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ART. I. *On the Natural History of the Dugong, (Halicore Indicus, DESM.)—the Mermaid of Early Writers; and particularly on the differences which occur in its Dental Characters.*  
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A POPULAR scientific periodical addresses itself to two classes of readers so entirely distinct, that it becomes necessary to assume therein a style and language appropriate to each. Thus, whilst we are desirous of adapting the papers we purpose to publish in this Journal, to the actual state of knowledge possessed by the most advanced student, it is a duty which we owe to the uninformed, to associate with the abstruse doctrines of science, those rudimentary principles, by means of which alone the former can be understood. And we hope that these considerations will, on all occasions, be taken into account in the perusal of the essays which may appear from our pen.

This globe, viewed as the residence of those myriads of animals which wander on its surface, or which sport in the bosom of its waters, presents itself to our observation under two important aspects,—as land, surrounded by an ethereal atmosphere,—and as sea, a medium of suffocating density. Oxygen, that vital air, by means of which, through the renovation of the deteriorated venous blood, the life of animals is sustained, must, however, be extracted from both the atmosphere and the water; and nature has accordingly endowed her creatures with respiratory organs peculiarly adapted

\* The substance of a paper read before the Royal Physical Society of Edinburgh, Nov. 3. 1829.

to each. The fishes, destined to live exclusively in the ocean, are provided with a comparatively external mechanism, (the branchiæ or gills,) over which the surrounding fluid flows, to impart its oxygen to the blood. The terrestrial vertebrata breathe by means of lungs, inspiring and expiring the circumambient air. And some remarkable reptiles, as the *proteus* and *siren*, created with a capacity for living in either of these media, are possessed of both those organs by which the terrestrial and aquatic tribes respire.

It would be impossible for any animated being to contain, in the ordinary bulk of a respiratory organ, that surface which would be requisite to extract from water a quantity of oxygen sufficient to maintain the temperature possessed by warm-blooded animals: lungs, in which, over a large surface, and at intervals, the oxygeniferous medium can be diffused, are indispensable to these classes. But the function of respiration by lungs is impracticable to animals which are constantly submersed; whence fishes respire by gills, and are cold blooded.

It cannot, then, fail to strike the observer with surprise, when he discovers in the ocean a large tribe of warm-blooded, mammiferous animals, analogous to fishes in their external form, with the fin and the hairless coat, and pursuing a similar mode of life. And wonder will increase, when examination proves, that they are nothing else than terrestrial mammalia, whose internal organs are concealed under the figure of the fish. Speculation immediately suggests the geological fact, that fishes existed prior to the creation of mammalia; and that the Omnipotent has passed by slow gradations from one series of organization to another; that the type or model on which all vertebrated animals are formed, is essentially the same; and the train of ideas may be easily extended to the conception, that those internal differences which were necessary to the terrestrial mammalia, were first attempted in the inhabitants of the ocean. The Cetacea, of which the whale (Cete) serves as an example, respire by means of lungs, incessantly rising to the surface for atmospheric air: they are viviparous, and suckle their young, and the sexes associate in the manner of terrestrial animals. The bones which represent those of the anterior limbs of quadrupeds, are concealed under thick tendinous envelopes in the form of pectoral fins; the posterior members are displaced by the cartilages of a horizontal caudal fin;\* and the pelvis is in a rudimentary state.

Some striking peculiarities present themselves in the general organization of the cetacea. Constantly immersed in the water, with the exception of a small portion of the body,† it became necessary to the act of respiration, that the nostrils should have a direction differing from terrestrial mammalia; and we find in the cetacea,

\* The cetacea differ from fishes in the direction of the caudal fin: in the latter it is always vertical.

† “ ———His delights  
Were dolphin like; they shew'd his back above  
The element they liv'd in.”—SHAKESPEARE.

apertures which have been named *spiracles*, placed on the summit of the head, in a perpendicular direction, by which are performed the functions of respiration, and of the ejection of the water which passes into the mouth during the act of feeding. As an article of commerce, every one is acquainted with that peculiar production which supplies the place of teeth in the whale; but it does not claim consideration amongst these generalities.

The enormous size of the cetacea is perhaps one of the most amazing facts in their history. Varying in developement from the most colossal proportions to the ordinary size of other beings, they are in their extreme bulk the largest of known animals. Indeed it is natural, says Lesson,\* that these giants of the animal kingdom, occupying the immense deserts of the sea, should bear relation to the vast surface which they have to animate. Thus the extensive wastes of Africa are the habitations of the largest quadrupeds, such as the African elephant, the rhinoceros, the giraffe, &c. And thus the uplands of Asia nourish the Asiatic elephant and the tiger; and in Borneo live the great oranges.

The habits of the cetacea vary in the different groupes. The whales are stupid and unwieldy, but move with great power; the cachalots are fierce and courageous; the dolphins warlike and voracious. The developement of the brain bears an interesting relation to the manners of the animal; of little magnitude in any of the cetacea, in proportion to the bulk of the body, it assumes its maximum in the dolphins, and their possession of superior intelligence is by all attested.

The period is but little distant to which we can look back with any degree of complacency on the nature and amount of our knowledge of these animals. Associated with the fishes anteriorly to the time of Bloch, they continued for many years the objects of vague though frequent descriptions; their history was but imperfectly related even in the classical works of Bonnaterre† and Lacepede;‡ and we hasten to the “*Regne Animal*” for the true arrangement of the cetacea, and to the labours of Lesson|| for an encyclopædia of the facts known in their natural history.

The order of cetacea was first divided by Cuvier into two families, the *herbivorous cetacea*, (*Sirenia*), and the *cetacea proper*, which last are piscivorous. As the dugong, towards whose history these preliminary remarks are directed, forms one of the genera which compose the first division, we shall now confine ourselves exclusively to that branch.

The whole of the cetacea are formed on a type of great similarity: the striking differences observed amongst other orders of animals, are in vain sought for amongst them. The law of variety is principally developed in the dental system; thus the *sirenia* are distinguished from the common cetacea by the flat crowns of their

\* Complément à Buffon, tom. 1.  
‡ Hist. Nat. des Cétacés, 1804.

† Cétologie, 4to. 1789.  
|| Loc. Cit.

molars, which result from the nature of their food. The neck, which can scarcely be said to exist in the other cetacea, owing to the diminutive size of the bodies of the cervical vertebræ, is more apparent in this family, which thus becomes approximated in general appearance to the amphibious Feræ, the walrus and the seal, with which it was long confounded in the systems. And as by the naturalists they are confused in the scientific works, so were they indiscriminately the subjects of the strange superstitions of the ignorant vulgar. Observing in early times the mammæ and the bearded chin of these animals, the people, fain for miracles and supernatural events, fancied that they saw the united forms of men and fish. The authenticity which was attached to the narratives, which at different times were published, would once have authorized their repetition in our pages; but if we now permit ourselves to relate some of the absurdities which were retailed from author to author with implacable mendacity, it is rather to illustrate the eccentric path in which the mind of man may wander, than for the purpose of showing that all these tales of mermaids and sea-nymphs are to be referred to the occasional appearance of a morse, a seal, a manatee, or a dugong.

In 1187, as we are told by Larrey in his *Hist. d'Angleterre*, a mermaid was fished up in the county of Suffolk, and kept by the governor for six months. It bore so near a conformity with man, that nothing seemed wanting to it besides speech.

In 1560, seven mermen and mermaids were caught by some fishermen near the island of Maner, on the western coast of Ceylon, and seen by several Jesuits, whose attestations may be found in the history of their society, (Part II. Vol. IV. No. 276.)

But amongst the numerous instances which have been thought worthy of preservation, the following is perhaps the most singular in its details:—

“The history of the Netherlands relates, that in the year 1430, after a great inundation, some women of the town of Edam, situated on the sea of Zealand, at the extremity of the little river Tye, going from their town in a boat to Prumeraude, where their cows were feeding, found in their way a sea-girl half buried in the mud; that they took her up, washed her, cleaned her, and took her to Edam, where they clothed her. The history adds, that they taught this girl to spin, and to make the sign of the cross, but that they could never teach her to pronounce one word, though they had taken her to Haerlem, where some literati attempted to make her speak. She was entirely like to our women, except in a very few particulars. She retained a great love for the sea, and even for the waters of rivers and canals, so that they were obliged to watch her lest she should throw herself into them, as she had several times attempted.”\*

The sirens of the ancient poets have by many been confounded

\* Maillet's *Telliamed*.

with the mermaids of more modern times ; and much ingenuity has been lent to the discovery of the mode by which those enchanting songs, which lured to destruction the unhappy mariner, could be articulated by the cetacea, whose language is a groan. But the sirens were most probably abandoned women, inhabiting an island on the coast of Sicily, and leading to perdition all those strangers whom they could draw within their toils. It is otherwise, however, with the naiads and tritons of antiquity, which seem to have taken their origin from our cetaceous tribes : the former were represented as young and handsome virgins, riding on dolphins' backs, and the latter like a man above the waist, and a dolphin in his inferior parts.

Of all the cetacea, that which approaches the nearest in form to man is undoubtedly the dugong, which, when its head and breast are raised above the water, and its pectoral fins, resembling hands, are visible, might easily be taken by superstitious seamen for a semi-human being.

The dugong, named Halicore, (sea nymph,) in allusion to these popular tales, was till very lately confounded with the manatus and stelleria, and placed in the same genus with the walrus or morse. Camper first distinguished it from this carnivorous quadruped. Leguat, Dampier, and others, described the dugong under the name "manatee of the Indies ;" but Lacepede separated the walrus, the dugong, and the manatus, into three genera, and Cuvier has added as a fourth the stelleria, an animal from the sea of Kamtschatka, supposed by Steller to be a mere variety of the manatee. The walrus is now associated with the seal, amongst the Feræ, and the manatee, dugong, and stelleria, compose the natural family of herbivorous cetacea.

Only one species of the dugong has been described, (Halicore Indicus,) confined to the seas of the Indian archipelago. The characters of its organization bear a great resemblance to those of the manatee, the principal difference being in the number and kind of teeth.\* Browsing on sea-weed near the shores of the ocean, the whole of this family of cetacea are intimately related to each other ; so great is the directing influence of similarity of food. The flattened molar teeth, the multiplied stomach, the mild disposition produced by vegetable diet, are all links which closely unite this family of pisciform mammalia. And in its external appearance, the dugong differs only from the manatee in the crescented form of its caudal fin, in the absence of nails from its pectoral fins, and in its superior lip being a little longer and more pendant.†

\* The geographical distribution of these two genera, however, differs exceedingly : the manatee is only found in the Atlantic, while the dugong is confined to the Eastern Seas.

† This great external similarity might have formed an excuse for Sir Everard Home's mistake, in calling the manatee "a species of dugong" since the publication of the *Regne Animal*, had not the state of his knowledge led him rashly to pen the following passage :—"In these two species of this extraordinary tribe of animals, between which there is so great a resemblance, the teeth

But in the dental characters of these animals, and the development of bones connected with the teeth, we observe the most striking differences. Suffice it to say, that the dugong possesses large tusks in the intermaxillary bones, which are of enormous size, whilst, except in its early youth, the manatee has none. Indeed, Cuvier remarks "that the manatee may be said to be a dugong whose tusks are not developed."\*

From the consideration of the teeth of the dugong brought from the East Indies, and from a belief which obtains amongst the Malays, countenanced by a comparison of the cranium figured by Daubenton, with the specimens brought home from the East Indies by MM. Diard and Duvaucel, it has been conjectured that there may probably be two species or varieties of this animal. And in No. I. of the New Series of Brewster's Journal, Dr. Knox published the results of some inquiries, which led him to suppose it "not unlikely that the differences in the form of the tusks, may originate not in a difference of age, but in their belonging to distinct varieties or species of the dugong," (p. 158.)

Since the publication of this notice, Dr. Knox, whose experience and zeal as a comparative anatomist are more generally known than his disinterested participation of the knowledge he possesses, has paid me the compliment of calling my attention to this question; and I have collated the evidence afforded by the writings of others, and compared it with the two specimens deposited in the collection of the Royal Society, and in the museum of the College, in this city, with the view of determining the nature of those differences which we have observed.

As it is not in my power to enter upon a minute examination of the skeleton of the dugong, and as the principal distinctive characters are derived from the teeth, I have confined myself to an investigation into the peculiarities of these organs, as observed in different specimens, the comparative size of whose crania is given.

The data (consisting of descriptions and engravings of crania, and of osteological preparations in the museums of this city) are perhaps sufficiently numerous for accurate deductions; but it would have been highly valuable had the history of the specimens been more complete.

They are, 1st, The figure and description of a mutilated cranium, engraved by Daubenton, (Tom. xxvii. P. 289, Pl. 56. Paris 1766;) and, after him, by Cuvier, (Oss. Foss. Tom. v. Pl. 19.)  
2d, The description, by Camper, of a cranium so very similar to

are totally different, which shows the mode of classing animals from the appearance of the teeth, to be very erroneous," (Phil. Trans. 1821, p. 391.) In the first edition of his great work, published in 1816, Cuvier adopted the generic separation between the manatee and the dugong, which had been established by Lacepede. But the knowledge of species was of secondary importance whilst every fresh arrival crowded the museums with *ad captandum* novelties.

\* Ossemens Fossiles, V. 260.

Daubenton's, that he has given no figure of it, (*Œuvres*, Tom. ii. P. 479.)

3d, The descriptions by Sir E. Home, (*Phil. Trans.* 1820, P. 144,) with figures, of two specimens sent to England by Sir Stamford Raffles from Sumatra; and of a cranium in Mr. Brookes's collection.

4th, Description by Sir S. Raffles of a male dugong 8½ feet long, (*Phil. Trans.* 1820, P. 174,)

5th, The descriptions and engravings by Cuvier (*Oss. Fossiles*, Tom. v. P. 262, Pl. 20,) of another skeleton, brought from Sumatra by MM. Diard and Duvaucel.

6th, Cranium in the Royal Society of Edinburgh.

7th, Skeleton in the Edinburgh College Museum.

1. The specimen which supplied to Daubenton the description he has given, was deprived of the whole of the occipital and parietal bones; but the remaining parts, and especially the teeth, appear to have been entire. They are thus described by the author:

“The molar teeth of the dugong are placed at the bottom of the mouth, at a great distance from the tusks; there are four on each side of the superior jaw, and three on each side below; their crown is formed of a concave surface; their root is hollow like that of the tusks, which are the largest of the teeth; they have a longitudinal fluting upon their sides. All the teeth are of ivory, with a thin rind of the same nature, but without any envelope of enamel.

“The tusks are about half a foot long, and two inches in circumference; the cavity of their roots is more than three inches deep; they are composed of ivory like the molares; they do not pass above an inch out of the alveoli; this extra-alveolar portion is shaped by friction to a cutting edge, whose oblique face is on the external side, where alone it is not covered with enamel. As it is not possible that this face can have been formed by friction against other teeth, I presume that the animal rubs them on the external side against surrounding bodies.”\* The age and sex of this specimen were unknown. As no mention is made of the inferior incisors, it may be presumed that they were wanting. It is remarkable that the dimensions are not stated.

2. From an impression that the morse and the dugong had been unnaturally associated by Buffon and Daubenton, Camper was induced to publish a paper on this subject, wherein is contained an account of a cranium sent to him from Batavia by M. Vandersteeg. “The figure and description,” says Camper, “which Daubenton has given in the 13th vol. of the *Hist. Nat.* of Buffon, are so exact and perfect, that it would be useless for me to add any

\* *Hist. Nat. gen. et partic.* 12mo. Paris 1766. Tom. xxvii. P. 293. Pl. 56. If it were probable that the most anterior pair of the inferior incisors (of which mention will be made in the sequel) ever attained sufficient development, they would be the most likely agents in the attrition of the tusks. The direction they would necessarily take, renders the idea plausible.

thing to them." It is unfortunate, however, that neither the age nor sex of this specimen is recorded.

3. At the period when no other perfect specimen had been described, Sir E. Home received two skulls from Sir S. Raffles, governor of Sumatra. In one of these crania, (*Vide Phil. Trans.* 1820, Pl. 12,) the superior incisores or tusks protrude in a very slight degree from their sockets. On making a longitudinal section of one of them, the whole of its substance was found to be solid; at the posterior extremity there was a small shallow cup, composed of the same materials, which appeared to be no part of the tusk itself, but, as it were, fixed to the end of it.\*

In the other skull, which belonged to an animal 8 feet long, the tusks project from the sockets, diverging outwards, and have their external faces worn to a flat surface. They are considerably broader than the former, and hollow from the extremity of the root to nearly half their whole length. In the lower jaw two rudimentary incisores were entangled in their sockets.

4. With the above skulls, Sir S. Raffles sent to this country an account of the general external appearance and anatomy of a male dugong, 8½ feet long, founded on personal observation.

The teeth are thus described:—"Two short tusks project straight forward from the extremity of the upper jaw, and are nearly covered by the upper lip..... There are no incisors in either jaw (the tusks above mentioned being more properly defences,) their place being supplied by the rough bristly surfaces of the palate and jaws, which serve as rasps, to enable the animal to browse upon the algæ and other submarine vegetables..... The molares are twelve in number, six in each jaw, placed far back on the horizontal part. They are cylindrical, with flat crowns; the first are somewhat oblique, and worn to a kind of point; the second are perfectly flat; but the last are composed of two parallel and adjoining cylinders. They are short, and scarcely project from the gums."

5. The last specimens sent home by Sir Stamford Raffles, were accompanied by a memoir from MM. Diard and Duvaucel, so similar to the accounts already published in the *Phil. Trans.* that it was considered unnecessary to have it printed. M. Fred. Cuvier, however, in his *Hist. des Mammif.* made use of the notes of these two French naturalists. It was from them, also, that the Baron Cuvier received a skeleton, imperfect from the absence of the sternum, but which served as the basis of his description and plate, in "*Ossemens Fossiles*," wherefrom corroborative information alone can be reaped.†

\* This idea of disunion is connected with a theory of Sir Everard's. In the cranium in the Royal Society of Edinburgh, exactly similar in other respects to the figure given by this author, there is not the slightest appearance of disconnection between the tooth and the shallow cup.

† M. Cuvier, however, lately told Mr. Robison, secretary to the Royal Society, when the notice of Dr. Knox was shown to him, that "he now possesses a perfect specimen."



6. In the Royal Society of Edinburgh there is deposited a cranium of a dugong, whose resemblance to that engraved in the Phil. Trans. 1820, Pl. 12, is so exact as to appear to be identical with it.

The description given by Sir S. Raffles, (*vide* p. 168, *supra*,) agrees minutely with the characters of the molar teeth in this specimen. They are to the number of 12, three on each side of each jaw; their surfaces are flat, approaching to a slight concavity: empty sockets indicate the previous existence of a greater number, which have been shed.

The superior incisives, or tusks, are not advanced above half an inch out of the socket, having the points uneven and not at all worn. The extremity of the root has a cup-like concavity, as described by Sir E. Home, but there is no evidence of its ever having been separate from the rest of the tooth.

In the lower jaw there are four incisive sockets on each side, two of which contain rudimentary teeth, (as in Phil. Trans. 1820, Pl. 14, Fig. 2,) directed into the substance of the bone; the others are devoid of teeth, and grown up with cancellations of bone.\*

7. In the Edinburgh College Museum, there is a handsome adult skeleton, nearly 8 feet long, which seems to be perfect except in the absence of the tympanic bone, whose loss Dr. Knox ingeniously observed. Through the kindness of Mr. Frederick Knox, I am able to give the following description of the dentition of this animal: †—

On each side of each jaw there are three molar teeth, and other empty imperfect sockets, indicating the former presence of teeth which are gone. Their surfaces are quite smooth from use.

Two incisores, or tusks, are deeply seated in the intermaxillary bones of the upper jaw, and diverge outwards when they project from the socket. The external surfaces of their extremities are worn flat by friction. Like the tooth figured in Phil. Trans. 1820, Pl. 13, Fig. 3, they are hollow to a considerable depth from the base. There are no incisives in the lower jaw, but there are five grown up sockets on each side.

\* It is the opinion of Dr. Knox, that "the incisive teeth in the lower maxillary bone remain imbedded in their sockets throughout life; they are neither shed nor replaced. They seem to be eight in number." (Brewster's Journ. N. S. Vol. I. P. 157.) It must, however, be remarked, that in the adult specimen in the College Museum, the inferior incisive alveoli are all grown up, and though they present evidences of being formerly occupied, no teeth remain in them now.

† At the time that this paper was already in the press, and it only remained for me to corroborate by minute examination the notes which had passed through the hands of Mr. Knox, who articulated this skeleton, I requested the Professor of Natural History, who is also Keeper of the Museum in this University, to permit me to have access to the collection for this express purpose; and, indeed, as I was aware that a degree of jealousy was attached to the admission of those who might employ the valuable materials which lie on those shelves "unnoticed and unknown," I provided myself with a ticket to the ensuing winter's course of Natural History, for the sole purpose of securing that *favour*, which had been promised to me before the delivery of the fee. But I have since been prevented from performing the duty to the public which I imposed upon myself when I undertook to write upon this subject,

Such is the amount of evidence that I am at present able to obtain.

It is very apparent that the whole of the specimens may be reduced to two classes, according to the differences in their tusks, the molares, *cæt. par.* being the same in all the individuals. Thus we have 1st, Those whose tusks (as in No. 1, 2, 3b, 5, and 7,) project 1 inch or 1½ inch beyond the bony sockets, diverging outwards, and whose external margin is worn to a flat surface: these teeth are hollow to a great extent from the extremity of the root. And 2dly, Those (as No. 3a, 4, and 6,) whose tusks do not protrude from the sockets in any degree sufficient to fit them for use: they are not hollow, but are terminated at the root by a crested cup. Moreover they are much straighter, rounder, and less compact in their general structure than the former.

Hence the question has arisen, are these diversities owing to difference of age? or do they constitute the characters of distinct varieties or species?

by two obstacles which are at present insuperable. 1st, Because, as the Professor on one occasion stated, "*the Royal Commissioners have not yet authorized*" him to throw open the osteological museum; and 2dly, Because it is the Professor's "*private property*," and I might as well "*go into his drawing-room*," as he recently remarked, with a degree of the *fortiter in modo*, when, in consideration of the absorbing engagements which he placed in the way of my admission, I inquired of him "Whether there were no *other* means of obtaining access to that museum, without giving him the trouble to attend me?"

I am concerned that the same cause should have prevented me from obtaining accurate notes on the osteology and general development of a young specimen of the dugong, (not much above half the size of the adult,) which is also deposited in the College Museum. There is a confused story of its having been sent home by the Duke of Manchester when governor of Jamaica; but it must not on that account be supposed that the animal is a manatee; for it has been also said, that the specimen came from the East, and the distinctive characters of the dugong are sufficiently evident. The skeleton is in an imperfect condition, being without the sternum, and having its mouth adorned with a most heterogeneous collection of teeth of horses, &c. and fragments of ivory. There are, however, most of the molar teeth remaining, five on each side of both the jaws being the original number. In the upper jaw, the posterior molar has its crown tuberculated, and very little advanced from the socket; and in the lower maxilla, the corresponding tooth has not yet passed out from its bed; the other molars have smooth crowns from use: the anterior are the smallest.

In the Phil. Trans. (1820, P. 315. and 1821, Pl. 20.) there is a description, with figures, of the skeleton and general anatomy of a young dugong, 4 feet 6 inches long, which was also sent to Sir E. Home by Sir S. Raffles, who, it is but justice to say, has done every thing in his power to increase our knowledge of this animal. It had two incisores in the upper jaw immediately before the tusks, and more advanced in the gum than these teeth. The gum covering the alveoli was very thick, and a ligamentous substance passed down from it into each separate opening, and attached itself to the teeth they contain. There were twenty (temporary) molars, five on each side of each jaw.

"In the anterior scabrous projection of the lower jaw, were four regular sockets on each side, filled with a ligamentous substance passing into them from the gum, forming gubernacula for the incisores not yet completely formed," (p. 316.)

The mangled condition of the bones in the College Museum, prevent the detection of these two superior incisores; but it seems to be the fact, that, as Dr. Knox has remarked, "they are shed at an early period, and not replaced by others."

The first paper published by Sir Everard Home on the dugong, had the express object of stating the discovery, (upon which, by the way, much overweening stress was laid,) that the first class of tusks we have described were the *milk tusks*, and the second class the permanent tusks of the same animal. And it did not appear necessary to the author to account for the cranium of the young animal being larger than that of the adult, according to his speculation, which, as shown by Dr. Knox, would be actually the case. The main argument supplied by Sir Everard, in support of his supposition, is, that "the whole of its (the tooth's) substance, was found to be solid, showing that it had arrived at its full growth, and was *therefore only a milk tusk*," (Phil. Trans. 1820, p. 146.) The true conclusion to be deduced, was, as I presume, that as this tooth, at its full growth, was not so much developed as the tusk in other heads, it was therefore not the same as the latter; but the fact might as well be the indication of a variety in the species, or of a sexual difference, as of the presence of a milk tusk. A forcible argument used by Dr. Knox against this hypothesis, is obtained from the observation, that no appearance of any germ which might afterwards be perfected in the form of a permanent tooth, can be discovered behind this supposed milk tusk, nor is there any indication of an approaching change in the shape of the tooth. And additional proof might be drawn from the fact, that the bone of the skull which immediately incloses the root of the tusk, is absorbed, from the long-continued pressure of that rough crest which surrounds the extremity of the tooth.

There seems, however, to have been a general impression in favour of the existence of two species or varieties of the dugong. The Malays believe that two varieties frequent their shores, and have given them the names of *busban* and *buntal*, "the latter much shorter and thicker in proportion."\* M. F. Cuvier and Lesson are both inclined to the conjecture that there are two species; and Dr. Knox employs this method of accounting for the discrepant statements of naturalists.

But after carefully comparing the different specimens which have lain before me, and after considering the analogies which might be derived from other animals, (though I am sufficiently convinced that the opinion of Sir E. Home must be erroneous,†) I cannot induce myself to accord with this latter supposition. It has occurred to me, from the recollection that a corresponding difference is observable between the male and female elephants of Asia, (the tusks in some females being so small as not to appear beyond the

\* Sir Stamford Raffles, in Phil. Trans. 1820, p. 180.

† If the specimen in the Royal Society, and that similar one figured in Phil. Trans. 1820, Pl. 12, be the young, in comparison with the adult skeleton in the College Museum, and with the other specimen described in Phil. Trans. 1820, p. 153, (which from their relative size is inadmissible;) the young skeleton in the College Museum, like the specimen engraved in Phil. Trans. 1821, Pl. 20, cannot also be the young of the same species.

lip,\*) that this may not improbably be a *mere sexual distinction*. Amongst the mammalia it is undoubtedly a general law, that the females are less developed in numerous portions of the body than the males,—a principle which, in many instances, extends itself to the teeth. Thus, the canine teeth in the musk-deer are much shorter, thinner, and straighter in the male than in the female, in which, indeed, they are sometimes altogether wanting. Thus also in the horse genus, the canines are almost always wanting in the female; and thus (to return to our own cetacea) the female narwhal often has a very inferior developement of the horn which at other times renders her undistinguishable from the male.†

Do not the foregoing statements, then, authorize the following results?

1. The specimens which have been described in the text, are of the full grown animal,—the ordinary length of the adult dugong being between 8 and 9 feet.‡
2. The number of molar teeth varies from five in youth, to three, and, according to Cuvier, even to two, in maturity, on each side of each jaw.
3. The inferior incisives have not been observed to attain a developement fitting them for use.
4. The superior rudimentary incisives are cast in youth and never replaced.
5. The peculiarities observed in the structure, size, and form of the tusks, are indicative of sexual differences,—the tusks of the female probably never projecting sufficiently for use. They certainly are not the characters of age; and there seems to be no reason to believe that they point out distinctions of species, or varieties.

It was my purpose to have subjoined to this memoir a tabular view of the comparative dimensions of the different crania, with a plate containing figures of each; but superior power has prevented my design. I trust, however, that when science is freed from monopoly,—when the gates of knowledge are no longer infested by a preternatural Cerberus, (whatever may be the sop that shall stupify his vigilance,) I shall be able to effect the completion of this subject with that degree of success which my means will permit.

\* See Mr. Corse's Obs. on the different species of Asiatic Elephants, Phil. Trans. 1799, p. 208. In the Barclayan Museum, belonging to the Royal College of Surgeons of Edinburgh, (from the use of which the public are fortunately not debarred,) there is a noble specimen of an old *female* elephant, brought by Dr. Ballingall from Asia. The imperfect state of dentition in the tusks of this specimen, forms an interesting corroboration of the above views.

† Lesson Cétacés, p. 108.

‡ Sir Stamford Raffles observes, "they are seldom caught above 8 or 9 feet in length, but how much larger they grow is not ascertained, as when they exceed this size, their superior strength enables them to make their escape when attacked," Phil. Trans. 1820, p. 180.