In the winter of 1878, being near Depot Island in North Hudson's Bay, we moved into igloos on the 1st of November. On King William's Land, next spring, we abandoned snow-houses, and took to tents on the 17th of June, having lived an igloo-life for seven months and seventeen days. That winter upon King William's Land we reared our first igloo on the 25th of September, being one month and five days earlier than at Depot Island the previous season. This would give a total of igloo-life for the southern part of King William's Land of eight months and twenty-two days, or nearly three-fourths of the year. This is the nearest to the pole of greatest cold (be it the magnetic pole or according to Bent) that any white men have lived *à la Innuit*. Assuming these two physical poles to be identical, and our position having been so near them, — being really only about a hundred miles distant, — we must have experienced about the maximum of annual igloo-life. Returning to North Hudson's Bay in the spring of 1880, we, as well as the majority of the Esquimaux living around Depot Island, moved into tents about the middle of May, giving igloo-life for North Hudson's Bay something over half the year, which is probably near the minimum.

While, of course, climatic causes principally determine the annual longevity of the snow-house, they are not the only ones. As soon as the spring thaws commence tumbling in the igloos, or making their structure insecure, the native would gladly avail himself of a tent; but this he cannot do, unless there be a clear spot somewhere near, on which it can be pitched. It may be a number of days from the time he would accept tent-life before the hilltops or ridges commence peeping through their winter covering. The inland ridges, higher and more marked, covered with black moss, which, once through the crust, makes sad havoc with the snow, appear much sooner than those facing the sea, which are flatter, enabling the inland reindeer hunters to occupy their tents earlier than the seal or walrus hunters of the coast. Some igloo-builders will wait until they can kill enough seal to make a new tent before using one. The Ooqueesik Salik Esquimaux of the Dangerous Rapids of the Great Fish River can be said to be practically without tents, securing nothing, or almost nothing, from which to make them. They hold to the shelter of an igloo late in the spring, and seek it as soon as one can be made in the early winter.

(To be continued.)

ON THE DEVELOPMENT OF THE PITUITARY BODY IN PETROMYZON, AND THE SIGNIFICANCE OF THAT ORGAN IN OTHER TYPES.

In the *Quarterly journal of microscopical science* (xxi. 750) I published a brief preliminary account of the development of the pituitary body in the lamprey, stating that it was formed from a part of the nasal sac. This account of a method of formation so entirely different from any thing that was known among the vertebrates was received with incredulity by Balfour, who says (Comp. embryology, ii. 358), "I have not myself completely followed its development in Petromyzon, but I have observed a slight diverticulum of the stomodaeum which I believe gives origin to it. Fuller details are in any case required before we can admit so great a divergence from the normal development as is indicated by Scott's statements." These fuller details have long been nearly ready for publication, but I have been prevented by circumstances from issuing them. I hope shortly to continue my series of studies on the embryology of Petromyzon, but, in the mean time, think it advisable to present this preliminary account.

My friend, Dr. Dohrn of Naples, has lately investigated this subject, and has come to the conclusion that neither Balfour nor myself can be correct, but that the pituitary body arises from an independent invagination of the epiblast between the nasal epithelium and the mouth (*Mitth. zool. stat. Neapel*, iv. 1 heft). On examining Dohrn's figures, however, I was much pleased to find that his disagreement with me is rather about terms than facts; for these drawings correspond almost exactly with those that I have already published, and many more as yet unpublished.

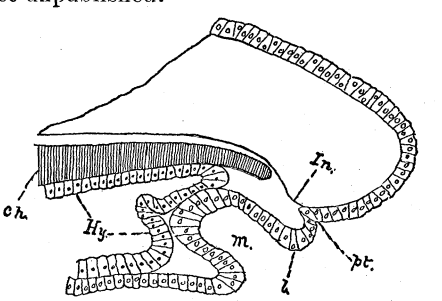

Fig. 1. — Sagittal section through head of lamprey embryo. *m*, mouth; *pt*, pituitary invagination; *In*, infundibulum; *Hy*, hypoblast of throat; *ch*, notochord; *l*, upper lip.

The development of the pituitary body, as far as I have been able to trace it, is as follows. Shortly before hatching, the mouth is formed by a deep invagination of the epiblast (see fig. 1,

taken from my article in the *Morphol. jahrb.*, vii). The upper lip is somewhat rounded in longitudinal section, and bounded anteriorly by a very slight depression, which is the beginning of the pituitary body; but, as this is also the beginning of the invagination to form the nasal sac,[1] I have preferred not to separate them, as Dohrn has done. In the next stage (fig. 2)

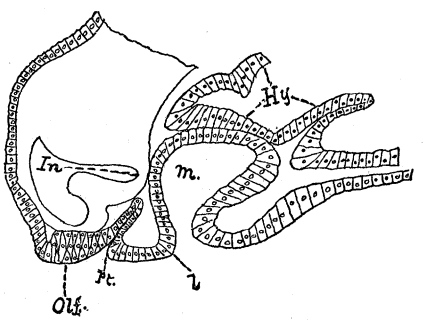

FIG. 2.—Section through head of an older embryo just before hatching. *Olf*, olfactory epithelium. Other letters as in fig. 1.

the nasal epithelium has become much thickened, the pituitary involution deeper, and the upper lip elongated so as to become triangular in section. At this time the cranial flexure has reached its maximum; though it is far less than in most other groups, owing to the relatively small size of the fore and mid brains. The mouth is ventral in position, corresponding very closely to the selachian mouth in position and shape.

Shortly after this, the upper lip begins that remarkable series of transformations to which, as I long ago pointed out, many of the most striking peculiarities of the cyclostome organization are due. The posterior edge of the lip elongates rapidly, becoming triangular in section; while the whole anterior part of the head rotates forwards, thus tending to correct the cranial flexure, and bringing the mouth to point somewhat forward as well as downward. By this process the edge of the lip, which in fig. 2 is directed backwards, now comes to point downwards (fig. 3); at the same time, the opening of the nasal pit points forwards instead of downwards. The involution for the nasal passage and pituitary body has now become a long tube of cells, which transverse sections show us to be

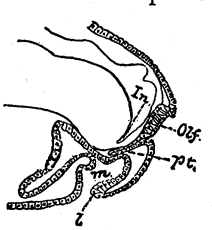

FIG. 3.—Section through head of a very young larva of the lamprey. Letters as before.

perforated by a small lumen. The end of this cellular tube reaches to the infundibulum, with which it lies in close contact. This portion will give rise to the pituitary body. Up to this time there has been no line of separation between the pituitary involution and the nasal epithelium; but when the process of rotation of the upper lip, and correction of the cranial flexure, is completed, the edge of the lip points directly forward, having passed through an angle of 180°, and the opening of the nasal sac is on the dorsal instead of the ventral surface of the head. At this time a fold appears below the olfactory epithelium, separating it distinctly from the pituitary passage.

The pituitary body is formed from part of the epithelium of this passage, and consists of solid follicles, separated by connective tissue. According to Dohrn (loc. cit., p. 178), this body is not constricted off from the passage or nasal sac at any time during larval life. I have not been able to satisfy myself, as yet, upon this point; but I am not inclined to agree with this view.

As to the morphological significance of the pituitary body, many views have been propounded, some of them bearing upon the question of the origin of the vertebrates. Some writers have contended that the conario-hypophysial tract through the brain is the remnant of the old mouth and gullet, which, in the ancestors of the vertebrates, passed through a ring of nervous tissue, as in the annelids. Space will not permit a discussion of this hypothesis; nor is such discussion necessary, as Balfour (Elasmobranch fishes, p. 170) has stated the insuperable objections to the view. Dohrn, in the pamphlet already quoted, adopts a view somewhat like one originally propounded by Götte, and adds a suggestion of his own. He considers the entire blind nasal sac of the lamprey to belong to the pituitary body, and that this sac has arisen from the coalescence of a pair of gill-slits. This hypothesis is but the carrying-out of the theory so ably advocated in the very suggestive pamphlet 'Ueber den ursprung der wirbelthiere.' But, until it can be shown that the vertebrate mouth is a new formation, the existence of pre-oral gill-clefts hardly merits discussion. I reserve for a later paper the consideration of the origin of the vertebrate mouth, — a question which is the turning-point of the solution of all these problems.

Balfour has suggested an explanation of the pituitary body. "It is," he says (p. 359), "clearly a rudimentary organ in existing craniate vertebrates; and its development indicates, that when functional it was probably a sense-

[1] By nasal sac, I mean the blind passage, as distinguished olfactory epithelium.

organ opening into the mouth, or else a glandular organ opening into the mouth.'' It seems to me that the facts of its development in Petromyzon negative this hypothesis. It is there seen to have no connection with the mouth; nor is this mode of development so entirely exceptional as it would at first seem. Of all known embryos of craniate vertebrates, the lamprey has perhaps the smallest brain and the least cranial flexure; which state of things allows space for a distinct invagination from without to reach the infundibulum. In the Amphibia this is seen to a less degree: the invagination for the pituitary body is formed before the appearance of the mouth, and just above it; so that, when the mouth appears, the two have an apparent connection, being crowded together by the increased cranial flexure. In other types — such as the selachian, bird, mammal, etc. — the brain acquires a very great size in early embryonic stages, and the cranial flexure is consequently very much increased. In these cases almost the only possible way for an epiblastic invagination to reach the infundibulum is from the epiblast of the mouth. If the reader will compare the figures given above for the lamprey with those from Götte (figs. 4 and 5) for the amphibian and that from Balfour for the selachian (fig. 6), these progressive changes will at once be clear. If embryological evidence counts for any thing, it would therefore seem extremely probable that the connection of the pituitary body with the mouth is only a secondary one, brought about by the greatly increased cranial flexure in the higher types. Assuming that the invagination originally took place independently of the mouth, such a secondary connection would be almost a mechanical necessity of the great brain-growth.

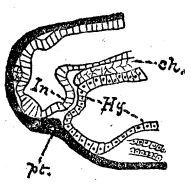

Fig. 4. — Section thro' head of embryo of Bombinator (after Götte). Letters as before.

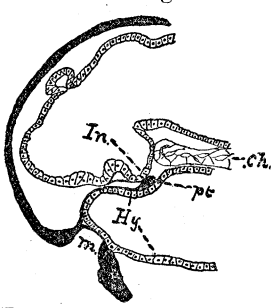

Fig. 5. — Section through head of young tadpole of Bombinator (after Götte). Letters as before.

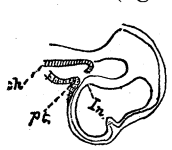

Fig. 6. — Section thro' head of embryo of Pristiurus (after Balfour). Letters as before.

Now, while I am not prepared to follow Dohrn in maintaining that the entire blind nasal sac below the olfactory capsule of Petromyzon really belongs to the pituitary body, yet I quite agree with him that the connection of the pituitary body with the olfactory organ is a secondary one. I have, in a former paper, stated the reasons for believing that the unpaired condition of the olfactory organ in the Cyclostomata is not primitive, but secondary, caused by the coalescence of two originally distinct pits. Now, if there were an independent invagination in the median line of the head, the causes which brought about the union of the two nasal sacs would also cause the latter to coincide with the pituitary involution. This is just what I conceive to have happened.

If the above reasoning be correct, the fact would seem clear, that the pituitary body is the remnant of some originally independent organ, which opened, not into the mouth, but on the surface of the head. Almost certainly this organ belonged to the invertebrate ancestor of the vertebrates. What its function was, is a difficult problem. Dohrn's hypothesis that it was formed by the coalescence of a pair of gill-clifts is untenable, not only for the reasons already given, but on account of the invariable epiblastic origin of this organ, while gill-clefts always arise in the vertebrates as outgrowths of the hypoblast. Perhaps we may modify Balfour's suggestion, and assume tentatively that it was a sense organ or gland which, having lost its function, has become rudimentary. At all events, it will be a step gained if we can establish the fact that the pituitary body is an organ originally independent both of the mouth and of the olfactory apparatus.

W. B. Scott.
Morphological laboratory, Princeton, N.J.,
July 5, 1883.

THE WEATHER IN JUNE, 1883.

The monthly weather review of the U. S. signal-service contains in usual detail reports from all portions of the country of the weather conditions which characterized the month of June. There were no unusual meteorological features; the month exhibiting the 'average weather,' as far as this term can be realized. The destructive floods in the lower Missouri River, and in the Mississippi River between St. Louis and Cairo, the unusual rainfall in that section, and sévere local storms in many of the states, are the special events of note.

The mean distribution of barometric pressure is illustrated by the accompanying chart, which also contains the mean isothermal lines,