THE AYE-AYE OR CHEIROMYS OF MADAGASCAR.

During the present year the Menagerie of the Botanical Garden has been enriched by the addition of several rare animals, and among others, by that of three Lemurs of Madagascar belonging to the strange species commonly called Aye-Aye, and scientifically *Cheiromys Madagascariensis*. The Museum of Natural History already possessed in its collection, not only the same species, obtained more than a century ago, by the explorer Sonnerat, but also several specimens preserved in alcohol or reduced to skeletons, which have been presented at more recent dates by M. de Lastelle, M. A. Grandidier and M. Meurand. The study of these different specimens and of those which the British Museum has procured, has at length led naturalists to the discovery of the true affinities of the Aye-Aye, and has decided the place it should occupy in classification, namely in the order of Lemurs. But, before coming to this conclusion, there was a great deal of hesitation and groping in the dark. Sonnerat, who discovered the Aye-Aye in Madagascar, considered it a squirrel having some connection with the Makis, soon after, Buffon found in it certain resemblances to the Tarsier, then Gmelin placed it decidedly in the genus *Sciurus* or Squirrel, under the name of *Sciurus Madagascariensis*; later still, E. Geoffroy Saint-Hilaire made a particular genus for this strange animal, namely *Daubentonia*, which G. Cuvier, agreeing with Geoffroy, afterwards changed to *Cheiromys*; finally Blainville maintained that the Aye-Aye belonged to the order of Lemurs, and he was successful, though not without difficulty, in establishing his views.

The Aye-Aye has nearly the height of a cat and resembles in a slight degree the Feline tribe in its short and globular head, erect and uncovered ears, eyes very open, nostrils oblique and pierced at the extremity of the nose, although it resembles a Squirrel in its slender toes, the color of the hair, and its bushy tail. But it differs entirely from both of these animals by the arrangement of its paws. In the Aye-Aye, indeed, the posterior limbs terminate as in the great majority of the Lemurs, in real hands, the thumb, however, being a little less developed than in the latter animals, and the anterior limbs present, at their extremities, singular anomalies. Here the thumb is no longer opposable to the other fingers and it carries, as the latter, a true claw, the middle finger is so slender that it seems withered, the fourth finger is a little less slender but still larger than the other, and finally, the little finger is very extended.

The dentition of the Aye-Aye differs in several respects from that of the other Lemurs; there are, indeed, two strong and sharp incisors in each jaw, four molars on each side of the superior maxillary and three molars only in the inferior maxillary; but no trace of canines, superior or inferior, can be seen in the adult, so that a wide space separates the incisors from the molars. Yet, this anomaly does not exist to the same degree at all periods of life, and, in the young, the dental system is least removed from the ordinary type, owing to the presence, in the superior maxillary, of a pair of small incisors.

Arrived at its full development, the Aye-Aye measures more than a metre from the end of the nose to the extremity of the tail, whose length is about equal to that of the body. It has smooth and slightly wart-like ears, uncovered nose, and lips ordinarily half open, exposing to view the incisors which, meeting two by two in a very prominent angle, resemble the beak of a parrot. Hair, bushy and very long, covers the whole of the body, the limbs and the tail, but does not present in every spot a uniform color; the hairs of the head and of the back are often white at their ends, while those of the breast and of the flanks are of a more or less brown, deepened by a yellow base. In the young, the whole front is also of a silvery white, and the dorsal line is marked by a band of the same color.

In Sonnerat's "Voyage aux Indes et à la Chine," some of the principal characteristics of the Aye-Aye are spoken of, but the portrait leaves much to be desired, and the author mentions but a few things on the habits of this curious representative of the fauna of Madagascar. This animal, says Sonnerat, appears to burrow, it does not see in the day, its eye is reddish and fixed like that of a screech-owl. It is very lazy and, consequently, very gentle. I have had the male and female and they lived only two months. I fed them with boiled rice, and they used in eating, the two slender toes of the fore-feet as the Chinese use chop-sticks. They are timid, fearful, like a great deal of heat, always roll themselves up in sleeping, lie on the side, the head between the fore-limbs. They were always lying down, and it was only on shaking them several times, that they would move at all.

Although this animal is very slow in movement, and seems to be torpid during the day, it has no relation to the *Unau* and the *Ai* of M. de Buffon. The name of Aye-Aye, which I have kept for it, is a cry of exclamation and astonishment among the inhabitants of Madagascar. This animal has been known to us but for a few years, because the western side, the part which it inhabits, is but little frequented; the inhabitants of the eastern side assured me that it was the first they had ever seen.

Fortunately, the successive observations on the *Cheiromys* at the Zoological Gardens at London and at Paris have completed the information given by Sonnerat on the manners and the diet of this species. The Aye-Aye is essentially a nocturnal animal; in captivity, it sleeps during the whole day, lying on the side, its body curled up and entirely covered by the bushy tail. During the night, on the contrary, it moves about continually, scratching and gnawing the walls of its prison. Frequently it hangs by its hind claws, and, in this position, it performs its toilet in the manner of certain Bats. In this operation it uses the third finger of the fore-feet, which it bends in the form of a hook in order to comb the tail and to adroitly wipe its front, the corners of its eyes, the nose, mouth and ears.

In eating, the Aye-Aye exclusively employs the left hand; it thrusts into the semi-liquid food which is given to it, the fourth finger, the longest of all, holding the third raised above the others, and the thumb, on the other hand, very low. The extremity of the anterior limb, thus arranged, describes a singularly rapid motion to and fro, and the lateral face of the fourth finger, passing every moment between the lips of the animal whose head is inclined on one side, places the food in the buccal cavity, over the tongue. At the same time, the cheeks and lips are in continual motion. "The Aye-Aye," says Mr. Bartlett, "can also advance its lips and lick in the manner of cats; but it does this but rarely. I have never heard it utter a single cry, emit any sound, during the long hours of night, and I never have observed that he was made uneasy by my presence. This Lemur seeks no species of insects, but readily feeds on a sort of pap made of milk, honey and eggs; it appears to love semi-fluid substances, soft and mucilaginous, while it rejects with contempt worms, grass-hoppers, and the larva of hymenopters. I have then the right to state that, in a state of nature, the Aye-Aye is not insectivorous. Seeing its strong and sharp teeth, I am inclined to believe that it cuts grooves in the bark of trees, in order to make the sap flow; it receives this in its mouth and it forms its principal nourishment. In support of this opinion, I state the fact that the animal frequently returns to the same spot on the branch or on the trunk, which it first attacked. It must also be stated that the Aye-Aye pays, so to speak, no attention to what it carries to its mouth. Having on several occasions withdrawn the dish which contained its pap, while it was eating, I saw with astonishment that it continued to direct its hand towards the spot where its food had been, and that it did not search for the latter until after having, for a long time, mechani-

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cally executed prehensile motions. Such a stupid manner of acting is in complete contradiction to that which is observed among animals that devote themselves to the pursuit of other animals and feed on living prey; I presume, therefore, that the Aye-Aye feeds on vegetable substances. I have often seen it, after having swallowed a certain quantity of liquid food, devour a piece of bark."

The Cheiromys, at the Botanical Garden, given by M. Humblot and M. Archambault, act exactly like the one which has been so conscientiously studied by Mr. Bartlett, the Superintendent of the Zoological Garden of London. They sleep during the whole day, which is very annoying to the visitors desirous of seeing these strange animals, and, when the keeper tries to arouse them from their sleep, they show their ill-humor by attempting to bite and by endeavoring to retreat to the most obscure corner of their cage.

In Madagascar, the Aye-Aye inhabits the large forests, and are found not only in the western region, as Sonnerat thought, but also on the southeastern side, where it has been observed by M. Grandidier. According to the natives, it builds a real nest, of a spherical form, in which the female deposits and raises her young. This assertion without doubt merits belief, since in 1877, M. Soumage brought to France one of these nests, which was built on the forked-head of two branches, and which contained a female and her young. The walls of this nest were formed of rolled leaves of the Ravenala or *Tree of the Traveler*, covering an interweaving of twigs; it has on one side a very narrow opening.

The smallest of the other Lemurs—the Chirogales, the Microcebes and the Lepilemurs—have, it appears, similar habitats, and also interweave, with twigs and leaves, a home for their progeny, while the Makis, and all the higher orders of Lemurs, build no nests, and carry their young attached to their back or hung against their breast.—*Translated from La Nature.*

DETECTION OF OLEOMARGARINE.*

By P. Casamajor.

In the *Moniteur Scientifique* for April, 1881, is an article on Butter Analysis, in which are given the processes, used at the Municipal Laboratory, attached to the Prefecture of Police in Paris, for the detection of foreign fats in butter. This is followed by an account of an areometric method, used for the same purpose and based on the difference of density between butter and the fats with low melting point, extracted from tallow, which are made to resemble genuine butter, and which are known under the commercial name of *Oleomargarine.*

The sale of Oleomargarine has become so extensive in this country, that a purchaser of butter is never sure whether he is getting true butter or its imitation. In view of this fact, I have thought it useful to give a process, based on the difference of specific gravity between butter and oleomargarine, of such simplicity that it can be easily applied by any person having rudimentary ideas of manipulation.

Processes of this character are those which can be used with greatest efficiency to check adulterations. I have, in previous communications, given such processes for the detection of Starch Sugar mixed with Cane Sugar, and for the detection of starch sugar syrup, mixed with sugar house syrups.

Although my concern is principally with the difference of density between butter and oleomargarine, I propose to very briefly call attention to the processes used at the Municipal Laboratory of the Prefecture of Police, as these show important differences in chemical composition between true butter and its adulterant, which confirm the difference in the specific gravity. Such an important character as the specific gravity would not differ to any marked extent, without a corresponding diversity in the composition of the two substances.

One process used at the Municipal Laboratory is the following: the sample of butter to be tested is melted, so as to separate water, salt etc., which are deposited, and a certain amount of scum, which comes to the surface. Of the clear melted fat, under the scum, about 3 or 4 grammes are taken and saponified by 1 or 2 grammes of potassic hydrate. The fat and potassa should be mixed with 50 C. C. of alcohol. In about 5 minutes the saponification is complete, and the cautious addition of water should not produce any turbidity. If any takes place, the operation must be begun anew. The soap formed is afterwards decomposed with weak sulphuric acid, and the insoluble fat acids are collected and weighed. The result of a great number of experiments is that in butter the percentage of fat acids thus obtained is usually 86.5 to 87.5 per cent., and that sometimes, it is as high as 88 per cent. In animal fats from tallow the percentage of insoluble fat acids is 95½. The difference 95½ − 87½ =8 per-cent., is attributed to the absence in tallow of volatile and soluble fat acids which exist in butter.

Another process is given in which the result is obtained volumetrically, by estimating the quantity of potassa used in saponifying the fat. One gramme of butter requires 225 to 232.4 C. C. of potassa solution, while 1 gramme of tallow, or other animal fat of the same nature, requires from 195 to 197 grammes of the same potassa solution.

Mr. Charles Girard, director of the Municipal Laboratory, considers as adulterated any butter requiring, for saponification, less than 221.5 C.C., of the potassa solution. In some unfavorable cases this volume may represent nearly 30 per cent. of foreign fat.

The method for detecting the difference between butter and oleomargarine by the difference of specific gravity, is one proposed by Messrs. Leune and Harburet.

The butter to be tested is first melted so as to separate the pure fat from water, salt, etc. The clear melted fat is placed in a cylinder, heated by the vapor escaping from a water bath, kept boiling, but no part of the cylinder is to be in the boiling water. I understand that by heating in this way, the temperature of the melted fat remains at about 93° C. To determine the density of this fat an areometer is placed in it. This areometer is graduated in such a way that, in butter, it will sink to the lowest mark of the scale, while oleomargarine corresponds to the highest point in the graduation. The intervening space is divided into ten equal parts, each one of which corresponds to $\frac{1}{10}$ of oleomargarine, mixed with butter. More than 600 experiments made by Messrs Leune and Harburet with artificial mixtures show that, within an approximation of ten per cent., the instrument gives correct results.

Soon after this areometric method was published, it was announced that the difference of the specific gravities of butter and of oleomargarine, was too slight to distinguish the one from the other. As Messrs. Leune and Harburet had not stated what the specific gravity of each was, it was impossible to judge of the truth of this statement, and it became interesting to ascertain the facts of the case. The following process is the result of my attempts to determine the specific gravities of butter and of oleomargarine. I chose in the first place to ascertain the specific gravity of each at 15° C, which is the usual temperature for such determinations. The process consisted in finding for each a liquid in which, at 15° C, a portion of butter or of oleomargarine, freed from impurities by previous melting and containing no air bubbles, would remain in equilibrium in any portion of the liquid, without any tendency to rise to the top or sink to the bottom. The readiest liquid for this purpose was a mixture of alcohol and water, as this is easily prepared and it has no dissolving action on the fats to be tested. As the density of the liquid in which a body remains in equilibrium is the density of the body itself, the problem was narrowed down

* (Read before the American Chemical Society Sept. 1881.)