piece." Our navigators confirm the

* *Arctic Zoology*, vol. i. p. 56, and *Introduction*, p. lxxxix. and p. cxciii.

† CHURCHILL'S *Collection of Voyages*, vol iv p. 808.

‡ *Journey from Hudson's Bay to the Northern Ocean, in* 1769-1772, p. 366-368.

statements of Fabricius and Hearne, having occasionally seen polar bears in the winter, and actually pursued one in December. It is mentioned in the narrative, (p. 406,) that the Esquimaux killed eight or ten in the winter of 1822, and Mr. Edwards learnt from the hunters that they often saw and killed the males when roaming at large during that season, and as often dug the dams with their cubs from under the snow. These facts seem to be conclusive as to the uniform hibernation of the gravid females, and the, at least, occasional appearance of the males abroad in the winter. It is possible, however, that the latter may also become torpid in the winter, when the local circumstances of their native districts are such as to preclude them from reaching open water at that season, and thus the opposite opinions of naturalists may be in some degree reconciled. An accommodation of habits to variety of situation has been remarked in the history of the *black* or *brown bear* of America. (U. Americanus, *Cuv.*) This animal regularly hibernates in the Hudson's Bay territory, where numbers of males and females are annually dug from their winter retreats; but the same species, inhabiting a more southerly district, from whence it can, upon the approach of severe cold, migrate to a milder climate, and procure food, follows a different law. Then the pregnant females alone retire to hide themselves in secluded caverns, whilst the great majority of the others travel to the south. And here we may adduce the often quoted fact, noticed by Catesby, that in one winter five hundred bears, that had come from the northward, were killed in Virginia, amongst which there were only two females, and they were not pregnant.

The Indian hunters remark, that a bear, if prevented by any cause from becoming fat at the commencement of winter, cannot hibernate; and if it does not make its escape to a more fortunate climate, it is speedily destroyed by the severity of the season.

It has been ascertained that the period of gestation of the brown bear is about one hundred days, and that it produces from one to five young, according to its age*. The Indians say that the dams are followed by the cubs for two years,

* The female black or brown bears conceal their retreats with such care that they are extremely rarely killed when with young. Hence the ancients had an opinion that the beaf brought forth unformed masses, and afterwards licked them into shape and life. Sir Thomas Brown cites many facts in opposition to this notion, some of which are quoted in SHAW's *Zoology*, and similar and more recent facts are noticed in WARDEN's *Account of the United States*, i. p. 195. After numerous inquiries amongst the Indians of Hudson's Bay, only one was found who had killed a pregnant bear. He stated that the den she had constructed was smaller than that usually made by the unimpregnated female.

and that they do not produce oftener than once in three years. Precise information on these points is still wanting to complete the history of the polar bear.

The polar bears are not uncommon in the autumn, as low as latitude 57°, and probably frequent the shores of Hudson's Bay, still farther to the southward. As the summer temperature of these districts rises, occasionally, to 87° Fahrenheit, these animals cannot, in the wild state, be so impatient of heat, as the captive one on which F. Cuvier made his observations*.

The favourite prey of the polar bear appears to be seals, and other marine animals; but in the autumn, when the absence of ice renders these less easy of capture, it frequents the shores in search of berries and other vegetable matters. Captain Cartwright† saw a polar bear diving in deep water after salmon, and succeeding in capturing that active fish.

A bear, shot in Captain Parry's former voyage, and examined by Mr. Edwards, had been labouring under violent inflammation of the intestines which were already partly sphacelated.

The Northern Indians will not eat the flesh of the bear, nor will their women even tread on the skin, but the Esquimaux have no such scruples.

It is known that a large *brown*, and, at certain seasons of the year, somewhat *hoary* variety of the American bear (U. Americanus, *Pall.*) frequents the coast of the Arctic sea in the summer time, to feed on seals, fish, and on the roots of the different species of *hedysarum* and *astragalus*, that grow in those quarters‡. This animal is occasionally confounded, both by the Traders and the Indians, with the polar bear. It is noticed by Hearne and Pennant under the denomination of the *grizzly bear*, but it is quite distinct from the *grizzly bear (U. ferox)* of Lewis and Clark, which is the *U. cinereus* of M. Desmarest§, and the *U. horribilis* of M. Say‖.

The polar bear, with the other two that have been incidentally mentioned, (U. Americanus and U. ferox,) are the only species known to inhabit North America, whose distinctive characters have been in any degree ascertained. Many *varieties* of the U. Americanus have been described, founded chiefly upon differences of colour. The *brown* variety is further distinguished in the United

* *L'Histoire Naturelle des Mammiferes.*

† *Journal of Sixteen Years' Residence in Labrador*, by G. CARTWRIGHT.

‡ FRANKLIN'S *Journal, &c.*, pp. 373, 377, 379.

§ *Mammalogie, Encyclopédie Methodique*, p. 164.

‖ JAMES'S *Expedition to the Rocky Mountains*, pp. 241 and 351

States by the epithet of *ranging*, and the *black* variety has been divided into the *long-legged* and *short-legged* kinds*; but the vague descriptions that have been hitherto given of these varieties lead to no certain conclusions. It may be noticed that the white ring round the neck which the European species exhibits in youth, is, at least, occasionally observed in the American one†.

The Cree-Indians term the black bear *cuskeeteh-musquaw*, and a tawny coloured variety *oosaw-wusquaw*. They call a little bear *muscoosees*.

2. Gulo Luscus. (L.) *Wolverene.*

Gulo luscus. *Supplement to Parry's First Voyage*, p. clxxxiv. *Appendix to Franklin's Journal*, p. 650, and *Narrative*, p. 99.
Gulo arcticus, var. A. *Desmarest Encyclopédie, arct. Mammalogie, No* 267.
Quickhatch. *Ellis's Voyage to Hudson's Bay*, p. 40, t. 4.
Kablee-arioo. *Parry's Narrative, Second Voyage*, pp. 184, 497, 512

Is termed by the Crees or Southern Indians *ommeethatsees* and *okee-coohawgees*, (whence *quickehatch*) by the Copper Indians *nagh-hai-æh*, by the Esquimaux *kablee-aree-oo*, and by the Canadian voyagers *carcajou*. The latter appellation having been applied to many different animals, numerous mistakes have arisen.

A figure and description of a living wolverene received by Sir Hans Sloane, from Hudson's Bay, were given to the world by Edwards. The figure, with slight alterations, has been copied by Pennant and Shaw, and succeeding naturalists have added little or nothing to the information derived from that source. It is proper to observe that although these figures give a tolerable idea of the general form of the animal, they err much in the shape of the head, and in some other details. The head is very broad and compact, and is suddenly rounded off on every side to form the nose, not tapering gradually as represented. The ears are rounded, and project less than in the figure. In the form of the head and muzzle the wolverene does not resemble the bear, with which from its plantigrade motion it has been sometimes classed. The specific name applied to this animal by Linnæus originated in Sir Hans Sloane's specimen having through accident lost an eye.

Cuvier remarks that the specific differences betwixt the *wolverene* of the new, and the *glutton* (Ursus gulo, L.) of the old continent, do not appear to be sufficiently determined, but that the colours of the American species are in

* Warden, opere citato. † Cartwright, opere citato.

general paler, and Pallas and Desmarest have described them as mere varieties. Scarcely any two wolverenes are exactly alike in the distribution and intensity of their colours, some being almost black, whilst others have a dull brown for the predominating hue. A litter of four young ones, taken near Cumberland-house in latitude 54°, were of a cream colour. We are ignorant whether this is the common hue of the cubs, as it is the only instance that has come to our knowledge of their being captured at a tender age. Pennant refers to the European species, white and yellow varieties, which occur in Kamtschatka, and whose furs are much prized by the natives.

To the wolverene, in common with the glutton, has been attributed the habit of destroying deer, by dropping upon their backs as they pass beneath its lurking places in trees; but this is certainly not one of its common modes of procuring subsistence. It lives chiefly upon the carcasses of animals that have been killed by accident, or left by other beasts of prey, rejecting no kind of carrion. In the summer time it digs up the *marmot*, and according to Indian report, 'proves destructive to the *beaver*, but the frozen walls of the winter habitations of these animals defy its utmost efforts. It is extremely annoying to the hunters, by devouring their stores of provision and carrying off the baits of their marten traps; whilst its strength and cunning are such that it is rarely caught itself. It has been known to visit daily a line of traps extending upwards of two miles, and to rob the whole of them of the baits, and of such animals as had been caught. In such cases, if the hunter does not succeed in destroying his enemy, it is absolutely necessary for him to move his hunting quarters beyond its range. The strength of the wolverene is well described by Hearne, and not exaggerated; but caution seems to be its predominating character, not ferocity. It does not hibernate; and, although its pace is slow, it wanders to a considerable distance in search of food, even in the winter time, (as we have often ascertained by tracing its path,) and when it finds a bone or other prize drags it to its retreat, a task which the shortness of its legs renders sufficiently laborious when the snow is deep.* If the glutton has similar habits, it may have assisted in accumulating the bones in the caverns examined by Professor Buckland.

The Esquimaux of the Welcome carry the skins of this animal to the trading post on Churchill River, and the skull of one was in the former voyage found as far north as Melville Island*. The expedition saw some of its bones in the possession of the natives of Melville Peninsula, and a piece of its skin brought home

* Appendix to Parry's First Voyage, p. clxxxiv.

by Mr. Edwards, has been identified with specimens in the Edinburgh Museum. Its fur, as an article of commerce, is at present of no great value.

The animal noticed by Crantz and Egede, under the name of *amanki* or *amarok*, is not the wolverene, as it is supposed to be by Fabricius†, but undoubtedly that large variety of the wolf, known to the Esquimaux of America, by the name of *amarrok*. This is a striking instance of the Greenlanders having preserved the name and description of an animal which does not now exist in the country they inhabit. Captain Sabine relates a similar fact in his notice of the musk-ox.

3. MUSTELA ERMINEA. *Ermine or Stoat.*

Mustela Erminea. *Supp to Parry's First Voyage*, clxxxv *Appendix to Franklin's Journey*, p. 652
Ermine. *Parry's Narrative, Second Voyage*, pp. 52, 101, 152.
Terree-ya *Esquimaux.* Seegoos *Cree Indians.*

THREE specimens of this pretty little animal, noted as males, were received. They were all killed on the 16th of September, yet one of them is in the perfect brown summer dress, another in its snow-white winter habit, and the third is in an intermediate state.

Ermines abound in the neighbourhood of Hudson's Bay, but although a few of their skins are occasionally sent home by the residents in presents, they do not seem to have attracted the attention of the Fur Company. The English market is supplied with them from other quarters; and from the revolutions of fashion, they at present bear a high price.

It is probable that the *lemmings* hereafter mentioned, form a considerable part of the food of the ermines, on the barren shores of Lyon's Inlet. In the interior of the country they feed chiefly upon the meadow-mouse, (arvicola xanthognatha, *Sabine*,) and as the latter take up their abode in the log-houses of the traders as soon as they are built, the ermines also become frequent inmates of the houses, and boldly chase their prey during the night, even through the sleeping apartments. In December, 1821, an ermine was caught on board the Hecla, led thither in pursuit of a new prey, the English domestic mouse which then for the first time visited those quarters, and which is still unknown in the interior of the fur countries.

† *Fauna Grænlandica*, p. 24.

4. Canis Lupus. (*L.*) *The Wolf.*

Canis lupus. *Supplement to Parry's First Voyage*, p. clxxxv. *Appendix to Franklin's Journey*, p. 654.

Wolf. *Parry's Narrative, Second Voyage*, p. 157, 162, 180, 230, 372, 446, 512, 514, 516.

Icon. *Franklin's Journal*, p. 312, *pl. var albæ.*

The wolf is termed *mah-haygan* by the Crees, *yes*, by the Northern Indians, and *ămărŏk* by the Esquimaux, which latter appellation, the origin of the *amanki* and *amarok* of the Greenlanders has given rise, as has been already noticed, to exaggerated descriptions of a ferocious animal, said to inhabit the interior of Greenland, and which Crantz and Fabricius erroneously conjectured to be the *gulo luscus* or *wolverene* *.

A pack of thirteen wolves attending the movements of a horde of Esquimaux, made their appearance in the neighbourhood of the ships in February, 1822, and it is remarked in the Narrative †, that it was difficult at a little distance to distinguish them from the Esquimau dogs. Observations of a similar nature have been made in other parts of the world. James has noticed the resemblance which the Indian dogs of the Missouri bear to a species or variety of wolf (*canis latrans*,) common in that quarter ‡; and on the line of Captain Franklin's route, the dogs were observed to be similar in their general physiognomy, and in the prevailing markings of their fur to the wolves of the same districts. Nor are facts of this kind confined to the Northern hemisphere, for I am informed by my friend Dr. Knox, that the native dogs of Southern Africa exhibit the same general aspect of the hyæna that those of Northern countries do of the wolf, and that in the course of a few generations, dogs imported from Europe, assume the habit and appearance of the native races.

These facts bear upon the often agitated question of the origin of the domestic dog, and seem to support the opinion of Buffon §, lately advocated by M. Desmoulins ‖, that the dog, the wolf, the jackal, and corsac, are, in fact, but modifications of the same species; or that the races of the domestic dog ought to be referred, each in its proper country, to a corresponding indigenous wild species, and that the species thus domesticated, have in the course of their

* *See article Wolverene of this Appendix.* Egede, *Description of Greenland*, p. 60. Crantz, p. 99, and *Fauna Græn.* p. 24.

† P. 514—516.

‡ James' *Expedition to the Rocky Mountains*, vol. i. p. 153, 332. *Eng. edit.*

§ Buffon, vol. xiv. p. 350. ‖ Desmoulins, *Mem. du Mus. d'Hist. Nat. tom.* 10.

migrations, in the train of man, produced by their various crosses with each other, with their offspring and with their prototypes, a still further increase of distinct races of which about fifty or sixty are at present cultivated*.

The wolf (*c. lupus*,) the fox (*c. vulpes*,) and jackal (*c. aureus, L.*,) are supposed to have given rise to the varieties of Europe, and of the West of Asia, the *c. cancrivorus*, DESMAREST, to be the origin of the dog domesticated by the Caribs, previous to the discovery of America, and the *papua* of Australasia, to be the stock of the domestic races in that quarter. With equal justice, the connexion betwixt the wolves of the Arctic districts of America, and the Esquimaux dogs, may be considered to be equally intimate, especially when we take into account not only their near resemblance in physiognomy, but also the great similarity of their woolly furs, which on their annual renovation fall off in large flakes

That the fox occasionally couples with the domestic dog, has been stated as long ago as the time of Aristotle, and the productive intercourse of the wolf and dog, and even the fertility of their offspring, have also been established by the observations of Buffon† and Pallas. But John Hunter‡, Pallas, Guldenstadt, and Tilesius§, consider the jackal of Caucasus as the most probable stock of the European dog. Cuvier, however, remarks, that the descendants of dogs which have been left upon desert islands, resemble neither the fox nor the jackal, and M. Lindecrantz‖ states, that the domestic dog is permanently characterized as distinct from the wolf, hyæna, fox, *&c.*, not only by the disposition of the sutures or ridges formed by the meeting of the courses of hair on

* Other naturalists taking into account the frequency with which accidental varieties of structure in an individual have been observed to recur in his descendants, have supposed that there was originally created a single species of dog, and that the domestic varieties which are the only traces we have left of it, have been produced by the influence of climate, and the treatment received from man. Various researches have accordingly been made, and much reasoning employed, to indicate this primitive race.

Some authors have even gone the length of conceiving, that most of the species of natural genera of animals, may have, in the course of ages, risen from varieties to their present rank; and that a primary species, or the germ of a genus, was all that was originally created. The subject is interesting, and intimately connected with the study of the fossil remains of extinct species, but it is involved in an obscurity not likely to be soon dispelled.

† BUFFON, *Supp.* 7 The readiness with which the wolf in the wild state copulates with the domestic dog, has been recorded by Captains Sabine and Franklin.—*Supp.* PARRY's *First Voyage*, p. clxxxv. FRANKLIN's *Journey*, p. 654.

‡ *Philos. Trans.* vol. lxxvii. p. 253—266, and vol. lxxix. p. 160, 161.

§ TILESIUS, *Nov. Act. Nat. Cur.*, 1823, tom. xi. Second Part.

‖ LINDECRANTZ, *Ammæn. Acad.* vol. iv. No. 53. See *also Captain* PARRY's *Second Voyage*, p. 515.

various parts of the body, but by the number and situation of the verucæ or warty risings on the face. In these respects eleven varieties of the dog were found to agree. Subsequent zoological writers have not, however, considered these marks in the same important light, and M. Desmarest, disregarding most of them, is disposed to rely for a distinctive mark chiefly upon the white of the tail of the domestic dog, being invariably terminal whenever that colour occurs associated with another in that part of the animal. This observation he hopes will lead to the discovery of the primitive species*. Professor Buckland found no difference between the bones of the dogs and wolves taken from the diluvian mud of the caves he examined, and those of the existing races of these animals†.

Many anecdotes tend to prove that there is nothing incompatible between the dog and wolf in natural disposition. In *L'Histoire Naturelle des Mammiferes*, there is a very interesting account of a wolf, whose good qualities having been elicited by kind treatment, which shewed a degree of affection for its master, equalling or exceeding that displayed by any variety of dog. It may be stated on the other hand, for the purpose of shewing how the dog may degenerate, that it is a remark of the Canadian voyagers, in speaking of their dogs, which are of the Indian breed, "quand ils sont egarès ils deviennent fous." When they have strayed away and been absent only a few days without obtaining proper nourishment, they lose almost totally their domestic qualities, and although driven by the pressure of hunger, to hover like the wolves around an encampment, yet they fly from the face of man, and do not even recognise the voice of their master. They differ in this state but little from wolves, except in a deficiency of strength and intellect, necessary for procuring their prey; and indeed the manners and appearance of the Indian dog of those northern districts are such as one would expect from wolves recently and imperfectly domesticated. They have little of the docility of the European races, possess no courage, hunt in packs, and prey upon almost every kind of carrion. Upon the first introduction of a small Orkney cow to one of the trading posts, we witnessed the whole of the dogs of

* DESMAREST, *Mammalogie, Ency. Meth.*

† The number of caudal vertebræ seems to vary both in the wolf and the dog, but the lumbar vertebræ appear to be seven in both species, at least this was found to be the case with the skeletons of the Arctic and other wolves examined by us, as well as in the skeletons of domestic dogs of various races. CUVIER, in his *Comparative Anatomy*, has stated the lumbar vertebræ of the dog to be only six in number, and this statement has been copiedin to FLEMING's *Philosophy of Natural History*, and other works.

the establishment, to the amount of fifty or more, forming themselves into a crescent and approaching the cow, which was enfeebled by her recent voyage, in the same timid and cautious manner that a pack of wolves would do, stopping or retreating the moment that the object of their attack raised its head. The cow exhibiting no signs of fear, they desisted from the attempt, but had it become alarmed, and sought for safety in flight, they would have tormented it until it was exhausted, and at length torn it in pieces. These dogs not only form an obstacle to the rearing of poultry, hogs, &c., at the different fur posts, but they frequently destroy foals, although they have been previously accustomed to the presence of horses.

The Esquimaux dogs seen by the Expedition under Captain Parry, seem to be a more generous race than the Indian dogs, which may be, perhaps, ascribed to the greater kindness shewn to them, and to their being companions to their masters nearly the whole year. In the fur countries, on the contrary, the dogs are much neglected in the summer, and left to a scanty subsistence upon such eggs, young birds, frogs, &c., as they can pick up.

Wolves vary much in size*, but in general those living within the Arctic circle are of large dimensions. Many of the Arctic wolves are entirely white in winter, but they have most generally bluish-gray backs. The natives assured us, that the white varieties became coloured in summer. A variety totally black (*c. lycaon, L.*?) is found as far north as Cumberland House, (lat. 54°,) and is said to be frequent in Canada. The black wolves are fierce, but not larger than the common kind.

On the sandy plains betwixt the branches of the Saskatchawan, the wolves bring forth their young in burrows that have more than one outlet. The badgers are very numerous in that quarter, and it is probable that the wolves take advantage of their labours, and by enlarging or uniting their holes form suitable abodes for themselves. On the barren grounds where the soil is not adapted for burrowing, they resort to caves in the rocks and amongst large stones.

The temperature of a wolf was ascertained by Captain Lyon immediately after it was killed to be 105° Fahrenheit.

	Length of body.	Tail.	Height at fore shoulder.
* Largest sized wolf of the United States, (Warden) - - -	3½ feet	18 inch.	18 inch.
Wolf killed at Cumberland House, (lat. 54°) - - - - -	4 „	14 „	24 „
White wolf at Fort Enterprise, (lat. 64° 30') - - - -	4⅓ „	19 „	34 „
Wolves seen by Captain Parry, average height (p. 516) -	— „	— „	27 „
Wolf European, (Desmarest, Encyclop.) - - - - -	3¾ „	18 „	31 „

5. Canis Lagopus. (L.) *Arctic Fox.*

Canis lagopus. *Supplement to Parry's First Voyage*, p. clxxxvii. *Appendix to Franklin's Journal*, p. 658. *Foster, Philosophical Transactions*, lxii. p. 370.

Tĕrree-ānee-ārĭoŏ. *Esquimaux of Melville Peninsula.*

Terregannœuck. *Esquimaux of the Welcome and of Coppermine River.*

Terienniak. *Greenlanders.* Wawpeeskeeshew-makkeeshew. *Cree Indians.*

White fox, and fox. *Parry's Narrative, Second Voyage*, pp. 128, 150, 151, 157, 230, 387, 446, 513.

Isatis *of the Siberian fur hunters*, (but the Isatis figured in Buffon, supplement, tom. 3. pl. 17. is the Canis Corsac, *Pall.*)

A Specimen of this animal procured at the entrance of Lyon Sound, in September, corresponds very nearly to one in the summer dress, described by Mr. Sabine in the appendix above quoted, except that the tips of the hairs at the extremity of the tail are black. Another killed in December, is quite white, with the exception of a similar black tip. This mark though slight is sufficiently apparent to call in question the specific character "cauda apice concolore" (Lin.); indeed Mr. Graham is quoted in Arctic Zoology for the observation, that the black tip of the tail forms a characteristic distinction between the Arctic and common foxes of Hudson's Bay, which have their tails always tipped with white. It is proper to remark, however, that the colour of the tail is not considered as a specific mark in other foxes, for the *canis alopex, cauda apice nigro* (Lin. Syst. 59), is by the best authors considered as a variety only of the common fox *. A better mark of distinction is to be derived from the different physiognomy of the two species, and their very dissimilar fur, which both in their summer and winter clothing is very obvious †.

In the summer time the fur on the soles of the Arctic fox is short, and allows small callous eminences at the roots of the toes to appear. In the winter the

* The c. *alopex* is known in Wales by the name of *Corgi or Cur fox*, and is of smaller size than the ordinary fox. (*Brit. Zool.* i. p. 87.) A similar variety occurs in America, where it is termed the Brant fox. Warden's *United States.* Penn. *Arct. Zool.* i. p. 47. *Hist. of Quadr.* i. p. 252.) and also in Russia, (Tilesius, *Nov. Act. Phys. Med. Acad. Nat. Cur.* 1823, tom. xi. Second Part, p. 375.) It would appear that this was once the common variety of fox in England, as Chaucer in his tale of Chanticleer, enumerates the black-tipped tail as one of the characteristics of Dan Reynard.

† Desmarest, rejecting the Linnæan specific character, has formed a new one on the principle just spoken of. *Ency. Art. Mammalogie, No* 305.

soles and toes are entirely covered by a very thick bushy coat of hair. The same thing occurs in the other foxes that inhabit those northern regions, and furnishes one of the means by which the hunters distinguish their foot-marks in the snow from those of the small wolves. The fox leaves a round hollow print that exhibits no distinct impressions of the toes. The foot-mark of the wolf is like that of the dog. Authors however, probably from not being acquainted with the summer states of the Arctic fox, have considered the hairy soles as a specific distinction betwixt the Arctic and other foxes." Thus in the *Dictionnaire des Sciences Naturelles* it is said "mais un caractère qui lui est particulier, c'est d' avoir la plante des pieds garnie de poils, contre ce qui se voit communement; la plupart ayant des tubercules nus aux parties de la plante qui s'appuient sur le sol." (Tom. viii. p. 565.)

It would appear that on the approach of winter, the fur of the Arctic fox does not fall off, but actually alters its colour, increasing at the same time in length and fineness. Similar changes take place in the coverings of most quadrupeds of those regions, " Incanescunt hyeme lupi, cervi, alces, maximeque tarandi" (Pall. glires, p. 7). It is a considerable time after the commencement of the cold weather before the fur becomes, in the technical language of the traders, *prime*. In the spring, however, the change is much more sudden, and after the first shower of rain, most of the furs are of little value. In a register kept in the year 1810 at Churchill, in lat. 59°, the *white foxes* are noted as being partially brown on the 10th of October, and as not yet prime on the 22d.

It is probable that in high northern latitudes the old foxes may retain their white colour even in summer. Some naturalists have gone the length of considering the white foxes occasionally seen in summer to be a constant variety of the Isatis, blue, or Arctic fox. The Siberian hunters informed Gmelin that "they often found gray and white individuals in the same litter, and that the first have at birth a very deep gray colour, the latter a yellowish tint, the hair being in both very short. Towards the end of the summer, when the hair begins to increase in length, foxes are often met with having a brown streak along the back, crossed by a similar one at the shoulders. These individuals, sometimes termed *cross foxes* *, become at length entirely white." Hearne states, from personal observation, that the Arctic foxes "when young, are almost

* These cross foxes are very distinct from the cross foxes of the Hudson's Bay traders, which belong to the species *canis decussatus* of Desmarest, and which F. Cuvier, with great propriety, considers as a mere variety of the *canis argentatus*, or black fox.

all over of a sooty black, but as the fall advances, the belly, sides, and tail, turn to a light ash-colour; the back, legs, some part of the face, and the tip of the tail, change to a lead colour, and when the winter sets in, they become perfectly white. There are few of them which have not a few dark hairs at the tip of the tail all the winter." P. 365.

Mr. Mogg caught two foxes in January, 1822, at Igloolik, one a male of a bluish cast, with the tips of the ears and tail black, and the other a female, longer than the former, and beautifully white. They weighed respectively 8 and 8⅛ lbs. (*Narrative*, p. 387.)

The fox mentioned below, under the epithet *sooty*, is most probably a dark-coloured variety of the Arctic fox, of occasional occurrence, even in the winter time.

The dimensions of summer and winter specimens received, are as follow:—

	Summer.	Winter.
Length from nose to the origin of the tail - -	22	24 inches.
,, of head - - - - - - - - - - -	5⅛	6
,, of tail to extremity of vertebræ - -	11	12
,, ,, including the fur - - - - - -	13	14⅛

The native country of the Arctic foxes, is, as their name imports, within the Arctic circle, but they migrate at uncertain intervals, and generally in very severe seasons, as far south as *lat.* 56°, following for the most part the line of the sea-coast in their journeys. They do not return to the north the following summer, but remain and breed in their new quarters, from which, however, they are in general extirpated in a few years by their numerous enemies. They bring forth their young in deep burrows, lined with moss. In the winter they generally retire to caverns, formed in the ice by the flux and reflux of the tide.

The islands in the Arctic Sea, visited by Captain Franklin's party, were studded with stone traps, erected by the Esquimaux for the capture of these animals. The traps are described in Captain Parry's Narrative, (p. 387) which also informs us that the foxes were numerous in their neighbourhood, until the end of November, when they began to decrease; that few were taken in December, and that in January, the traps, from want of success, were finally dismantled.

The simplicity of the Arctic fox is noticed by most authors, who have given an account of their manners, but an anecdote told by Captain Lyon in his *Private Journal*, (p. 89) shews that they are not naturally stupid. The flesh of the Arctic fox is white, and when young, resembles that of the rabbit in flavour, and is equally delicate. The mean temperature of fourteen of these foxes examined immedi-

ately after their death by Captain Lyon and Mr. Mogg in the winter time, was 102° Fahrenheit.

Further particulars respecting the Arctic fox, its varieties, and the characters by which it is distinguished from the karagan of Pallas, may be learnt from a paper by Dr. Tilesius in the *Nova Acta, Phys. Med. Acad. Nat. Cur.* 1823, tom. xi. second part, p. 375. (Quoted from *Bulletin des Sciences*, January, 1824, p. 81.)

Canis Lagopus. β. *Fuliginosus. Sooty Fox.*

Canis fuliginosus. *Shaw's Zoology*, i p. 331.
Canis fuliginosus and blue fox. *Mackenzie's Travels in Iceland*, p. 337.
Canis lagopi, varietas. *Pallas, glires*, p. 12.
Le chien brun. *Desmarest, Mammalog.* p. 205, *in notis.*
Kernektak. *Fabr. Faun. Greenland.* p. 20 ?
Sooty fox. *Penn. Hist. of Quadr.* i. p. 257.

A solitary fox, having the usual form, and the quality of the fur of the Arctic species, but differing from the ordinary summer or winter states of that animal, in being almost entirely of an uniform blackish-brown colour; was obtained in Winter Island on the 16th of December, 1821. The colour is purest and deepest on the belly, approaching to brownish-black, and the fur there is longest. The face, from an admixture of short white hairs, is hoary, and there are a very few white hairs on the back, not sufficient, however, to vary the colour, unless on close inspection. The fur is long, has a considerable lustre, and when blown aside presents a bright ash-gray colour towards its roots. The size of the specimen is greater than that of the Arctic foxes killed at the same place.

Length from nose to insertion of tail	- - - -	28 inches.
,, of head	- - - - - - - - - - - -	6
,, of tail to end of vertebræ	- - - - -	13
,, ,, including fur	- - - - - - -	15

These admeasurements being of a dried skin, are like the preceding ones of the Arctic fox, liable to much uncertainty.

The fur on the soles of the feet is of a grayish-white colour, and as bushy as in the winter state of the Arctic fox.

Fabricius appears to refer to this variety, when he says " Dantur canis lagopi duæ varietates: altera cœrules centi-nigricans pedibus subtus lana alba et vibrissis interdum albidis (Groenl. Kernektak); altera tota alba naso nudo nigro

(Grœnl. Kakkortak): minimè tamen species diversæ; invicem coëunt, et utraque utriusque colores pullos habet; quin imo cærulescentem in albam, itidem albam in cærulescentem, cum ætate transmutari posse videns sum testis." Pallas likewise in speaking of the varying hare, incidentally mentions a similar variety as occurring in Siberia. " Præter constantem illam metamorphosin et climatis rigidissimi patientiam cum Cane Lagopode etiam in eo convenit Lepori variabili quod (minori licet frequentia) nascatur in hac specie, varietas, *tota fusca vel etiam aterrima hyeme colorem haud mutans.*" (Pall. glires, p. 12.)

Pennant says, that the sooty fox is a distinct species, inhabiting Iceland in great numbers, and Sir George Mackenzie gives the following account of it. " The blue fox (*c. fuliginosus*) varies considerably in the shades of its fur, from a light brownish or bluish-gray, to a colour nearly approaching to black. It is more gracefully formed than the white fox, has longer legs, and more pointed nose. Horrebow says, that 'the black foxes are sometimes brought over to Iceland on the ice.' (*Travels in Iceland*, p. 337.)

The specimen received bears no resemblance to the American silver fox, (*c. argentatus*) which is sometimes quite black. The silver fox is much larger, and is clothed with a very different and highly valued fur. Hearne states, that the common foxes of Hudson's Bay (*canis fulvus, decussatus, argentatus,* Desmarest), are never found on the barren grounds to the northward of the woods. " So long," says he, " as the trade has been established with the Esquimaux, to the northward of Churchill, I do not recollect that foxes of any other colour than white were ever received from them," (p. 382). This fact would lead us also to infer, that the sooty variety is very uncommon in the winter time, the only season in which the fur forms an article of commerce.

The black fox noticed by Dr. Tilesius, as an inhabitant of Russia*, if found in northern and barren tracks, may be this sooty variety of the Arctic fox; but if it frequents woody districts, it is more probably the representative of the American, *c. argentatus*.

Arvicola, (*Cuv.*) (Lemmus, *Dict. des Sciences nat.*)

The genus Arvicola of Cuvier, comprises the *mures cuniculari*, and some of the *mures subterranei* of Pallas, and the *mus zibethicus* of Gmelin, which agree in having their molar teeth composed of plates of enamel, forming a series of triangular prisms, arranged alternately in two lines. The sides of these grinders

* *Nov. Act. Acad. Nat. Curios.* 1822, tom. xi. Second Part, p. 375.

are very deeply impressed with perpendicular furrows, and their upper surfaces are flat, and exhibit sections of the prisms in form of spherical triangles, more or less oblique, and generally with slightly excavated areas. Cuvier has indicated three sub-divisions, which some other authors consider as distinct genera. The animals we are about to describe, belong to the third sub-genus. (Georychus, *Illiger*, Lemmus, *Desmarest*,) to which Cuvier has referred, not only the *mures cuniculariі brachyuri*, but also those *mures subterranei*, that have not been placed in the genera *spalax* and *bathyergus*.

The LEMMINGS, characterized by very short ears and tail, and feet formed for digging, are very low on their legs, and have fat fleshy bodies. The upper fore teeth terminate in an even outline, or are more or less excavated or lunated at the apex; and the under ones are more or less circular at their summits, but are sometimes so narrow, as to appear pointed.

The lemmings may be arranged in two divisions, according to the number of claws on the fore-feet.

The species with five claws on the fore-feet, that is with a large thumb nail, are *Mus lemmus, aspalax, talpinus* of Pallas, and *arvicola trimucronata* (mihi.)

Those with no thumb nail at all, or with only a minute one at the base of a callous projection are,

Mus Hudsonius, lagurus and *torquatus* of Pallas, and *mus Grœnlandicus*. (Scoresby's voyage.)

The *mus aspalax* has a naked tail*, but the other lemmings have a pencil of stiff hairs, which is the only part of the tail that projects beyond the fur of the body. The *mus aspalax, talpinus*, and *lagurus*, agree also with each other in having naked palms, which in the two former approach in strength and form to those of the mole-rat or spalax; all the other species of the sub-genus georychus have both the palms and soles thickly clothed with coarse hairs.

6. ARVICOLA GRŒNLANDICA. *Greenland Lemming.*

Mus Grœnlandicus. TRAILL, *Scoresby's Voyage to Greenland in* 1822. p. 416—419.
Mus Hudsonius. *Parry's Narrative, Second Voyage*, p. 52.
Ow-in-yuk. *Esquimaux?*
Mures campestres breves crassi. *Anderson Nachrichten von Grœnland*, p. 178?
A. (*Grœnlandica*) *brachyura, exauriculata, rostro acuto, palmis tetradactylis hirsutis, unguibus apice cylindrico producto (callo nullo subjacenti.)*

DESCR. *Size*, rather less than the water-rat, (*m. amphibius, L.*) the length to the

* PALLAS, *glires.*

root of the tail, being (in the stuffed specimen) about 6¼ inches. In the form of the body it resembles the other lemmings.

Head narrower than the body, rounded. It tapers slightly from the auditory canals to the eyes, but from thence the accumination is sudden on every side, and it terminates in an acute snout. The general colour of the superior and the lateral parts of the head, is the same with that of the back. There are no external *ears*, but the site of the auditory opening is denoted by an obscure transverse brownish streak in the fur. The *eyes* are near each other, being only half an inch apart. The fur on the *cheeks* is a little puffed up, has a rufous tinge, and is bounded posteriorly by an obscure blackish semicircular line, which commences at the anterior angle of the eye. The nose covered with short erect black hairs, intermixed posteriorly with some hoary ones, is rendered prominent by a depression on each side of it, anterior to the cheeks. Its apex is acute, covered with black hairs disposed round it in a circular manner, and projects slightly beyond the mouth. The *nares* appear to be under the projection. They are covered with fur, and there is no naked space around them, not even the septum*. The upper lip is deeply divided.

Teeth. Incisores exserted, chisel-shaped, having a slight yellowish tinge; *superior* ones directed downwards with a slight curvature, of nearly equal breadth throughout, truncated and irregularly excavated interiorly; *inferior* ones narrower, nearly twice as long, not tapering, four sided, with a slight rounding exteriorly, rounded at the points and sloping forwards and upwards.

Whiskers. The vibrissæ that arise from the upper lip are numerous and long, some of them black, some white, the longest, which are the exterior ones, measuring about sixteen lines. There are also one or two long hairs on the eyebrows.

Body thick, having a smooth dense covering of long and soft fur. The colour of all the upper surface of the body is composed of black intimately intermixed with yellowish-gray so as to produce a nearly uniform tint in which the black predominates. These colours belong only to the tips of the hairs, and the black tips are longer than the others. When the fur is blown aside, it appears of a uniform deep blackish gray to the roots. A distinct black stripe runs from the nose along the back to the tail. The whole under surface of the throat, neck, and body, exclusive of some rusty marking anterior to the fore extremities, is an unmixed yellowish-gray. The fur of the belly when blown aside shews the same blackish-gray colour which that on the back does. The colours of the back and

* From the specimen being dried and perhaps distorted in mounting, the form of the animal, and particularly of the parts about the mouth, could not be ascertained with absolute certainty.

belly do not intermix at their line of junction on the sides. This line is nearly straight, and runs on a level with the inferior part of the cheek and the tail.

The *tail* is very short, and is of the same colour with the back at the root, but the part which projects beyond the fur of the body, is only a pencil of stiff white hairs or bristles, about four or five lines long.

The extremities are short. The length of the *fore extremity* from the sole to the axilla is little more than an inch, and the greater part of it is hid in the fur of the belly. Measured anteriorly and including the curvature of the foot and claws, its length is about an inch. The palms incline slightly inwards, are small, and the toes very short; both are covered above and below thickly with strong hairs curving downwards, and extending even beyond the nails The only naked parts on the foot, are a minute flat callus far back on the inside, in place of a thumb, and a rounded smooth callus at the extremity of each of the toes underneath. These callosities do not project forwards under the nail, and bear no resemblance to the large compressed horny projections of the *arvicola Hudsonia*. The *claws* are long, strong, curved moderately downwards, and also inclining inwards to the mæsial line with a more slight curvature. The second claw from the inside, which is considerably the longest, is nearly four lines in length. At the root it has a thick compressed subulate form much deeper than broad, being rounded however above, and flattened or slightly groved underneath; but its curved extremity is lengthened out in a slender cylindrical manner, its groove being obsolete*. The other claws, though smaller, are similar to this one. The third from the inside is the next in size, and the two extremes are considerably shorter than either. The length of the whole palm and the middle claw is only six lines. The claws are fitted for digging, but not for cutting roots.

Hind feet. The soles are very hairy, and the hairs project further beyond the claws than on the fore feet. *Toes* five, of which the three middle ones differ little in length: the two extremes arise farther back, and are shorter. The *claws* are shorter than the fore ones, slightly arched, narrow, but not sharp at the points, hollowed out underneath, and calculated to throw back the earth.

The individual above described was a male, killed August 22d in Repulse Bay.

The *mus Grœnlandicus* of Scoresby differs, from the specimen here described, solely in colour, which above is a mixture of mottled ash-gray, and blackish and reddish-brown, and on the belly and inferior parts is rufescent. The slight dif-

* Compare this form with that of the nails of the Arv. torquata, which Pallas thus describes, "ungues robustiores catheto-plateo-lati, mucrone tenui falcato."

ference in size may be accounted for, from the greater or less distention of the skins in preparing, both being described from dried specimens. The form and structure of the different members is precisely the same in the two specimens, which are both preserved in the Museum of the University at Edinburgh.

Of the habits of the Greenland lemming we know little. In page 53 of Captain Parry's Narrative, where they are mentioned under the name of *mus Hudsonius*, it is stated, that a considerable number being caught in Repulse Bay, and put into a cage together, they fought and destroyed each other. The same fact has been recorded of other species of lemming. Pallas speaking of the *m lagurus* says, " Quando mares plures cum feminis inclusi, pugnabant continuo, donec robustior exagitatem diu comparem interimeret atque Caribæo more stratum hostem devoraret. Fœminam tunc illam, quæ alterius socia fuerat, pessimè habet victor et sæpissime subigit, quasi pugnæ præmium etiam gravidam." " Sunt quoque alioquin salacissimi."

In the very mild spring of 1816, large bands of mice were seen travelling across Great Slave Lake, appearing at a distance like black spots on the ice. It is probable that these mice were either of this species, or of one of the other two about to be mentioned as natives of that part of America.

With regard to the claim of the *arvicola Grœnlandica* to be ranked as a distinct species, it may be remarked, that the want of a thumb-nail separates it from one half of the genus, but it may be proper to notice a few of the characters by which it is distinguished from the species which it most resembles. In the first place, it is a larger animal than the *m. Hudsonius*, *lagurus*, or *torquatus*, and it differs from them in having an acute snout. The *m lagurus* has a very obtuse snout, naked soles, a large callus in place of a thumb, and a remarkable moveable one on the palm; and the *m. Hudsonius* is at once distinguished by its remarkable nails on the fore-feet, to be hereafter mentioned.

The affinity betwixt the *a. Grœnlandica* and *mus torquatus*, is much more decided. They agree in form, colour, dorsal stripe, in and in so many particulars, that were it not for the acute snout, the greater size of the former*, and its total want of even the minute rounded thumb-nail which the latter has, they might be considered as the same species. The two rings or collars which surround the posterior part of the neck, the one pale, the other brown, which have given rise to the specific appellation of *torquatus*, do not exist in the *a. Grœnlandica*. The structure of these two species being so much alike, and the district

* The *m. torquatus* is three inches long.

they inhabit not dissimilar, it is probable that their food is nearly the same. Pallas thus mentions the habitations and food of the *m. torquatus*. "Hinc in calvis Montium Uralensium per Arcticam Regionem crebri apparent horum murium cuniculi, a nido sub cœspitoso tubere latente pluribus canalibus pervii, a quibus quasi semicanales cœspiti muscoso insculpti, et hinc inde infra superficiem delitescentes continuantur. Lichene rangiferino et nivali etiam hi nidi repleti, attamen polygoni vivipari etiam tubera inibi reperta sunt." (PALL. *glir.*)

7. ARVICOLA HUDSONIA. *Hudson's Bay Lemming.*

Mus Hudsonius FORSTER, *Phil Trans* lxxi. p. 379. PALL. *glir.* 208. LIN. *Gmel.* 187. PENN. *Quadr. Third Edition*, ii. p. 201. SHAW's *Zoology*, i. p. 94.

Lemmus Hudsonius. *Supplement to* PARRY's *First Voyage*, p. clxxxviii *Appendix to* FRANKLIN's *Journey*, p 661. *Dictionaire des Sciences Naturelles*, tom. viii p 566.

Hair-tailed mouse. HEARNE's *Journey to the Northern Ocean*, p 387.

A. *(Hudsonia,)* brachyura, exauriculata, palmis tetradactylis, unguibus duobus intermediis maximis compressis obtusissimis bi-mucronatis (macrone uno super alterum.)

THIS animal was first described by Forster, from an imperfect specimen, and afterwards more fully by Pallas, who received a number of skins from Labrador, one of which he sent to Pennant. The latter author, and Shaw, have merely made extracts from Pallas' description. From its general form, it was placed by these writers in the genus in which it now stands, but it was from a skeleton preserved in the *Museum d'Histoire Naturelle* at Paris that the place so assigned to it was first ascertained to be correct Hearne gives some information respecting its manners, and Captain Sabine, in the appendix above quoted, describes those seen on the former voyage.

The Hudson's Bay lemming has four toes on the fore-feet. The two middle ones are of equal size, and are each armed with a nail disproportionately large, compressed, deep, and very blunt at the extremity, which presents two obtuse points, one lying over the other, separated by a transverse notch. The under part of the nail has been described variously, as a callus, or as a second nail lying under the true one. It is, in fact, in the adult male, of equal length with the upper nail, externally continuous with it and of similar texture, but a shallow longitudinal groove on each side produces the appearance of one nail lying over the other. The nails of the two extreme toes are placed higher up, and are much smaller than the two middle ones, but are somewhat similar in form. There is merely a minute naked callus on the usual site of the thumb. The *hind claws* resemble those of the allied species; the two middle ones, however, in the full

grown individuals, shew some approach to the peculiar form of those on the fore-feet. In the females and young, the callus, or subjacent production of the nail, is less conspicuous.

The singular structure of the fore-nails distinguishes this lemming from the rest of the species, but the purpose it serves in the economy of the animal has not been explained.

Like its congeners, it has hairy palms and soles.

The *fur* is long and fine, like that of the *a. Grœnlandica* and *tri-mucronata*; in the summer time, clouded above with dark-gray and brown, and reddish on the sides; hoary throughout, in the winter. The anterior part of the back is the last to change its colour to the winter hue.

The *whiskers* are longer than the head, and the tail, like that of the other American lemmings, is composed of a short pencil of stiff white hairs.

The form of the snout, head, &c., have not hitherto been described from living or recent specimens. A specimen preserved in the *Museum d'Histoire Naturelle* at Paris, is said to have had a short rounded head, extremely small eyes, no exterior ears, and to have been very low on its legs. The one commented upon at present, was obtained from the Esquimaux, and is too imperfect to supply the deficiencies in this part of the description. Its nails seem to have attained the full size exhibited by the male, but the length of its body is only $4\frac{3}{4}$ inches. The largest skin measured by Pallas was $5\frac{1}{4}$ inches long. The one kept at Paris, and those seen by Captain Sabine at Melville Island, were under six inches. It is therefore a smaller species than the *a. Grœnlandica*.

Hearne says that the Hudson's Bay lemmings are easily tamed, and become very familiar, and fond of being handled. They burrow in stony ridges near Churchill, but never enter the houses, differing totally in that respect from a *campagnol* described in the appendix to Captain Franklin's Narrative, under the name of *arvicola xanthognatha*, which shews a great propensity to domesticate itself. It is probable that the lemming feeds on roots, lichens, and other vegetable matters.

8. ARVICOLA TRIMUCRONATA, *(mihi.)* *Five-fingered American Lemming.*

A. *(trimucronata)* brachyura, auriculis brevissimis, rostro obtusiusculo, palmis hirsutis pentadactylis, unguibus (4) excavatis; pollicari utrinque convexo truncato tricuspidato, corpore super fusco badioque latere ferrugineo subter cinereo.

DESCR. Size a little inferior to the Hudson's Bay lemming. Length from $4\frac{3}{4}$ to 5 inches.

Head rather flat, an inch long, covered with pretty long fur, above of the same colour, with the anterior part of the back. *Ears* very short, and concealed by the fur: *Eyes* small. *Upper lip* deeply cleft. A small naked space around the nares, not pointed nor projecting. The end of the nose is obtuse, and hairy above. The margin of the mouth is hoary.

Whiskers numerous, about an inch long, black at the roots, brownish or white towards the extremities: some entirely white.

Mouth. Inside of the cheeks hairy: the hairs seated on projecting glandular folds.

Fore-teeth exserted. Upper ones slightly yellowish, shorter, broader, much worn away or excavated inside, and deeply lunated at their extremities. The lower ones white, narrower, chisel-shaped, and almost pointed at the extremities. A prominent conical papilla rises from the narrow palate behind the two upper incisors, and is succeeded by two transverse folds, having their edges turned backwards. The posterior of these folds is immediately anterior to the grinders, between which and the fore teeth there is a considerable space of naked gum. The *grinders* are equal to each other in height, have a prismatic shape, and are deeply cut with perpendicular grooves. Their grinding surfaces present the edges of plates of enamel on a level with each other, arranged so as to form a series of acute-angled spherical triangles, placed alternately in two rows. The areas of the triangles being composed of softer bone, are hollowed out. There are three grinders on a side in each jaw. Those in the upper jaw contain four triangles each, but the posterior grinder has the plates more crowded, and the triangles indistinct. The two anterior grinders in the lower jaw have five triangles, the posterior one four.

The *body* is broad and rather flat, and everywhere covered with a beautifully fine and soft fur, upwards of half an inch long on the back, but rather shorter on the belly. This fur at its base, and for the greater part of its length, is of a deep shining blackish-gray colour, but its tips are variously coloured on different parts of the body. There is no distinct neck.

The *colour* of the head and anterior part of the back, is grayish from an admixture of clove-brown, yellowish-brown, and blackish-gray tips of the hairs. The posterior part of the back approaches to chestnut-brown, the sides are yellowish-brown, and the belly bluish-gray, intermixed with many yellowish-brown hairs.

The *tail* projects three or four lines beyond the fur, and is clothed with stiff gray hairs.

The *fore-legs* are almost buried in the fleshy body, but there are four toes, tolerably long, and armed with moderate-sized strong curved nails, which are

much excavated underneath, and have sharp edges fitted for digging. There is also a thumb placed higher up, and almost entirely composed of a strong nail which is not excavated like the others, but is compressed, having two convex surfaces nearly alike, a strap-shaped outline and three small points, or teeth, projecting from its truncated extremity The second toe from the thumb is the longest, the first and outer one are nearly equal to one another, and shorter than the others, and the third one is of intermediate length. The palms are narrow and hairy. The ends of the toes under the roots of the nails are naked.

The *posterior extremities* are considerably longer than the fore ones, the thighs and legs being tolerably distinct from the body. The sole is narrow, long, and somewhat oblique, having its inner edge turned a little forwards. The hairs on the upper surface of the tarsus and toes are adpressed, beneath they curve inwards to the mæsial line, and form a thick rough coating to the sole. Some of the hairs project beyond the nails. The length of the sole, from the heel to the root of the nails, is half an inch.** The toes are longer, and the claws as long, but more slender than those of the fore-feet, and they are merely channelled underneath, not broadly excavated. The three middle ones are nearly of equal length, the outer toe is next to these in size, and is situated further back; the innermost arises still higher up, and is smallest of all. There are small rounded callous eminences beneath the roots of the nails, forming the extremities of the toes.

The individual here described, was killed by Mr. Back, on Point Lake, in lat. 65°, on the 26th June, 1821, It showed some courage and attempted to bite its pursuers. It was a female and had six young in the womb, fully formed but destitute of hair. The snow had disappeared from the ground about twelve days before this time.

Mr. Edwards procured one of these animals at Igloolik, but it was accidentally too much injured to be fit for setting up, although what remained was sufficient to identify it with this species. The sex of this individual was not ascertained. It is probable that this lemming becomes hoary in the winter, but no specimens were procured in that season.

The specific name adopted refers to the shape of the thumb-nail which approaches to that of the *mus lemmus*, PALL. in form. In the latter, however, even when most complete, there are only two points, and the nails of the other toes are very much compressed and scarcely furrowed underneath, not broadly excavated as in the species just described. In other respects they are much

allied, and the *a. trimucronata* may be said to bear the same relation to the *m. lemmus* that the *a. Grœnlandica* does to the *m. torquatus*.

The *m. aspalax* has a sub-bidentate thumb-nail, but its broad naked palms and very large nails, with its naked tail, at once distinguish it from the *a. trimucronata*.

The *m. talpinus* is also distinguished by its broad naked palms, furnished with a large callus at the thumb, and another at the wrist, and also by the form of its thumb and claws.

From the near resemblance in form betwixt the *a. trimucronata* and the *m. lemmus* it is probable that their modes of life are similar. The latter feed on grass, lichens, catkins of the dwarf birch &c. They make shallow burrows under the turf in the summer, and in the winter form galleries under the snow, along which they travel in search of food, receiving air by small spiracles which open on the surface. As the margin of a lake is a favourable place for such retreats, because the grass is abundant there, and the snow always drifted more deeply and compactly, it is possible that the long ridges of mouse-dung mentioned by Captain Lyon in the Narrative p. 462 may have been deposited by the *arvicola trimucronata*.

Arctomys.

Since the time when the marmots were first separated from the Linnæan genus *mus*, by Schreber, many allied animals have been discovered and ranked either in the same genus, or in new genera, or sub-genera, according to the different views of authors; and M. F. Cuvier (*Mém. du Mus. d'Hist. Nat. 5e année 4e cah.*) has founded his new genus, *spermophile* upon one of the marmots which has been longest known.

The animal which is more particularly the subject of this article, is a spermophile, but as it is probable that this genus is not really distinct from some of those previously indicated by the American Naturalists, and that various animals hitherto referred to the genus *sciurus* may also be spermophiles, it has been judged proper to preserve the name arctomys in its original extended signification, until the limits of the new genera are more correctly fixed, by a comparison of their different species with one another, prefacing, however, the description of the Arctomys Parryii, by a brief enumeration of the species described by authors, for the purpose of more ready reference.

When Schreber wrote, three species were well known as inhabitants of the old continent.

A. marmotta *. *A. bobac* †, and *A. citillus* ‡.

The two former, similar to each other in habits and general appearance, were the types of the genus, and still continue to be ranked as true marmots. The third has furnished to M. Cuvier, as has been just mentioned, the characters of his new genus *spermophile*, which, as we shall notice in enumerating the American marmots, is intimately allied to the division *tamias*, of the genus *sciurus*.

The following is a tabular view of the characters, by which he distinguishes the two genera :—

ARCTOMYS.	SPERMOPHILA.
Grinders, presenting on a transverse section, a nearly circular outline.	*Grinders*, when cut transversely appearing somewhat wedge-shaped, the inner margin being narrower than the outer one.
External ear, a flat flap with the vestige of a helix merely at the anterior and posterior parts of the auditory opening.	*External ear*. The auditory opening entirely surrounded by a helix (bearing some resemblance to the cicatrix of a human ear that has been cut off. PALLAS.)
Pupil of the eye, round.	*Pupil of the eye*, oval.
Feet, broad and clumsy.	*Feet*, slender.

* The *arctomys marmotta*, (GMEL.) is found on the Alps and Pyrenees, and was known to Pliny under the name of *mus alpinus*, (*Hist. Nat* l. viii. c. 37.) It is the *mus marmotta* of Linnæus, and has given rise to the English appellation of the genus. We are indebted to Gesner, (*Quadr.* p. 748,) for the most complete account of its manners, and there is a good description and figure of it in *l'Histoire Naturelle les Mammifères*. It is well known to travellers on the continent, as one of the animals which the Savoyard boys exhibit, in order to procure a small pittance.

† The *a. bobac* (GMEL.) which is fully described by Pallas, under the name of *mus arctomys*, (*Glires*, p. 97,) is an inhabitant of Poland and Siberia, choosing its residence in sunny exposures on hills of small elevation.

‡ To Pallas we also owe very detailed accounts of the *a. citillus*, which is the *mus noricus* of AGRICOLA, and is found from Bohemia to the distant parts of Siberia. He has described several varieties, differing from each other in size, in the capacity of the cheek-pouches, the proportional length of their tails, and in the spotted, or waved, or clouded disposition of their colours, and which on further research may prove to be so many distinct species.

ARCTOMYS.	SPERMOPHILA.
Toes, short and robust, united up to the commencement of the second phalanges by a strong membrane.	*Toes*, long, slender, separated.
Sole, including the broad heel, entirely naked.	*Sole*. The four tubercles and under surfaces of the toes naked, the rest of the sole, including the narrow heel, hairy.
The *cranium* flattened above, and presenting a nearly straight line from the occiput to the nose, with a deep bending, however, at the root of the nose. The temporal depressions large, and nearly equal to the orbits in size.	The *cranium* presenting an uniform curvature from the occiput to the extremity of the nose, large orbits and small temporal depressions.
The *fur* spotted.	The *fur* nearly uniform in colour, (not spotted.)
Manners, &c., social, hibernate, feed upon grass in summer.	*Manners*, &c. Live solitary, and lay up a store of berries for winter food.

In addition to the three marmots of the old world above mentioned, Dr. Eversman has collected some new ones in the deserts of Bukhara, but not having been able to procure the narrative of his journey, we know nothing more of them than the names of two, (*a. fulvus* and *a. mugosaricus*,) imposed by M. Lichtenstein*, nor do we know whether they are true marmots or spermophiles. Neither is the Circassian marmot of Pennant (*Hist of Quad.* i. p. 137,) (*glis tscherkessicus*, ERXLEBEIN,) sufficiently described to enable us to arrange it. An African animal the *gundi* which inhabits Mount Atlas, and is ranked by Gmelin and Pennant as a marmot, has only four toes on the hind feet, is otherwise little known, and belongs most probably to another genus.

The American species are more numerous, and much information respecting them, may be derived from a paper by Joseph Sabine, Esq., published in the *Linnean Transactions*, vol. xiii.) wherein he has cleared up many difficulties respecting the synonymy of the then known species, and figured and described three new ones.

* *Bulletin des Sciences, No. 3, Mars*, 1824, p. 265.

The American marmots enumerated by him are, *a. monax**, *a. empetra*†, and *a. pruinosa*‡ of GMELIN, *a. Franklinii*, *a. Richardsonii*, and *a. Hoodii* of SABINE§, to which may now be added *a. Parryii*, MIHI, and as nearly allied to these, and perhaps in a few instances, synonymous with some of them, or with each other, *Cynomys socialis*‖, RAFINESQUE-SMALTZ. *C. griseus*¶, IDEM. *Anisonyx brachyura*¶, IDEM. *A? rufa*¶, IDEM, and the division *tamias* of the genus *sciurus*, as *s. striatus***, KLEIN. *s. tridecemlineatus*††, MITCHILL. *s. Hudsonius*, FORSTER. *s. quadrivittatus*, SAY. *s. lateralis*‡‡, IDEM.

* *A. monax* has been often described, and is well known in the southern districts of the United States under the appellations of *wood-chuck* and *ground hog*. DESMAREST, *Mammalogie*, *No.* 525. WARDEN'S *United States*, i. p. 225.

† The *a empetra*, or *Quebec marmot*, requires correction as to references. Four specimens have been described under this name by authors, but as Mr. Sabine (FRANKLIN'S *Journey*, *Appendix*, p. 662) has justly remarked, there is so much discrepancy in the descriptions, that they cannot be all referred to the same species with any certainty. A specimen in the Museum of the University of Edinburgh, sent from Canada by the Earl of Dalhousie, although of smaller size, agrees in other respects with the one described in the *Linnean Transactions* by Mr. Sabine. Desmarest (*Mamm. No.* 526,) mentions that three individuals of this species, had been recently sent to Paris from New York.

‡ The *a pruinosa* is known only by Pennant's short description of a specimen in the Leverian Museum, and the characters he has given, with the exception of the fur of the abdomen being hoary, are all referrible to the *a. empetra*. Its long coarse hair sufficiently distinguishes it from *a. Franklinii* and *Parryii*, to which it bears some resemblance in colours

§ *Trans. Linn Society*, vol xiii. p. 19, *et seq* *Appendix to Franklin's Journey*, p. 662.

‖ *Cynomys socialis*. *Arctomys Ludoviciana*, ORD, known also by the names of *monax missouriensis*, *wistonwish*, *prairie dog*, burrowing or barking squirrel, has been scientifically described only from a prepared specimen, kept in Peale's Museum, Philadelphia, and excepting its larger size, there is no character ascribed to it by James who has given the fullest description, but what applies equally well to the *a. Richardsonii* as described by Mr. Sabine There is a good account of its manners in PIKE'S *Travels through Louisiana*, p. 207; and a description of it in JAMES' *Account of Long's Expedition to the Rocky Mountains*, vol. ii. p. 140, 141 and 334. See also WARDEN'S *United States*. i. p. 226, and for an account of M. RAFINESQUE SMALTZ'S characters of the genus *cynomys*, DESMAREST'S *Mamm.* p. 314, which is taken from the *Amer. Month. Mag.* 1817, p. 45. The genera *geomys* and *diplostoma* of the same author, also mentioned in p. 314 and 315 of *Mammalogie*, seem to approach nearer in general character to the hamsters than to the marmots.

¶ DESMAREST, *Mamm. l. cit.*

** *Mamm. No.* 547.

†† *Sciurus tridecemlineatus*, *Mammalogie*, *No.* 548, seems from the description to be synonymous with the *a. Hoodii* of Sabine. SCHOOLCRAFT, in his *Narrative of Governor Cass' Expedition*, mentions two kinds of striped ground squirrels, one of which seems to bear considerable resemblance to this species.

‡‡ *S. quadrivittatus* and *s. lateralis* are described in JAMES'S *Account of Major Long's Expedition* vol. ii. p. 234, 235, 349. (Lond. Edit.)

References to the descriptions or notices of these animals, are given at the bottom of the preceding page.

The *a. monax, empetra,* and *pruinosa,* as far as known, appear to be true marmots. The rest agree with each other in having fine fur, distichous bushy tails, much agility, and lively manners, and may be probably all referred to the genus *spermophila* of F. Cuvier, or to *Tamias* of Illiger, (*Tenotus,* Rafinesque Smaltz.) That these genera are very closely allied, has been noticed by F. Cuvier, and the connexion seems to be rendered more apparent by a consideration of the intermediate habits, structure, and manners of some of the American animals just enumerated.

9. Arctomys Parryii. *Gray Arctic-marmot.*

Ground squirrel. *Hearne's Journey,* p. 141 and 386.

Quebec marmot. *Forst. Phil. Trans.* lxii. p. 378 & *abridgem.* p. 329.

Arctomys alpina. *Parry's Narrative, Second Voyage,* p. 91

A. palmis pentadactylis, rostro obtusissimo, bacchis sacculiferis, auriculis brevissimis, cauda elongata apice nigra, corpore supra maculis albis nigrisque confluentibus marmorato subtus ferrugineo.

Descr. *Size* greater than the *a. Franklinii* and less than the *a. empetra.* Length, exclusive of the tail, from twelve to fourteen inches. Broad flattish body with thick short legs. *Head* depressed.

Face moderately broad, covered with short, dark, reddish-brown hairs, intermixed with a few coarser black ones. The *nose* is very blunt, and covered with a dense coat of short brown hairs, a little paler than those of the face, but mixing insensibly with them. A small portion of the upper margin of the nostrils, and their furrowed septum, are the only naked parts. The margin of the mouth is hoary. The *eyes* are large, prominent, and dark-coloured. Orifice of the auditory passage large. *Ears* very short, consisting merely of a flat semi-ovate flap projecting about 2½ lines on the superior and posterior margin of the auditory openings, and covered with short hairs. *Cheeks* of a brighter colour than the face.

Pouches ample, opening into the mouth anteriorly to the grinders.

Whiskers. There are some black *setæ* on the cheeks, above and below the eyes, and beneath the ears on the posterior part of the pouches; none of them exceeding half the length of the head. The last mentioned are the longest, and at the same time the most slender.

Teeth. Fore-teeth white, with chisel-shaped cutting-edges, wearing away and

frequently channelled inside; *upper ones* short and somewhat truncated: *lower ones* one-third longer, rather narrower, and terminating at the points by nealry a semi-circular outline: five *grinders* above and four below on each side, the posterior ones the largest; (some adult individuals were observed with only four grinders on a side in the upper jaw.) The crowns of the grinders are bounded by an irregular bending plate of enamel, intersected by two transverse ridges of unequal height, and present a few obtuse points.

Body thick. *Back* covered with a dense coat of short soft fur, consisting of a fine down, which has a dark smoke-gray colour at the roots, pale French-gray in the middle, and yellowish-gray at the summits; and of longer but not coarse black and white hairs. The arrangement of these hairs produces a crowded assemblage of ill defined, irregular, and confluent whitish spots, margined and separated by black, and yellowish-gray. The spots are more distinct, and assume an obscure transverse arrangement on the posterior part of the back. The throat, sides of the neck, extremities, and whole under surface of the body have a colour intermediate between brownish-red and brownish-orange, which is most intense on the sides of the neck, posterior to the cheeks. The colours of the back and belly run gradually into each other on the sides; and according to Mr. Edwards' observations, the gray colours of the back extended farthest when the animal was fat, and the fur in *prime* order. In old and lean individuals, the rusty brown of the belly spreads up over the flanks and sides. The hair of the belly and thighs is longer and coarser than that of the back.

Tail to the end of the vertebræ about four inches, the hair projects nearly $1\frac{1}{2}$ inches, and its whole length may be stated at $5\frac{1}{4}$ inches, or in proportion to the length of the head and body as 1 to $2\frac{1}{2}$. It is flattish, and the hairs subdistichous, very much resembling the tail of the *Sciurus Hudsonius;* (*Sabine, Franklin's Journey*). The upper surface of the half next the body is yellowish-brown intermixed with black hairs, and the under surface uniform brownish-orange. The outer half above and below is black with a slight admixture of reddish-gray hairs. The hairs of the tail are long ($1\frac{1}{2}$ inch), and the animal possesses the power of expanding them like a feather. In this state, owing to the exterior hairs being black towards the tips, and brown towards their bases, the tail is brown down the centre, and tipt and margined for about two-thirds of its length with black.

Legs robust, the hind and fore ones nearly of equal length. The *feet* are covered superiorly with short adpressed brown hairs, which at the roots of the claws bend downwards. The *claws* are large, blackish, compressed, arched

above, nearly straight and grooved underneath, and tapering, but not very sharp. On the inside of the *fore-feet* and high up, there is a small toe or thumb, armed with a conical nail of sufficient size to be of a little use in grasping substances. Of the remaining four toes of the fore-feet, the first and third are of equal length, the middle one a little longer than these, and the outer one the shortest of all. The claws are about half an inch long. The *palms* are naked and furnished with some remarkable roundish callous protuberances. Three of these are placed at the roots of the toes, the thumb is inserted into the largest one; there is a small one opposite to this at the root of the outer toe, and there is a large one at the extremity of each toe beneath the roots of the claws.

On the *hind feet* there are five toes, longer and more slender than those of the fore extremities, but having rather smaller claws. The inner and outer hind toes arise high up and opposite to each other. The three middle ones arise nearly together, but the centre one is rather the longest. The callosities at the roots of the nails are as large as those on the fore-feet, but there are only four on the soles, two at the roots of the extreme toes, and two lower down at the roots of the three middle toes.

These animals are truly plantigrade, the soles being naked to the heel. The heel is narrow and partially covered with hairs which curve over it.

Few *anatomical details* were preserved. Mr Edwards has noted the cæcum as being very large. The liver exactly resembles that of the *Mus Citillus* as described by Pallas. A female killed on the 13th of June, 1821, at Point Lake in lat. 65°, had seven young in the dilatations of a tubiform uterus. The testes of the male lie over the symphysis pubis, and are small, without any projecting or pendulous scrotum.

This beautiful marmot was first noticed by *Hearne*, under the name of the ground-squirrel, and indeed it has a most striking resemblance to the Hudson's Bay squirrels in form and voice. In page 141 of his narrative he mentions them as the favourite food of the *grizzly bear*, a hoary variety of *U. americanus*, and in page 386 there is some account of its habits. Forster in the *Philosophical Transactions* describes a specimen of the *A. Parryii* procured from Churchill, under the name of the Quebec marmot, at the same time expressing his doubts of its identity with that animal. The Quebec marmot is found only in the woody parts of the country, but the *A. Parryii* is common in the sandy, barren tracks, near Churchill. It is possible that the *earless marmot* mentioned in Arctic Zoology as observed at Nootka Sound by Captain Cook, may be this species. It was observed by Captain Franklin's Expedition, in the summer of 1821, to abound on

the *barren grounds* from lat. 64° to the Arctic Sea, but it was not noticed in Mr. Sabine's paper because the specimens did not reach England. The descriptions then taken, however, correspond in every respect with the specimens brought home by Captain Parry, and which were obtained in Five Hawser Bay in September, 1821.

The gray Arctic marmot is common in stony barren tracks, but delights chiefly in sandy hillocks amongst rocks, where it burrows, living in society. The same entrance is common to a number of individuals. It is not found in woods. A sentinel is generally observed sitting erect upon the summit of the hillock, whilst the others are feeding or sporting in the neighbourhood. Upon the approach of danger, he gives the alarm by a kind of whistle, and they instantly betake themselves to their holes, remaining chattering, however, at the entrances, until the near advance of the enemy obliges them to retire to the bottom. When their retreat is cut off, they become much terrified, and seeking shelter in the first crevice that offers, they not unfrequently succeed only in hiding the head and fore part of the body, whilst the projecting tail is, as is usual with them when under the influence of terror, spread out flat on the rock. Their cry, in this season of distress, strongly resembles the loud alarm of the Hudson's Bay squirrel, and is not very unlike the sound of a watchman's rattle. The Esquimaux name of the animal seek-seek, or cheek-cheek, is an attempt to express this sound. They run with considerable rapidity, have the gait of the Hudson's Bay squirrel, and can squeeze themselves into a very narrow cleft of a rock: we never observed them attempt to leap. According to Hearne, they are easily tamed, and are very cleanly and playful in a domestic state. From the deepness of their burrows, and the want of proper instruments to dig them out, it was not ascertained in what manner, or with what materials, their nests are constructed.

Their food appears to be entirely vegetable. In upwards of fifty individuals examined at various periods, no animal substance was detected in the pouches or stomachs. At Point Lake in lat. 65°, their pouches were observed about the middle of June to be filled with the berries of the *Arbutus alpina*, and *Vaccinium vitis idæa*, which were just then laid bare by the melting of the snowy covering, under which they had lain all the winter. In the end of July, on the shores of the Arctic Sea, their pouches contained the seeds of a *polygonum*, and in Five Hawser Bay in September, they were filled with the seeds of *astragali*.

We possess no precise information as to their hybernation, but it is probably commensurate with the time the snow lies on the ground, which may be generally

stated to be from the middle or end of September, to the beginning of June, between the 65th and 68th parallels of latitude.

The number of young they produce at a time has, in one instance, been mentioned already.

Towards the end of summer, these animals, like the bear, acquire a layer of soft fat under the skin, and then they are considered by the Indians to be delicate food, and are much sought after by the bears and wolverenes.

The fur of the Arctic marmot though short, is, when in season, very beautiful and fine, and their skins might be easily procured in sufficient quantity to form an article of commerce. The skins of a spotted variety of the *A. citillus*, which is smaller than the Arctic marmot, are sold at a high price by the Tartars, to the Chinese.

The Canadian voyagers apply the term of *siffleur*, not only to this animal, but also to all the other marmots, and even to the badger, (*meles labradoria.*)

The *A. Parrii* may be distinguished from the *A. Franklinii* by its greater size, its flatter and scarcely gibbous forehead, shorter ears, tail shorter in proportion, tipt with black, but not banded, by the colours of the fur, and lastly, by the presence of a very distinct thumb nail on the fore feet.

It differs from the *A. Richardsonii* also in its greater size, in having an obtuse snout, shorter ears, a tail rather more than one-third the length of the body, in the greater thickness of the body, and in the dissimilarity of the colours of the body and tail.

With the *A. Hoodii* it can never be confounded.

The *A Parrii* has a greater affinity with the *A. citillus*, than any of the American marmots. Indeed Pallas has, as we have already noticed, referred so many varieties to this latter species, that it is not easy to find characters which may separate them all from the *A. Parrii*. One of his varieties approaches the *A. alpinus* in size, and is clothed with coarse fur; another, not larger than a water rat, and inhabiting the same districts with the last, has a short and very soft fur. There are besides intermediate varieties, differing in colour, which in some is nearly uniform, in others clouded or spotted. They vary, too, in the proportional length of their tails, and remarkably in the size of their cheek pouches. The characters which seem to distinguish the *A. Parrii* from all these are, its greater size, its forehead not rounded nor gibbous, but rather depressed, ears clothed with very short, yet distinctly visible, hairs, and a tail longer than the posterior extremities.

10. Lepus glacialis. *Polar Hare.*

Lepus glacialis. *Leach, Ross's Voyage. Supplement to Parry's First Voyage*, clxxxviii. *Appendix to Franklin's Journey*, p. 664.

Lepus timidus. *Fabricius Fauna Grœnl.* p. 25.

Varying hare of Hudson's Bay. *Hearne's Journey to the Northern Ocean*, p. 382. *Penn. Arctic Zoology*, i. p. 94. *Hist. of Quadr.* p. 100.

Kaw-choh. *Copper Indians.* Ookălik, *Esquimaux.*

Hare. *Parry's Narrative, Second Voyage*, p. 18, 94, 103, 104, 107, 137, 150, 157, 230, 309, 313, 512.

The Polar hare inhabits both sides of Baffin's Bay, and is common in the barren rocky tracts, from lat. 64° on the continent of America, to its extreme northern capes, and on the North Georgian Islands in lat. 75°. It is not found in woods; its favourite resort is to the dry acclivities of gently elevated hills, where it shelters itself under large stones and in the natural cavities of rocks, but does not dig burrows for itself. In the winter time, it scrapes a hole in a wreath of snow, generally at the foot of a precipice, and seldom wanders far from its retreat. It feeds on the bark of the *betula glandulosa* and of the various species of willow, and also on dry grass or hay, which it easily obtains even in winter, as the snow is speedily drifted from the acclivities to which it resorts. It is likewise fond of the berries of the *arbutus alpina*, and scratches them from under the snow with its fore-feet, which are armed with nails well adapted for the purpose. On the desolate shores of Melville Peninsula, the hares in the month of January, as stated in the narrative, were driven to the necessity of feeding upon the offal thrown from the ships —p. 149.

Although considerable numbers of the Polar hares are found in favourable districts, it is not a gregarious animal, nor do the situations it lives in require that it should be so; but the American hares living in society, chiefly in willow thickets where the snow is deep and loose, find their association necessary to form beaten roads in the winter time, on which they may travel in search of food. This habit renders them an easy prey to the natives, who capture them by placing a noose formed of the sinews of the rein-deer in their path. The Polar hare, on the contrary, makes a devious and solitary track in the snow, and is destroyed by the bow and arrow or by fire-arms. The hunter, by a gradual circular approach, gets sufficiently near without alarming the animal, but its fur being of as pure a white colour as the snow itself, its presence is detected only by the dark colour of its eye.

The winter fur of the Polar hare is very dense and fine, of a snow-white colour to the very base, and longer than that of the American hare, which, even in winter, is dark-coloured towards its roots. Its length is about one inch on the back, and two and a half on the belly. During this season the animal is entirely white, with the exception of the black tips to the ears, the honey-yellow coloured irides, and part of the whiskers, which are black. In Greenland the hares continue white all the year, and the same thing would appear to occur with some individuals (probably old ones) in other quarters of the Arctic regions. A white hare was seen by Captain Parry on the 17th of August, although dark-coloured ones (young?) were frequent at the same period (p. 313). A partial change of the points of the hair on the face, front of the ears, and back, to grey and greyish-brown was observed by Captain Sabine in some of the hares killed in the height of summer on Melville Island. A *young one*, killed on the present voyage at Repulse Bay on the 22d of August, and hence nearly three months old, had the head and back hoary, from an intimate intermixture of hairs entirely black with others black at the base and white at the tips. These hairs are longer and coarser than the dull yellowish-grey down, which becomes visible when they are blown aside. On the breast, flanks, and thighs, the long hairs have fewer white tips, and are more thinly scattered, permitting much of the down to be seen; the down on these parts is of a bluish-grey colour. The belly, feet, and tail, both above and below, are white. The hairs on the belly are very long. The ears are coloured like the back, but have a greater proportion of black hairs; the margins are white, and there is a small brownish-black spot at their summits: they are about the same length with the head, that is $3\frac{1}{2}$ inches long. The length of the back and head is $17\frac{1}{2}$ inches.

About the end of April (in lat. 65°), the winter fur falls off with the slightest touch, a circumstance which does not occur in October when they begin to assume their winter dress. April is also their rutting season, and, according to Indian information, they bring forth only once a year, and from two to four young at a time. Otho Fabricius, however, from personal observation, ascertained that the Greenland hares produce as many as eight young at a time in the month of June.

The flesh of the Polar hare is whitish, and has a good flavour, contrary to that of the varying hare, which is said to be insipid. The flesh of the American hare is more brown, like that of the common hare. The Polar hare is also distinguished from the others by the extreme thinness and tenderness of its skin in the winter time. The full-grown hares killed on Melville Peninsula, weighed

about 7lbs.; and Captain Sabine states, that the largest killed on Melville Island did not reach 9lbs.; none of those obtained by Captain Franklin's party in the neighbourhood of Fort Enterprise exceeded this latter weight. Hearne, however, informs us, that in his time they were frequently killed near Churchill river, weighing 14 or 15lbs. Pennant, in British Zoology, notices nearly as great a variation of the weight of the common hare.

The polar hare was considered by Fabricius to be the common hare, with the colour of its fur altered by climate, and by Barrington and Pennant, as the same with the varying hare of Scotland. Dr. Leach, on examining one brought from Baffin's Bay by Capt. Ross, named it as a new species, and Capt. Sabine, who had opportunities of seeing many recent specimens at Melville Island, describes their characteristic marks in the appendix above quoted. The different species of hare, although differing in manners, resemble each other so much in form, that it is difficult to find artificial characters by which they may be readily distinguished. The colour of the fur is, in many instances, an uncertain mark, especially as the effects of climate upon it are not yet perfectly known; authors have therefore generally had recourse to the relative proportions of the members, for the purpose of obtaining specific differences, and we are indebted to Pallas, Barrington, and Pennant, for measurements of this kind of the *lepus cuniculus*, *americanus*, *ogotona*, *variabilis*, and also incidentally of the *lepus glacialis* under the name of *variabilis*. It is to be remarked, however, that the differences of length are often minute quantities, and some uncertainty occurs as to the exact part of a joint, from which former authors have measured; hence this method is not so useful in practice, as might at first be supposed, and it is very convenient when any other character of practical application exists. Captain Sabine has therefore done a service to naturalists, by pointing out a very distinct specific difference betwixt the polar hare and the other two species, which it most resembles, the *L. timidus* and *variabilis*, in the direction of the fore teeth: those of the former being much less curved, and standing out more nearly in the planes of the jaws, into which they are implanted. We may add that the upper fore teeth of the two latter species have each a deep longitudinal furrow, which is continued so as to form a notch on their cutting edges; this groove is nearly obsolete in the adult polar hare, and the cutting edges of the teeth are even; the teeth too, in consequence of their dissimilar inclination, wear away on the inside differently in the different species.

The following table contains the dimensions of the common hare from the lowlands of Scotland, and of the varying hare from the highlands, taken care-

fully from recent specimens of full-sized individuals, procured in the month of January for the purpose. They are contrasted with some of the dimensions of the polar hare, in the last columns, but it is to be regretted that the latter being taken from the specimen which was brought home for the purpose of setting up, is necessarily defective, and in some degree inaccurate, because the cartilages of the few bones that remained attached to it were shrivelled by drying. The measurements are in inches and lines.

	L. timidus Common Hare. Old Male.	L. timidus Common Hare. Female.	L. variabilis, Varying Hare. Old Male.	L. glacialis Polar Hare.
	IN. LI.	IN. LI.	IN. LI.	IN. LI.
Length from *nose to root of tail* (measured along the back)	21 0	23 0	22 0	22 6
—— from nose to point of middle claw, hind leg stretched out	31 0	30 6	29 6	(*)
—— of *head*, from occipital spine to nose measured over the forehead, and pressing down the fur	5 6	5 4	5 0	4 6
—— of *head*, measured with a pair of calliper compasses	4 6	4 5	4 3	4 0
—— of *ears*, including fur	5 6	5 0	4 6	4 0
—— of *ears*, from rictus to apex, or from the commencement of the cartilaginous part of the auditory canal	4 0	3 9	3 1	3 5
—— of *tail* to end of vertebræ	3 6	3 6	2 0	1 6
—— of *tail*, including fur	5 0	5 6	3 6	3 6
—— of *whiskers*	4 6	3 6	3 0	2 6
FORE EXTREMITIES.				
Length of *humerus* (measured anteriorly)	4 0	3 9	3 6	.
—— of *ulna* (from olecranon to wrist)	5 1	5 0	4 11	. . .
—— from wrist joint to end of middle claw	3 0	3 0	2 9	2 9
—— of *middle toe and claw*	1 7	1 6½	1 6½	1 2
—— of *fore leg* (from anterior part of elbow joint to point of middle claw)	7 5	7 3	7 0	. . .
HIND EXTREMITIES.				
Length from knee joint to point of middle claw	10 8	10 7	10 6	. . .
—— of *femur* (from trochanter to knee)	5 [illegible]	5 2	5 2½	. . .
—— of *tibia* (measured exteriorly)	5 8	5 8	5 8	. . .
—— from *heel* to root of middle toes	3 11	3 9	3 8	3 8
—— of *middle toe and claw*	2 2	2 1	2 2	2 1
—— from heel to point of middle claw	6 1	5 10	5 10	5 9

* A Polar hare, (termed by Pennant varying hare) measured at Hudson's Bay, was 24 inches long from nose to tail; 31¼ inches from nose to the point of the middle claw, stretched out, and weighed 7 lbs. 6 oz. See *Arctic Zoology*, i. p. 95; Article, American hare.

The following Table is extracted from Barrington's paper in the *Philosophical Transactions*, Vol. LXII.

	Fore Leg measured from uppermost joint to end of toe.	*Hind Leg* from uppermost joint to end of toe.	Length including tail.
	IN.	IN.	IN.
Rabbit	4⅕	6¾	½
Hare	7¾	11	22
L. Americanus	6⅜	10⅛	18
Alpine Hare from highlands of Scotland (Varying Hare)	6⅝	10⅝	22¼

It will be observed from the above table, that one of the most striking differences betwixt the polar and the common, or varying, hare is in the length of the fore toes, those of the former being nearly half an inch shorter. The claws of the polar hare are similar in form to those of the common hare, but are in general a little blunter, perhaps from more frequent use in scratching. The claws of the varying hare are more accuminated and sharper than either, but at the same time more depressed. The head of the polar hare seems to be proportionally smaller

When the ears of the common hare are bent forwards over the crown of the head they reach to the tip of the nose, and if bent along the cheek they reach an inch beyond the nose. The ears of the varying hare treated in the same way reach, in the latter case, just to the tip of the nose, and in the former, they fall an inch short. The ears of the polar hare seem in general to be of a length intermediate between these two, although some differences seem occasionally to exist in this respect: Mr. Edwards, who examined several of these hares on the present voyage, found their ears, exclusive of the fur at their tips, of the same length with the head, and this agrees with the specimen in the Edinburgh Museum, from Melville Island. Those killed at Fort Enterprise had the ears, including the fur, about one-eighth part longer than the head, and Captain Sabine states the ears of those measured by him to exceed the head, by from one-fifth to one-seventh part. Barrington remarks that similar variations occur in rabbits, the ears of those fed in the house being usually longer than the head, whilst those living in warrens have the ears shorter than the head.

The *American Hare (L. americanus*)* which in northern districts also changes to a pure white in the winter, may be distinguished from the polar hare by its being of a much smaller size, by the fur at the tips of the ears being grey not black, and by the hind leg and foot, measured from the knee-joint, considerably exceeding one-half the length of the animal. The tail of the polar hare is like that of the varying hare, totally white even in summer, whilst the American hare has the upper surface of its tail black, like that of the common hare. The average weight of the American hare is about four pounds, scarcely half that of the polar hare. In the southern parts of the United States, the American hare does not change its dress in the winter time. It lives only in wooded districts, resorting chiefly to willow thickets, and was seen by Capt. Franklin's party as far north as 64° 30′ at Fort Enterprise, at which place, at Churchill, and along the whole borders of the barren grounds between these places, it lives in the neighbourhood of the polar hare. We never observed them associating or visiting the same haunts, and did not learn whether there is the same antipathy betwixt them that exists between the common hare and the rabbit, or whether like the common and varying hares they occasionally breed with each other†. Mr. Sabine in the appendix to Captain Franklin's Narrative has stated, we suspect from some error in the information communicated to him, that the American hare retires from the northern districts of Hudson's Bay to the southward in winter. We believe that they never migrate; but in some seasons, generally after a very wet summer, a great mortality prevails amongst them, and they become very scarce in certain districts.

II. CERVUS TARANDUS. (L.) *Rein-deer.*

Cervus tarandus. *Supplement to Parry's Voyage*, exc. *Appendix to Franklin's Journey.*
Tukta (male,) Pangnek (female,) Kollowak. (young) Norak. *Greenlanders.* Fabr.
Deer. *Parry's Narrative, Second Voyage*, p. 52, 84, 101, 107, 108, 214, 324, 332, 434, 439, 505, 512.

THIS is the only species of deer found in America, to the eastward of the chain of the Rocky Mountains, and in a greater northern latitude than 64°. It is the *Attekh* of the Cree Indians, the *etthin* of the Copper Indians, and *tooktoo* of the

* This animal was first described by Kalm.—*Travels in America*, i. p. 105, ii. p. 45.

† This fact is stated by Pallas, and has also been lately observed in the highlands of Scotland. Professor Jameson, who received his information from a highland gentleman of veracity and observation.

Esquimaux. These people have, besides, names appropriated to the different ages and varieties. Thus the Copper Indians denominate a rein-deer of the smaller kind, such as frequent the barren-grounds, and migrate in the summer to the sea-coasts, and which were the only kind seen by Captain Parry, by the generic term *etthin*, or more exclusively *bedsee-awzeh*. The male is named *bedsee-ehoh*, the female *tsootai*, and if she is suckling a fawn, *tampeh*. A larger and woodland variety of rein-deer is named *tantsee-ah* *.

The rein-deer has been often described by naturalists, and there is a very full history of it in the Amænitates Academicæ, tom. 4, No. 57, from which succeeding authors have borrowed freely. It may be remarked that its horns vary exceedingly in shape and size, so that no two individuals in a herd are alike in their antlers, and in extreme cases it is difficult to trace any resemblance. Some have the extremities and branches of the antlers broadly palmated, others have them cylindrical, and even tapering. Many have a broad plate which runs down betwixt the eyes, and projects above the nose; in some this plate arises from the right antler, in others from the left, in a large proportion there is one from each antler, whilst in a great number it is altogether wanting. After paying considerable attention to the subject, we did not find ourselves warranted in ascribing these variations solely to sex or age. The rein-deer hunters, although, as might be expected, intimately acquainted with the economy of the animal, are unable to distinguish like the stag-hunters of Europe the age of the animal by the *tines* of its antlers. They remark indeed that the old males have generally (but not always) larger horns than the young males and females, and that they come to perfection sooner, and are shed earlier in the season.

It has been supposed that nature has provided the female rein-deer with horns, because inhabiting more northerly regions than the rest of the deer species, it requires them to clear away the snow. This affords no explanation of the fact that the old males lose their horns in December, before the snow has attained its greatest depth, whilst the young males and females retain theirs until March, April, or May. We know from frequent observation that the rein-deer removes the snow with its feet, but want confirmation of its ever using its horns for that purpose.

The horns attain their full size, and lose most of their hairy covering before the commencement of the rutting season, at which time the males have much

* For the numerous Lapland names applied to the rein-deer, see *Lach. Luppon.* 11, p. 42.

fat deposited upon their backs. The old males come first in season, generally about the beginning of October; their fat soon becomes red, and strong tasted, and in a fortnight they are lean and exhausted. They are succeeded in their office by the younger males, and the whole season is over before the middle of November. Although the males, as we have stated above, in general shed their horns some months earlier than the young ones, Captain Cartwright, who resided sixteen years in Labrador, and was much occupied in the pursuit of the rein-deer as an article of food, remarks that he often met with stout male deer which retained their horns in February, whilst many of the younger ones had shed theirs; that he frequently killed old stags which had not cast their horns in March, and that in May he saw a male three or four years old still carrying his antlers. He goes on to say that although they are thus irregular in shedding their horns, they all burnish in August*. The connexion that exists between the state of the genital organs of the male deer, and the increment of their horns, has been illustrated by Blumenbach and other physiologists. The immediate process by which nature produces the fall of the horns is pointed out by Mr. Brookes, of London, in his anatomical lectures. The rough coronary circle of bone at the base of the horn becomes gradually larger until it strangles the blood-vessels of the soft hairy covering of the antlers. This soon dries, shrivels and peels off, and the horns no longer deriving any nourishment also dry, and drop off like an extraneous substance.

The migration of the rein-deer has been considered as a flight from the incessant attacks of the *æstrus tarandi*†, but it is not until the herds have reached the sea-coast, or the still more remote islands which form the limits of their summer journey, that the larvæ deposited in their skins and fauces‡ on the preceding season, become perfect insects and take wing; and in a short period thereafter, the ova of a future brood are deposited. Hence, as the barren-ground deer do not return to the woods until November, when much snow has fallen, and the insects are put to rest for the season, it is clear that they never hear the sound of the gad-fly in the woody country. Their migrations seem to be prompted by that

* *Journal of sixteen years' residence in Labrador, by G. Cartwright, Fifth Voyage*, p. 91, 112, 133.

† "Hæc musca notissima est rangiferis et quorum dorso prodit circa initium Julii tumque deponunt rangiferi crines, qui omnes in dorso ferè erecti conspiciuntur." *Flor. Lapp.* Ed. Smith, p. 378.

Vide etiam Travels through Sweeden, Norway, &c., by A. De Capell Brooke, p. 41.

‡ The *larvæ* deposited in the fauces are said to belong to the *æstrus nasalis*.

instinct which leads them to resort, at certain seasons, to districts where alone food of the proper quality is to be obtained. In the winter time they feed on the *usneæ*, *alectoriæ*, and other lichens which cover the lower branches of the trees in the dark forests of larch and spruce fir. About the end of April, when the partial melting of the snow has softened the *cetrariæ*, *cornicularieæ*, and *cenomyces*, which clothe the barren-grounds* like a carpet, they are found ultimately resorting to these their most nutritious food, and returning to the woods according to the state of the weather. In June, when the increasing power of the sun has dried up the lichens, and rendered them quite hard and friable, the deer resort to the moist pastures which lie between the rocky ridges on the coasts and islands of the Arctic Sea, where they graze not only on the sprouting *carices*, but also on the hay and withered culms of the preceding year. Their spring journey is performed partly in the snow, partly after the snow has disappeared, on the ice of the rivers and lakes which have in general a northerly direction; and their return takes place after the snow has begun to fall, but whilst the heat remaining in the earth is still sufficient to keep the lichens in a comparatively soft state under their snowy covering. The food thus preserved for them brings them into a good condition for the rutting season, which takes place in October, when they arrive on the verge of the woods.

The pregnant does precede the males a month or six weeks in the spring migrations, and bring forth their young on the sea-coast, in May and June. It is probable that they go farther northwards than the bulk of the males, and as they travel before the ground is laid bare, they are very lean on their arrival in their northern summer quarters although on quitting the woods they are in better condition than the males. The deer seen on the coast by Captain Franklin's party were almost uniformly does and fawns, and Captain Parry remarks that they were wretchedly poor on their arrival in his neighbourhood. Captain Parry saw deer as late as the 23d of September, and the females with their fawns made their first appearance on the 22d of April.

This account of the migrations of the rein-deer is to be considered as merely a general view, for stragglers are found in every part of the country at all

* The BARREN GROUNDS, ("Hi lichene obsiti campi quos TERRAM DAMNATAM diceret peregrinus," (*Flor. Lapp.*, p. 374,) are an extensive tract of country, more or less rocky and hilly, but no where mountainous, lying between the 60th and 68th degree of north latitude, and to the eastward of the 110th degree of west longitude. They are, except in a few alluvial spots on the banks of the larger rivers, where a few white spruces grow, entirely destitute of any shrub larger than the *betula glandulosa* or dwarf-birch.