On the Regeneration of the Limbs in the Axolotl (Siren pisciformis).
By J. M. PHILIPEAUX.

On the 24th of September, 1866, I had the honour to bring before the Academy some experiments demonstrating that the limbs of the newt (*Triton cristatus*) are only regenerated when at least the basal part of these members is left in its place (that is to say, the scapula, when, as in my experiments, we have to do with the anterior limbs). It appeared to me necessary to repeat these experiments upon other animals of the same class, in order to see whether we have to do in this case with a constant fact, as, indeed, everything would lead us to suppose.

By the kindness of M. Duméril, I have had at my disposal ten Axolotls bred in the menagerie of reptiles at the Museum of Natural History. On the 4th of October, 1866, I removed the left anterior limb, including the scapula, from five of these Axolotls; from the five others, on the same day, I amputated the right anterior limb, with scissors, at the surface of the body, consequently leaving in place not only the scapula, but also the head of the humerus.

It is now more than eight months since the operation was performed; and it is easy to prove that it has furnished the results which I had foreseen. In the Axolotls of the first series cicatrization has taken place in the most regular manner; but there has not yet been the least indication of any regeneration. In those of the second series, on the contrary, very soon after the operation, the cicatrix began to rise, and there was formed a projection which has gradually increased, and I was able to trace day by day the phenomena of the regeneration of the limb. Already, and indeed for a long time past, this limb has been completely reproduced, with all its normal characters of form and structure.

Thus all the experiments which I have made since I commenced studying the question of the reproduction of removed parts constantly lead me to the same conclusion. Whether we have to do with the removal of entire limbs, as in the Batrachia, or with that of more deeply seated organs, such as the spleen in the Mammalia, regeneration never takes place except when the operation has left in position, and with its normal anatomical connexion, a portion of the limbs or of the spleen. This constancy in the results already attained has encouraged me to try other experiments, the results of which I will hereafter communicate to the Academy.—*Comptes Rendus*, June 10, 1867, p. 1204.

On the Development of the Brown Aphis of the Maple.
By MM. BALBIANI and SIGNORET.

The facts recently observed by M. Dareste in the evolution of the common fowl, and the deductions which he has drawn from them with regard to the production of races in animals, with the conclusive analogous examples in plants made known by M. Naudin, demonstrate that, in both kingdoms, certain anomalies of development may

be the starting-point of peculiar races. The following observation proves not only that simple races are produced in this manner, but that forms described as species, or even as actual genera, sometimes acknowledge no other origin.

In 1852 an English naturalist, Mr. J. Thornton, indicated, under the name of *Phyllophorus testudinatus*, an Hemipterous insect which he had found on the leaves of the common maple (*Acer campestre*), and which he regarded as the larva of an undetermined species of *Aphis*. Subsequently, in 1858, Mr. Lane Clark also observed it, and placed it, under the name of *Chelymorpha phyllophora*, in a genus intermediate between the *Aphididæ* and the *Coccidæ*. Lastly, in 1862, M. van der Hoeven, of Leyden, described it, also as a new genus, replacing the generic names *Phyllophorus* and *Chelymorpha* by that of *Periphyllus*, the other names being previously employed to designate other genera of insects; and our Hemipteron received from the illustrious Dutch naturalist the name of *P. testudo*. Like Mr. Thornton, M. van der Hoeven regarded it as the larva of an *Aphis* of which the adult form was still unknown.

These brief historical indications form a summary of all that was known about this insect when we on our part undertook some investigations upon it, the results of which we now propose to communicate. We first ascertained that, far from constituting a new genus or even a distinct species, the *Periphyllus* is really nothing but the larva of one of the known species of Aphides which live on the maple —namely, *Aphis aceris*, a brown species which is to be met with during a great part of the year upon the leaves and at the extremities of the young shoots of that tree. But, at the same time that we ascertained this fact, we were set on the track of a most unexpected discovery, constituting a new and very remarkable peculiarity in the development of the animals of this group, already presenting such curious phenomena in connexion with their reproduction.

This was the faculty, become transmissible to all the generations of a particular species, of engendering two kinds of individuals—one normal, the other abnormal—of which the former alone, after their birth, continue the course of their development, and become capable of reproducing the species; whilst the latter retain throughout their existence the form which they possessed on coming into the world, and appear to be incapable of propagating. Moreover these two categories of individuals present such marked characters that, without having watched their birth, and being thus convinced that they are really produced by identical females, and sometimes even by one and the same mother, one would inevitably consider them to belong to two species, nay even to two completely different genera. Now one of these is nothing but the *Periphyllus* mentioned at the commencement of this note as having been described by the authors who had observed it as a separate genus in the family of the Aphides.

Such is, in summary, the singular observation that we have made upon *Aphis aceris*. We may now give some fuller details upon each of the two kinds of individuals of which this species is composed.

When we examine with the naked eye or with a lens the embryos of the brown Aphis of the maple at the moment of their being produced by the females, or after opening the bodies of the latter, we see at once that all of them have not the same coloration. In some they are of a tolerably bright green, whilst in others their colour is more or less brownish or greenish brown. The brown embryos present no peculiarities, and only differ from their mothers by characters analogous to those which are remarked in all species of Aphides between the newly born young individuals and the adult females. As in these latter, their bodies and appendages are furnished with rather long simple hairs, and, like all young Aphides at the moment of their birth, they already contain rudiments of embryos in the interior of their generative apparatus. If, on the other hand, we examine the green embryos, we at once detect, besides their peculiar coloration, very marked differences between them and their brown congeners. The various parts of the body and limbs do not present the same conformation as in the latter, but one is especially struck by the extraordinary development and the unusual appearance of their tegumentary system. Thus their surface is no longer furnished only with simple hairs, but also and principally with scaly transparent lamellæ, more or less rounded or oblong, and traversed by divergent and ramified nervures. These lamellæ occupy especially the anterior margin of the head, the first joint of the antennæ (which is very stout and protuberant), the outer edge of the tibiæ of the two anterior pairs of legs, and the lateral and posterior margins of the abdomen. Moreover the whole dorsal surface of the latter and of the last thoracic segment is covered with a design having the aspect of a mosaic composed of hexagonal compartments, and which is not without analogy to the pattern formed by the scaly plates of the carapace of tortoises. These peculiarities give our insect a great elegance of appearance, which causes it to be much in request with the amateurs of the microscope in England, where it is commonly known under the name of the "leaf-insect." The entire animal is strongly flattened, and resembles a small scale applied to the surface of the leaf upon which it reposes, and on which it requires a certain amount of care to detect it.

Another remarkable character of these abnormal individuals of *Aphis aceris* is the rudimentary state of their generative apparatus. This is reduced to a few groups of small pale and scarcely visible cells, none of which arrives at maturity to become transformed into an embryo; and it retains this character as long as it is possible to observe the animal. The functions of nutrition, also, are performed in them in a very unenergetic manner; for from the moment of their birth until that at which we cease to observe them, they increase but little in size, attaining scarcely 1 millimetre. They undergo no change of skin, never acquire wings like the reproductive individuals, and their antennæ always retain the five joints which they present in all young Aphides before the first moult. Nevertheless they possess a well-developed rostrum and an intestinal canal, the peri-

staltic contractions of which we have distinctly observed. In short, although we have observed them for several months (that is to say, from May to November), no change in their condition was ascertained; and they disappeared with the leaves which bear them, without its being possible to ascertain what becomes of them subsequently.

The question naturally arose, What was the signification of these abnormal individuals of the *Aphis* of the maple, and what part did they fulfil in the reproductive functions of the species to which they belong? They are evidently not males, since their generative apparatus retains the same rudimentary form at whatever epoch we examine them. Moreover in no known species of *Aphis* are the males produced at the same time as the viviparous individuals, which are not the true females of the species. There is therefore no other alternative but to regard them as a modification of the specific type constantly reproduced with the same characters by the successive normal generations. Our abnormal Aphides are indeed deprived of the faculty of reproduction, either by sexual generation or in any other manner; but after the observations of M. H. Landois upon the law of sexual development in insects, we know that in them the sexes depend simply upon the conditions of alimentation of the larva. Because, in the present state of things, these conditions have not yet occurred for one of the two sorts of larvæ of *Aphis aceris*, there is no reason for our concluding that they may not some day be realized; and by thus acquiring, with the attributes of the sexes, the faculty of propagating directly in an indefinite manner, these abnormal individuals will become in their turn the origin of a new species produced by deviation from an anterior specific type.—*Comptes Rendus*, June 17, 1867, pp. 1259–1262.

Cervus megaceros *previously known in the Fens.*

To the Editors of the Annals and Magazine of Natural History.

Gentlemen,—If Mr. Norman Moore will turn to pp. 466–467 of Prof. Owen's 'British Fossil Mammals,' he will find it recorded more than twenty years ago that "remains of the *Megaceros* found eight and a half feet below the surface of the peat-bog at Hilgay, Norfolk, are preserved in the collection of Mr. Whickham Flower, F.G.S." Various specimens have come under my notice in the last five or six years; and these facts I have recorded, by enumerating the species as one of the peat-fauna mammals, in the 'Geological Magazine' for November 1866, and in the 'Quarterly Journal of the Geological Society' for the same date.

I remain yours, &c.

H. Seeley.