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PART I.
ORIGINAL COMMUNICATIONS.

ART. XV.—*On the Infra-orbital Cavities in Deers and Antilopes, called Larmiers by the older French Naturalists.*
By ARTHUR JACOB, M. D., Professor of Anatomy in the Royal College of Surgeons in Ireland.

[Read at the Meeting of the British Association held in Dublin, August, 1835.]

IN compliance with the recommendation of the committee of the Zoological Section of the Association made at the meeting in Cambridge in 1833, I have availed myself of such opportunities as have been afforded me of investigating the nature, structure, and uses of these remarkable parts. To those altogether unacquainted with the subject it is necessary to state that they consist of two oval depressions about an inch and half long, half an inch wide, and more than three quarters of an inch deep in the majority of instances; situated on the side of the face, and so near to the inner angle of the eye that they create a very reasonable suspicion that they are connected with

that organ, and hence the term *larmier* applied to them. The bottom of the depression is in most cases naked, but in some it is covered with the hair, consequently it is composed of the skin formed into an open sac, accommodated in a corresponding depression in the bones of the face. In many animals provided with this organ a gutter, formed by folds of skin, leads so directly to it from the surface of the eye that the passage of the tears from the one place to the other appears inevitable; while in others this communication is so imperfect that a doubt is at once raised as to its destination to such a purpose. If the part in question be not a cavity, as suggested by some, in which the overflowing secretions from the surface of the eye are disposed of by evaporation, another reason for its existence must be assigned. The arguments which may be urged against the supposition that it is destined to receive the tears are, first, that it exists in the antelopes and deers only, and is even absent, or merely rudimental, in many of these; while in animals said to be destitute of the usual canals for carrying off the tears to the nose, as the elephant and hippopotamus, it is absent; secondly, that the solid concretions generally found in it are not composed of such ingredients as the tears and other secretions from the surface of the eye should afford.

If the conclusion that these are cavities for the reception of tears be discarded, their identity of nature and character with the numerous provisions for the secretion of peculiar or odoriferous materials suggests itself. In many instances, especially in the mammalia, glands are found opening on the surface of the skin, and pouring out peculiar fluids, sometimes altogether unconnected with any organ; such are the glands on the side of the head between the eye and ear of the elephant, those described by Tiedemann between the eye and nose in certain bats, consisting of a sac with a folded lining membrane, affording a foetid, oily secretion, and beneath the eye in the marmot and two-toed anteater; such also are the glands on the side of the chest of the shrew, described by St. Hilaire, and the inguinal glands of

hares. Still more remarkable examples are furnished by the pouches, affording the valuable odoriferous materials in the musk, beaver, and civet; and if additional examples be required, they are found in the otter, male hyena, ichneumon, badger, and the dorsal gland in the peccary. That the cavities alluded to in the deers and antilopes afford peculiar and often odoriferous secretions, is established on the authority of several naturalists. Buffon describes the contents in the stag as resembling ear-wax. Daubenton found the secretion in an old stag so much indurated as to constitute a solid mass, or bezoard, as he calls it, eleven lines long, seven broad, and six thick. Camper found hard, yellowish particles in the fallow deer. In a species of antelope first described by Dr. Herman Grimm, this organ secretes a fluid of such peculiar and distinct character that no doubt can be entertained of its nature. He describes it to be a yellowish, fatty, and viscous humor, having an odour between musk and camphor. Vosmaer says that it hardens, and becomes black in time, and that the animal rubs it off on the rails of its cage, but he could not detect the musky odour. Pallas, who describes the antelope grimmea particularly, concurs in these observations.

It may be objected to the conclusion, that these are organs for the production of an odoriferous secretion, that the sac exhibits so little of glandular character that it appears inadequate for the purpose, especially when several of the external openings alluded to, as that on the head of the elephant and the back of the peccary, are merely the outlets of considerable glands; but on the other hand, many organs of this character are mere sacs, as that on the face of the bats, the bottom of which presents a peculiar folded appearance, and the cavities in the musk and beaver, which afford the odoriferous secretion in such large quantity.

A statement respecting these infra-orbital cavities has been made by the Rev. Gilbert White in his *Natural History of*

Selburne, which might appear to originate in some error were it not supported by the more recent testimony of Major Hamilton Smith. These gentlemen state that when the deer drinks, the air is forced out through these cavities, and, according to Major Hamilton Smith, may be felt by the hand, and affects the flame of a candle when held to it. Notwithstanding such a positive statement by two observers of established character for faithful description, the passage of air through these cavities cannot take place, they are perfectly impervious toward the nostril; but I have no doubt that the fact stated is correct, the air which escapes passes, not through the infra-orbital sacs, but through the lachrymal passages, which are very large, consisting of two openings capable of admitting the end of a crow's quill, the entrance to a tortuous canal, which conducts the tears to the extremity of the nose. Introducing a pipe into the outlet of the nasal duct at the extremity of the nose, I can without difficulty force a current of air or water through the nasal duct; and it therefore appears reasonable to admit that the effect observed by the two gentlemen alluded to, arose from the animal forcing the air into the nostrils while the nose and mouth were immersed in water. Even in the human subject air may be forced up the nasal duct into the lacrymal sac by filling the cavities of the nose from the lungs while the nostrils are closed by the hand.

Persons following up this investigation should be aware that these cavities exist in a very imperfect state in many species, being, in fact, merely rudimental, and incapable of affording the secretion which they are destined to provide in others. The last traces of the organ may even be detected in goats, sheep, and perhaps all the ruminants. It is a beautiful example of that adherence to an original type or model which is so conspicuous in animal organization, and as if in obedience to a law that all the ruminants should be provided with a sinus beneath the eye for the secretion of a peculiar odoriferous matter, but that it should remain in an imperfect or unfinished state in those

who do not require such additional aid to distinguish sex or recognize species.*

Since the above was written I have had an opportunity of examining these sinuses in the wapiti, (*Cervus Canadensis*), and obtained from one of the cavities a large solid mass of the indurated secretion like that found in the sinuses of the stag by Daubenton, and called by him *bezoard de cerf*. This, Dr. Geoghegan, the Professor of Medical Jurisprudence in the Royal College of Surgeons, has been kind enough to submit to analysis, the results of which corroborate the inference that the secretion found in the cavities is derived from the cavity itself, and not from the surface of the eye. The existence of the hairs and flakes of exfoliated cuticle in layers proves that the deposit is formed from the surface beneath, and not by evaporation of fluids trickling into the cavity. Dr. Geoghegan's account of the analysis I annex in his own words.

“ The bezoard described by Dr. Jacob is covered by a fine transparent membrane, a good deal resembling gold-beater's leaf; within this, and arranged concentrically, are four or five laminæ, having a coriaceous appearance; these seem to be soaked with the dark-brown matter which constitutes the great bulk of the mass. The thickness of these membranous coverings is altogether about a line and half. The matter contained within this covering is of a dark-reddish brown colour, resembling indurated cerumen, and consisting apparently of a number of fine hairs matted together by a substance of an oleo-resinous appearance. This substance in one specimen was viscid and tenacious, and of the consistence of common turpentine; while in another it was more friable. Both exhaled a most peculiar

* The authorities quoted are Buffon in the original quarto edition, T. vi. and Suppl. T. iii.; Pallas, *Spicilegia Zoologica*; White's *Natural History of Selburne*; the supplementary volume of Griffith's *Translation of Cuvier on the Ruminants*, by Major Charles Hamilton Smith; and Camper, *Œuvres*, T. i.

odour resembling soft soap made with fish oil, but slightly pungent and aromatic. The more friable specimen had the smell of kreosote when much diluted. The specific gravity of the large mass was 1,081. The material has a slightly bitter taste, but does not dissolve in the mouth, and imparts a very slight greasy stain to paper. When heated it swells, grows darker in colour, and undergoes a partial fusion; and if the heat be increased it takes fire, and burns with a bright flame and much smoke, leaving behind a greyish white ash. A fragment digested with five successive portions of water, imparted to them the peculiar odour of the substance, which was however dissipated by evaporation. It appears therefore to contain a volatile odorous principle, which is so intimately combined with the other principles present, that even after digestion in the above-mentioned number of waters, the residuum, which was but little acted on, possessed its peculiar odour nearly as strongly as before. The aqueous solution afforded on evaporation a brownish extractive matter, with which nitrate of silver gave a copious precipitate of chloride of silver; and oxalate of ammonia indicated a salt of lime, most probably lactate. Another portion digested in æther coloured it yellow, and the solution on evaporation furnished a yellowish brown transparent substance, very viscid and tenacious at ordinary temperatures, very readily fusible, and exceedingly soluble in caustic potash; immediately on uniting with which, it exhales strongly the smell of fish-oil soap. This solution is miscible with water without decomposition; acids precipitate a white matter, and when, subsequent to the addition of acid, the mixture is heated, an oily-looking matter floats, and the rest of the fluid becomes turbid and milky. Cold alcohol digested on another portion took up a good deal of yellow viscid matter; and when evaporated furnished also some extractive, soluble in water, probably the same as that afforded by the aqueous solutions. Boiling alcohol, digested on the residuum, takes up more of the yellow matter, which, on evaporation, affords a more resinous-looking residuum,

the surface of which is covered with a greasy film, also saponifiable by caustic potash. Alcohol, digested on what remained after the action of æther, dissolved only a trace of saline matter; and the residuum, after exhaustion by æther, had the appearance of thin flakes of pearly cuticle, coloured yellowish brown, insoluble in strong acetic acid, but soluble in potash, from which it was precipitated by acetic acid. A portion of these flakes, when strongly heated, left a white ash, consisting of carbonate and phosphate of lime, carbonate of soda, and chloride of sodium. The material then appears to consist of a number of hairs, with a quantity of delicate, cuticular flakes, the whole intimately mixed with a dark matter, composed as follows: a brownish, viscid, oily substance, probably containing resin; a volatile odorous principle; extractive, soluble in water, and alcohol; colouring matter, which adheres to the flakes of cuticle; lactates of soda and lime, a trace of phosphate of lime, and chloride of sodium in considerable quantity."

ART. XVI.—*Cases of Malignant Diphtheritis*. By EDWARD BEWLEY, Licentiate of the Royal College of Surgeons in Ireland.

CASE I.—Fanny, eldest daughter of the Rev. J. P. H. of C—, King's County, aged 5 years, had been for more than a month in a delicate state of health, owing to derangement of the digestive organs. On the 29th of June, 1835, she accompanied her mother to the residence of a relation, distant from her own home eleven miles, where the children of the family were recovering from severe colds, stated to have been attended by sore throat, but not of so bad a character as to render medical assistance necessary.

July 1st. This morning she complained of some soreness in the throat, but immediately forgot it. Her appetite, however,