she fled from her cub; it seems probable no maternal duties had bound it to her. Had Stephen Bradford, with his dirty gun, met her in May, he would have been only too happy to have escaped with his life instead of going to camp with her skin.

In its production of young so comparatively small, and in its privacy during parturition, our bear has an affinity to the opossum, our sole North American marsupial, but without the pouch; and from these facts, as well as its hibernation, and its capacity of sustaining life either as a vegetarian or a carnivora, may justly be considered in its Polar or fishing variety one of the first mammals that occupied this continent on rising from its glacial submergence. The Polar variety, but few shades above the walrus, might easily have sustained life for the few short summer months on fish and seals, ere yet the emergence of rock peaks, or swampy terraces; and when a tardy vegetation was clothing these plateaux, and before the herbiferous races appeared, his descendants straying landward thrived upon this vegetable diet, till these races appearing after their natural food had grown for them, allowed him again to become a carnivora. In this struggle of fish, vegetable and flesh life, his prolonged torpidity, perhaps at first much more prolonged in arctic regions, and destined as he advanced to warmer climates to cease, must have been of wonderful use in his struggle for existence.—*Communicated by the Author, Jan. 26, 1880.*

ART. V.—NOTES ON THE ANATOMY OF A SEAL FROM MAGDALEN ISLANDS.—BY J. SOMMERS, M. D.

(Read Feb. 9, 1880.)

IN bringing to your notice the following points on the anatomy of a seal, I take occasion to express my sincere thanks to the gentleman through whose kindness I have become indebted for the opportunity to conduct an interesting investigation.

The Seal was sent from Magdalen Islands by J. B. F. Painchaud, Esq., to Robt. Morrow, Esq., who conjointly with myself made the dissection. I wish also in this place, and feel that I carry the members of the Institute with me, to express the feelings of regard that I entertain for the spirit which actuated our

friend Mr. Painchaud, in that he had voluntarily undertaken trouble to aid us in the promotion of the objects for which our Institute has been established. Could we infuse the same spirit into the minds of many friends less remote from us, whose opportunities are probably not less than his, our Transactions would before long, supply to investigators all material knowledge required for acquaintance with the extent of our natural productions.

It is right also that I should make explanation here of what the subjoined notes will render apparent, viz: that our study of the Seal was far less minute and less perfect than it might have been. When it arrived in July, decomposition had set in, the heat of the weather at that time increased the process, which went on with great rapidity, notwithstanding it had been carefully injected by Mr. Skelly, the Janitor of the Medical College, who was careful also to keep it surrounded with disinfectants, yet the changes were not checked to any extent. The above circumstances necessitated a speedy dissection, and although the vessels were well filled with injected matter and under other conditions could have been easily followed out, we were compelled to confine our work to the study of our subject, more from a zoological than from an anatomical stand point.

The following are the notes taken July the 2nd, 1879, and subsequently on days when the dissection was carried on—the subject, a young specimen of Phoca Grœnlandica, supposed age, third or fourth month, length from muzzle to tip of tail three feet, weight eighty pounds, the cuticle having peeled in many places a description of the pelage was not admissable, colour of hair was a dirty yellowish white, the skin viewed as a whole presenting where the cuticle remained, the dark markings or spots commonly observed on seal skins from Newfoundland and Labrador, the anterior and posterior extremities had each five digits, the nails on the anterior fingers were strongly developed, those on the posterior not so large.

The animal had been caught in a net and despatched by a blow on the skull which had fractured the bones, general shape of head broad oval, length from muzzle to occiput, ten inches,

eyes fine dark prominent, with a strong nictitating membrane, which in the dead animal could be made to cover two-thirds of the globe, nostrils closed by valves or folds of mucous membrane, external ear without appendages, the meatus opening by an oval aperture upon the skin of the head in the position usual in mammalia, the meatus was beset with soft bristles, depth of canal of external ear, i. e. from meatus to tympanum one and one half inches, the body on the removal of the integument presented a well nourished appearance, the sternum was prolonged upwards to the top of the larynx by a cartilaginous extension, this measured three and one half inches above the clavicles, and gave origin in its whole length to portions of both pectoral muscles, these muscles arose as in the human subject from the sternum and ribs in front, but the great pectoral was continued downward to the point of the ziphoid cartilage, their insertions the same as in man, viz: to the clavicle humerus and scapula, the positions of other thoracic muscles are so similar to the corresponding parts in human anatomy I deem it to be unnecessary to proceed with their description.

The development of these muscles in the seal corresponds more to the same in birds than in land mammals, the shoulder muscles are also correspondingly developed, the trapezius very thick, deltoid and biceps short, thick, and strongly attached to the bones, these points in the myology of the seal can be seen only on dissection, they are covered by the general integument nearly down to the wrist joint, as however the integument is loose the bones short and articulated at opposing angles, there is much freedom of movement in the anterior limbs.

The modification of the bones at the extremities, furnishes a most striking peculiarity in the anatomy of the seal; in the superior, the scapula is broad, rounded at the edge, bearing some resemblance to the same bone in man, the fossæ for the supra and infra spinati muscles are deep, the under surface of the bones are deeply concave for the lodgement of the large sub-scapulars, the humerus very short and thick, the ulna and radius also short, but the olecranon process of the ulna is much prolonged to afford attachment for the powerful extensors of the arm, the metacarpal

and phalangeal bones are developed out of proportion to the bones of the forearm, taken together they have a much greater length, the flexors and extensors of the wrist, &c., are short and thick, the tendons are long and well developed.

The inferior extremities of the seal are also confined in the general integument, the bones being shortened and otherwise modified as in the anterior extremities, yet every bone is present as in man, the gluteal muscles are short and well developed, but it is evident from dissection that the other muscles of the hind limbs in the seal are not so well developed as the corresponding organs in the anterior members, the articulation of the femoral bones, and the insertion of their muscles are such that the inferior extremities are twisted so that the tibial bones are external to the fibulæ, owing to this the palmar surfaces of the fee become opposed to each other in a position similar to tha which can be produced in the hands of man by the partial rota tion of the radius upon the ulna.

The phalangeal bones of the feet are longer than those of the forelimb, the claws are not so large, the tegumentary covering broader and looser allowing great freedom of movement in these parts which are readily observed to be specially adapted for progression in the water, while comparatively useless for the same purpose on land. The tibiæ and fibulæ were free.

Opening the thorax, the viscera were examined; larynx and trachea same as in other animals, the rings of the latter being, however, complete; right lung, upper lobe distinct; middle and lower imperfectly divided or marked off from each other; left lung distinctly two-lobed; weight of lungs and heart, 1½ lbs.; heart large, notched at the apex, denoting imperfectly the septum between the ventricles, four-chambered; the foramen ovale open, Eustachian valve not more marked than in the heart of adult human subjects: ductus arteriosus not present. The aorta gave off separate subclavian and carotid arteries for either side. The anatomy of the vascular system in other respects differs not from that of man.

Of the abdominal viscera, the stomach was large, having the bagpipe shape of the organ in carnivora, being also simple; it

measured when distended about 14 inches in length, by about 5½ in width. There is a permanent constriction at the junction of the middle with the pyloric third due to the muscular fibres dividing the organ into two imperfect cavities. The intestines measured in length 42 feet, 3 inches; diameter, about ¾ of an inch. Mucous membrane of both stomach and intestines, desquamating, was not examined microscopically. There were no valvulæ in the intestines. The stomach, &c., contained shrimps, partly digested herrings and bones. The liver had so far decomposed, its dissection or examination was rendered impracticable, no gall bladder was observed, although some attention was given to its discovery. The spleen and pancreas were not noticed; the kidneys were moderate in size; the urinary bladder small, oval shaped; ureters much larger, "thrice, than in man; urethra measured from neck of bladder to tip of penis about thirty inches. The animal was a young male; the generative organs small. The penis was contained in a sheath or pouch of the integument of the abdomen, this sheath extends from the vent upwards towards the umbillicus, enclosing the organ so completely that a superficial glance would lead to the supposition of its being entirely absent. The penis is provided with a long bone, situated or in connection with the corpora cavernosa; the diameter in this young animal being about that of an ordinary lead pencil. The testicles are within the abdominal cavity. The spermatic cords and vessels on either side pass through a very long abdominal canal, with internal and external rings, as in man. They pass up the abdominal wall to join the root of the penis. The testicles contained no spermatozoa. The penis could be made to protrude from its abdominal sheath.

Any remarks which I am inclined to make in reference to the seal will refer only to the organs of progression, and taking the evidence afforded by their anatomical structure, it is easy to draw the following conclusion, viz.: so far as the two pairs are concerned, their uses are entirely different. The shortness and restricted movements of the anterior extremities renders them but of little moment in swimming. The great osseous and mus

cular development of these organs, along with the strength of the claws, renders them adaptable for climbing. The seal raises its own weight out of the water by means of its fore limbs; it uses them also, when on land, as a means of progression. While moving in the water they are at rest, held tightly against the body, upon the ice or solid surface the palmar surfaces of the anterior flippers are underneath. The tips of the fingers approach from side to side, and the olecrenon processes point outward. The posterior limbs under like conditions are not brought into use, they trail out behind, their edges resting upon the support. They may be said to be practically useless as organs of locomotion on land, but their shape and structure eminently fits them for swimming. They present broad, flattened surfaces to the water, the regular contraction of the extensor muscles of the leg and foot causes the latter to flatten and spread; by contraction and relaxation of the hip and thigh muscles, the thighs are drawn towards the abdomen and then suddenly projected from it; the broad feet striking the water, drives the animal's body forward by a succession of jumps. The seal moving in the water does not swim smoothly like a fish; on the contrary, the propulsion is due to successive arching and straightening movements of the lower portion of the body, resembling very much the movements of a shrimp propelling itself by its tail. We must not forget that the hind limbs of the seal are somewhat in the condition of those of a human being, whose legs being enclosed in a bag, with his feet free, the only movement he could accomplish would be that of leaping, by drawing his thighs towards the abdomen, throwing his body forward from the soles of his feet. The hummocky motion of the seal on land described by many, is due to their being used in such a way as described above; but as the soles of their feet cannot be brought upon the ground or ice, the animal rests upon his knees or heels, and attempts to use them as the moving point. The natural condition of the organ renders them facile in threading water, but makes them awkward and inefficient for like purposes on land or ice.

Of the whole family, the sea lions are the only ones that can

rest with the palmar surfaces of their extremities upon the land, because there is greater freedom of leg and arm than in our seals. They move more freely and with greater rapidity when on land, nevertheless their movements are on the whole very similar to those of our own species.

NOTE—The tentorium cerebellum partly of bone as in cat, falx cerebri at its junction with tentorium also formed of bone.

ART. VI. — TUBES IN THE FEET OF THE MOOSE. — BY R. MORROW.

Read May 10th, 1880.

IN April, 1877, I read to you some "Notes on the Caribou," (see vol. 4, *Transactions N. S. I. N. S.*, page 281, *et seq.*,) in which I drew your attention to the tubes in the feet of the moose. I shot last December an old cow moose, in the hind feet of which the tubes were fully developed, but differed from those in the hind feet of the bull described by me (see page 292, *ibid*,) in being more perfect in shape, closely resembling the tubes in the hind feet of the old doe caribou, that is, being much narrower and more perfectly defined in their mouths, and of nearly equal diameter to their inferior extremities, also being very strongly marked, as in the caribou, by the coarse, bristly tufts of hair which issue from their mouths. The inferior extremities of the tubes are attached, as in the caribou, by strong fascia to the superior surface of the skin of the web, or soles of the feet.

In the fore feet the tubes were nearly obliterated, existing only as a slight depression in the skin, about one inch in length, the tube proper being so reduced as scarcely to be perceptible; this depression, lying between the phalanges, is attached as in the hind feet, by fascia to the sole, but the fascia extends to the middle of the depression, marking what was originally the lower extremity of the tubes, and it is therefore of greater length than that in the hind feet. There were no bristly tufts marking the tubes in the fore feet of this cow moose, as are in the fore feet of the doe caribou.