THE

THIRD ORDER

OF THE

MAMMALIA,

CONTINUED.

SUPPLEMENT ON THE MARSUPIATA.

It is a great misfortune to science that zoological systems are necessarily not merely the creatures of human inventions, but, to a certain extent also, of human fancy and caprice: they have none of the certainty of mathematics, but partake more of that indefinite point of excellence which belongs to painting; the *chef d'œuvres* of a Raphael might be better, and the best zoological arrangement will ever be capable of improvement.

It is painful to observe the defects which are, and ever will be, found in artificial systems of the most acknowledged merit; but it is still more so to contemplate the endless efforts of naturalists to ameliorate and improve them: so long, indeed, as there is no acknowledged standard, it is extremely difficult to fix the arbitrary rovings of fancy; though in natural science, as in political economy, attempts at reformation are dangerous in practice, and uncertain in the result.

Hence the great deference which has long been paid, more especially in this country, to the scientific works of the great Linnæus, may not have been without its beneficial effects; nor are the fashionable, though as we firmly believe necessary and proper, departures from his orthodoxy without their inconvenient consequences.

Such reflections naturally suggest themselves on entering

upon the consideration of the Marsupial animals. It is easy to see that inasmuch as they include groups or genera possessed of teeth as various as in the whole class, and, consequently, of manners and habits equally different, there is an impropriety in treating them merely as one division of the flesh-eating Mammalia, but it is not so easy to discover any other mode of arrangement that will not be without its objections.

If the Marsupiata be treated as a distinct order, (which, if we were to express an opinion, appears to us the least objectionable arrangement,) it might be said that the order includes animals which by their several habits might, with propriety, be referred to all the other orders of Mammalia; and therefore that the better plan would be to make the Marsupiata a class, and to divide its genera into orders concurrent with those of the Mammalia now established. In short, opinions and plans might be as various as individuals, if every one were to assume the office of zoological legislator.

Allowing, therefore, to our author the credit of seeing and feeling these and similar difficulties which attend his arrangement, the most prudent course appears to be, to guide one's judgment by his, and to conclude that, all things considered, his determination is most likely to be the least objectionable in practical application.

The principal trait in which these animals all agree (however various in other points), is the existence of the abdominal pouch, from which their name is taken, being derived from the Latin word *Marsupium*, which signifies a purse.

Pouched animals were known at first only in America: all the species found on that continent agree so completely in general organization, as well as in this peculiar conformation of the genitals, that Linnæus found in them the elements of a single genus, which he called *Didelphis*, or double-wombed.

Afterwards from the East Indies, and still later from the regions of Australasia, animals arrived equally distinguished by the possession of the abdominal pouch; these were immediately set down as genuine *Didelphes*, and Gmelin has bestowed on them the titles of *Didelphis Orientalis*, *Didelphis Brunii*, &c.; and even the *Tarsier* of Daubenton he inscribed among them, under the name of *Didelphis Macrotarsus*.

None, however, of these animals answered to the definition of Linné; all had less than six incisors above, and less than eight below, *&c.*: nevertheless, Pallas, Camper, and Zimmermann still preserved the appellations of Gmelin, and thus prolonged the abuse.

In the mean time, the discoveries of our countrymen in New Holland added other animals to the list of the Didelphes which carried that external mark of resemblance which we have noticed. Our hardy navigators, familiar with the Opossum of America, set down these as animals of the same kind.

Travellers, by their labours, do doubtless much enrich natural history; but, in proportion to the multiplication of animals, so is the difficulty and confusion consequent on their classification. Animals were found agreeing, it is true, in the character of the pouch, but varying most essentially in other particulars.

We shall lay before the reader the characters of each of the families of the Marsupiata in the table, and confine ourselves here, for the most part, to some general observations upon them, the substance of which be principally derived from M. Geoffroy St. Hilaire.

The anatomy of the Marsupiata is well worth the minutest consideration: the females, as we have seen, have a pouch under the abdomen, at the bottom of which is the mammary apparatus: within this pouch the young receive their nourishment.

The reproduction of living beings, as is well known, takes place in various modes: attention, however, has never perhaps been given to this subject in the degree which it merits. These very various modes, these unusual combinations, have been observed only in animals of a lower order. They were considered as something inherent in the gradation of organic constitutions, a necessary consequence of the scale of animal life; but so assured did naturalists feel of the uniformity existing in this respect among all animals conformed like Man, that in the case of the Marsupiata, they were inclined to reject as inaccurate all that did not square with received opinions on this point, and agree with known analogies. Such a principle is, doubtless, essential to all just philosophizing, but some reservation must be observed in its application.

Thus from the origin of our acquaintance with the Didelphes, an opinion arose that their young were actually produced in the abdominal pouch beside the mammæ of the mother. It is nearly two centuries since Marcgrave has said, "The pouch is properly the matrix of the Carigueya *(Didelphis Opossum)*. I have been unable to find any other; this is a point which I have ascertained by dissection. The semen is produced there, and there the young are formed." Pison confirms the same facts, having, as he observes, dissected many of these carigueyas. Valentyn, occupied in ecclesiastical functions in the East Indies, and who never was aware of the existence of pouched animals in America, makes the same assertion, in his account of the Molucca Islands: "The pouch of the Philanders is a matrix, in which the young are conceived. This pouch is not what is usually supposed. The mammæ are, with regard to the young, what stalks are to their fruits." The young remain attached to the mammæ, until they have attained maturity, and then separate from them as the fruit drops from the stalk.

These notions are also common in Virginia, even among physicians. Beverley says, that the young Opossums exist in the false belly, without ever entering the true, and are developed on the teats of the mother. The Marquess of Chastellux makes a similar remark. Hence Pennant says, "That suspended to the mammæ of the mother, they remain there at first without motion: this lasts until they have acquired some development and strength; but then they undergo a second birth."

A French gentleman, who accompanied La Fayette to America, was taken prisoner by the Creeks, and afterwards became chief of a savage tribe, has often assured M. Geoffroy, that he brought up a number of Opossums, and always observed that the young were born on the teats within the pouch.

Such a number of testimonies had a considerable effect in Europe. Naturalists procured pouched animals; they had never conceived, or thought of admitting, but one hypothesis: being convinced that anatomical inspection was unfavourable to this, they agreed to reject the facts, and deny their possibility. The most celebrated naturalists and anatomists of the period to which we allude, sought and did not find the direct and interior road from the matrix to the pouch. The Marsupiata were then considered as beings, whose premature birth was compensated for by a sort of incubation in the pouch. "It would be desirable," says Buffon, "to observe living Sarigues, and more particularly that their precocious exclusion from the uterus should be examined: by such observation we might doubtless obtain some insight into the method of preserving the lives of children prematurely born! The gestation of these beings having been proportionally short, the period of their lactation would be lengthened. "So small are they," says Blumenbach, "when born, that they may well be called abortions." Thus persevering in the system of a second, but premature, birth, naturalists imagined that a

second matrix protected the development of animals born in a state of such considerable debility.

While this theory was predominant, some observations appeared from the pen of a French Officer of Artillery, in 1786, in favour of the proscribed notions: they are to be found in the travels of the Marquess of Chastellux, and we shall present them in an abridged form to our readers.

Two Opossums, (*Didelphis Virginiana*,) male and female, were domesticated in the house of M. d'Aboville, in 1783; these animals copulated, and the effects were attentively observed by that gentleman: in about ten days, the edge of the orifice of the pouch grew thicker, a phenomenon which afterwards grew still more perceptible. As the pouch increased in size, the orifice widened. On the thirteenth day, the female did not quit her retreat except to eat, drink, and evacuate: on the fourteenth she did not stir from it.

M. d'Aboville then determined to seize and examine her: the pouch, the aperture of which had widened before, was now nearly closed; a slimy secretion moistened the hairs on its circumference. On the fifteenth day, a finger was introduced into the pouch, and a round body about the size of a pea was plainly felt at the bottom. This examination was made with difficulty, on account of the impatience of the mother, who had before this been always very mild and tranquil. On the seventeenth, she permitted a further examination, and M. d'Aboville discovered two bodies about the size of a pea. There was, however, a great number of these young ones. On the twenty-fifth day, they moved very perceptibly, yielding to the touch: on the fortieth, the pouch was sufficiently open for them to be plainly distinguished; and on the sixtieth, when the mother lay down, they were seen hanging to the teats, some outside the pouch, some inside. The nipple is about two-eighths of an inch in length; but it soon dries up, and at last drops off, after the manner of the umbilical cord.

These observations occasioned Professor Reimanus, of Hamburgh, to address himself on the subject to Dr. Barton in America. Roume de St. Laurent, who had already communicated to Buffon, that the nipples of the female Didelphis appeared at a certain time, in the form of little clear bulbs, in which the embryo was commenced, had also excited the zeal and stimulated the researches of Dr. Barton. This learned physician answered the appeals of his correspondents, and in two letters (one addressed to the Professor, the other to M. Roume) states his facts, observations, and conjectures, touching the generation of the Opossum. His observations are of great importance, and the more so, as while he professes never to depart from what he deemed sound physiological views, the facts he brings forward decidedly militate against the theory he proposes to establish: part of his remarks we shall give in substance to the reader.

The Didelphes put forth not fœtuses, but gelatinous bodies, embryos without eyes or ears. The mouth of these embryos is not cut: sprung from parents about the size of a Cat, they weigh at their first appearance generally about a grain, some a little more, and seven of them together weighed ten grains. Barton detached one of these embryos, weighing about nine grains, without producing any wound. In this he contradicts what Pennant and other English naturalists have asserted. Fifteen days of development in their new *domicile* (an expression of Barton's, intended to give what he thinks the true character of the pouch) are sufficient to bring the little ones to the size of a mouse; they do not quit the teats until they are as large as rats. After this they resume suckling, at pleasure, being then equally sustained by the mother's milk, and whatever substances they can eat at that period. It is necessary to the perfect development of these embryos, that the organs of digestion and respiration should be in perfect harmony Accordingly, we find the nostrils considerably widened from

the origin, and they consequently become the first conduits of air to the lungs. The stomach of a young Opossum, which weighed forty-one grains, was found considerably distended and dilated, with a white and milky matter. That of a younger one, on the contrary, contained a transparent and colourless liquid.

The eyes are opened after fifty or fifty-two days. The teats are then quitted, and resumed successively. After sixty days, a young opossum weighs 531 grains. Barton relates a surprising circumstance of a female opossum, having a double gestation of two separate litters, one drawing to its close, and the other just commencing. This mother was then nursing seven young ones as large as rats. Though strong enough to live on solid aliments, they still had recourse to the teats for milk. But on a sudden the pouch closed, for it had become the new *domicile* of seven other young ones, weighing each from one to two grains. Nevertheless, the first litter was not deprived of the cares of the mother, who always manifested a constant attention and affection for them all. Her watchfulness always extended to the family already brought up She continued the cry with which she was accustomed to call them back. She assembled them on her back, and withdrew them, on the appearance of danger, to the tops of trees.

From all these facts, Barton in his first letter concludes that these animals have two kinds of gestation: one which he calls *uterine*, and which he considers to last from twenty-two to twenty-six days; and the other *marsupial*, which commences from the entrance of the embryo into the pouch. This last, physiologically speaking, is the most important; for the pouch, he adds, is strictly a second uterus, and the most important of the two.

In the interval of the publication of his two letters, Barton was informed that Sir Everard Home had published a paper on the generation of the Kangaroos, in the Philo-

sophical Transactions for 1795, in which he states this remarkable fact; that the fœtus of pouched animals exhibits no trace of the umbilical cord. Barton proceeded immediately to the authentication of this point, by examining young opossums in the pouch, and found it correct. He supposes, however, that this umbilical cord will be discovered on individuals in the uterine gestation; but his researches not enabling him ever to have seen a fœtus in the uterus, he gives himself up to theoretical conjectures. He proposes to refer the mode of generation peculiar to the Didelphes, to that of reptiles and fishes, which, he believes, are also without the umbilical cord.

Dr. Barton furnishes a testimony in contradiction to the assertion of Camper, that man is the only animal capable of lying on his back. This, he says, often happens to the female opossum, especially when she has young ones. Lying on her back, she can touch, with the extremity of the vagina, every point of the interior sides of the pouch, and consequently the little ones, at the moment of birth, are protruded into the pouch without difficulty.

Fœtuses, without any trace of the umbilical cord, which yet have the nostrils widely opened, and the lungs considerably developed, would seem to countenance the opinion of a different system of organization from other animals. M. de Blainville, in an article on the generation and fœtus of the Didelphis, verifies the facts stated by Barton. He was unable, after the strictest examination, to discover any umbilical vein or artery, nor even the suspensory ligament of the liver. The gland of the ethymus was also wanting, and, generally speaking, none of the arrangements observable in the fœtus of other mammiferous animals, such as circulation and respiration depend on, are found here. From these facts, M. de Blainville agrees with Dr. Barton pretty nearly. "There are," he says, "two sorts of gestation, one *uterine*,

another *mammary*, and these two sorts of gestation act differently, one supplying the deficiencies of the other." With Barton, however, the meaning of the word gestation is obvious. He applies the term to the simultaneous existence of the uterus and the pouch, to the notion of those two *domiciles*, in which certain phenomena, imperfectly exhibited in the one, are completed in the other. But with M. de Blainville, the idea of *uterine* and *mammary* gestation extends only to the different action of certain modes of nutrition. In the mammalia, he says, the fœtus, before it can be sustained independently, is capable of drawing its nutriment from the mother in two distinct places, and two different manners; *i. e.*, in the uterus from the blood, by means of the vascular system, and at the teats from the milk by the intestinal canal. And the two modes of nutrition, as to their duration, are in an inverse ratio in the various animals. M. de Blainville applies this generalization to the pouched animals. He imagines that one of these two modes of nutrition might be altogether suppressed. If the uterine be done away, we have the pouched animals; if the mammary, we have mammalia without mammæ; *i.e.*, the *monotremes*. That an animal may be born by means of a mammary nutrition, organized like a young one that has its full term of uterine gestation, is a bold conjecture, and accordingly M. de Blainville does not absolutely insist upon it. But he gives some consistency to this idea, when he admits at the end of his observations, that the fœtus probably passes directly from the uterus into the pouch, observing that the round ligament, the use of which in the ordinary mammalia is not known, may be the means of this passage.

M. Geoffroy, lamenting the vagueness and obscurity existing in the science of the Marsupiata, wrote an article on the subject in 1819, with this query as title, "Are the pouched animals born attached to the teats of the mo