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Note on the phenomena of digestion in the cockroach (*Periplaneta americana*, L.)

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Posterior wing lobed, projecting at the middle of the outer margin, crossed transversely by two bands of brown.

Exp. $1\frac{3}{8}$ inch.

Hab. Brazil.

In the collection of Dr. Staudinger. May be a variety of the last.

MISCELLANEOUS.

Note on the Phenomena of Digestion in the Cockroach (Periplaneta americana, L.). By M. FÉLIX PLATEAU.

THE Editors of the 'Annals of Natural History' have given (in volume xvi. 1875, p. 152) a summary of my "Recherches sur les phénomènes de la digestion chez les Insectes"*. In the number for April 1876, p. 333, they have reproduced, under the title "On the Functions of the Glands of the Digestive Apparatus of Insects," an abstract of the memoir of M. Jousset de Bellesme entitled "Recherches expérimentales sur la digestion des Insectes et en particulier de la Blatte" (8vo, Paris, 1875).

The publication of M. Jousset's work has called forth on my part a well-founded claim of priority†, since M. Jousset reproduced, a year after myself, nearly all my results. A discussion has also resulted, as we did not agree on certain points, of which the principal may be characterized as follows. Relying on a long series of experiments, I had put forward in my memoir of 1874 that the digestive juices of insects are alkaline or neutral, *never acid*. M. Jousset asserts the contrary, and says that in the *Blatta* the liquid of the cæca of the middle intestine is slightly acid.

The present note contains the results of a study which I have just made of the phenomena of digestion in *Periplaneta americana*. The following is an abstract of it.

The aliments when swallowed accumulate in the crop and undergo the action of the secretion (which is most frequently alkaline) of the salivary glands; there the feculent substances are transformed into glucose. This first product of digestion is absorbed on the spot, and is met with no more in the rest of the digestive tube.

The valvular apparatus (gizzard), which by no means plays the part of a trituratory organ, allows the matter in course of digestion to slide in small quantities into the middle intestine. That region receives the juice secreted by eight glandular cæca, which is ordinarily alkaline, *never acid*, neutralizing the acidity that the contents of the crop may have acquired after a long stay in that organ, transforming the albuminoids into soluble and assimilable bodies analogous to the peptones‡, and forming emulsion of the fats.

* Mém. de l'Acad. Roy. de Belgique, tome xli. 1874.

† Comptes Rendus, 1876, vol. lxxxii. p. 340.

‡ The action of the secretion of the cæca of the cockroach on the albuminoids has been demonstrated by M. Jousset. I am happy to confirm his results; only this secretion is not acid.

Finally, in the terminal intestine the residues of the digestive operation and the secretion of the Malpighian tubes (a purely urinary secretion) are mixed together.

If this summary is compared with that deduced from all my preceding researches on the Insects in general, which concludes my memoir of 1874, it will be seen that the phenomena of digestion in *P. americana* scarcely depart from the conclusions I then laid down. They complete them, and are a remarkable confirmation of them.

The notice terminates with a detailed reply to the objections of my learned opponent.—*Bull. de l'Acad. Roy. de Belgique*, tome xli. p. 1206.

Singular Ceylonese Frogs.

[We have received the following interesting observations on Dr. Günther's paper "On the Mode of Propagation of some Ceylonese Tree-frogs," which appeared in the 'Annals' for May 1876.—Eds.]

When I began to collect our Ceylon reptiles some years ago, the spawn referred to of a tree-frog seemed so common that I did not then notice it as a curious circumstance. I have had several of these sent to me from the damp trunks of plantain trees, and especially from the perpendicular sides of the stone-quarries at Mutuwal; and about the same time I saw one on the corner of a tank close to the lake near my house in Slave Island. All these masses of spawn were firmly attached to some object, and were several inches from the water. They were several inches in length and from $2\frac{1}{2}$ to 3 inches across the rounded mass at the lower end; and I concluded they were the spawn of the most common tree-frog in Ceylon from the coast up to several thousand feet elevation. In a note from Mr. J. Catto from Illagolla, and dated 1872, he told me he had seen a good deal of this spawn, and offered to send me some of it.

Our Colombo frogs are the following; and this spawn must be the produce of one of them. 1st. The most abundant is the bright green-coloured large frog seen in such quantities on weeds, with their heads out of the water, in the Colombo lake, and not unlike the eatable frog; indeed a Frenchman who could not resist eating these pronounced them very good. It is the *Rana hexadactyla*, and adds to the concert of frogs in the lake at the commencement of each monsoon. 2nd. The *Rana tigrina*, or Ceylon bull-frog, a very large brown-spotted frog, with corrugations along his back, found in holes in damp places along the shores of the lake, rare compared with the above, and croaks so loudly that his voice resembles that of a young bull. 3rd. The *Rana cyanophlyctis*, a smaller one than either of the above, with dark spotted back and white abdomen, found in ponds and smaller bits of water, still more rare than the other two. 4th. The very common house-toad, generally found under flower-pots in Colombo: this is the *Bufo melanostictis*; and I am aware that all these four breed and spawn in the water. 5th. *Diplopelma ornatum*, a beautifully coloured small squat frog, has been brought to me from the vicinity of Colombo. 6th. *Callula pulchra*, a dark-coloured toad-like one, very rarely found near Colombo; but I never saw these, nor heard of their being found in