

LETTERS TO THE EDITOR.

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The University of London.

MR. THISELTON-DYER now narrows his attack to my suggestion that in voting on the new Charter, members of Convocation should do so "as at a Senatorial election," *i.e.* by voting papers. This seems a very narrow basis for so severe a condemnation.

The reason for this provision was, I presume, that as many members of Convocation are professional men, masters of schools, &c., it is in many cases difficult, if not impossible, for them to come up to London.

The provision applies, I may add, not only to Senatorial, but also to Parliamentary, elections. I cannot see why Mr. Thyselton-Dyer should assume that a vote so taken would "destroy the prospects of academic study in London." That, however, is not an attack on me, but on the Constituency.

High Elms, August 17.

JOHN LUBBOCK.

Plant-Animal Symbiosis.

IN Prof. Stewart's collection at the Royal College of Surgeons there is a preparation of a mimosa which protects itself from browsing animals by providing in its great thorns a domicile for a species of vicious, stinging ants. I believe this example of plant-animal symbiosis comes from one of the West Indian Islands, while on the mainland of America the same species of mimosa exists, but suffers greatly from the depredations of animals, because there is no suitable ant to come and ward them off. If my recollection of the distribution is correct, the following note of a similar phenomenon in South Africa, I think, is of considerable interest.

In a recent tour through the Karroo, in search of the skeleton of the Dicyonodons, I came across a mimosa tree which here forms the chief fuel, on one of the lower branches of which there were some very large thorns; one of these had a little oval hole bored just beneath the summit. On breaking it open, there issued an incredible number of ants, considering that they were packed in the space of a pair of spines about four inches long and half an inch in diameter. The asexual forms were of the usual two kinds: the soldiers were about a quarter of an inch long, brown, and very attenuated, showing very markedly the influence of surroundings on form; while the workers were scarcely half the size of their protectors, and of a darker hue. The sexual forms I did not see. The ants emerged from the crack in a very sleepy manner, and did not seem at all aggressive; this may have been on account of the cold, which would affect them more than their relatives which live in the earth. Embedded in the soft wood of the stem, where the two spines meet, were several aphides, which thus were able to feed themselves on the sap of the tree, and yet always be within the house of their owners. In the West Indian thorn-tree the leaves offer a further inducement to the ants to remain constantly near them, by providing at the extremity of the leaflets little masses of a nutritious substance adapted to the digestions of their guests; in the South African tree there is a mass situate at the base of the leaves, similar to that in the cherry, which probably serves the same object. On returning shortly afterwards, I found the ants had trekked with all their cattle, and I failed to trace their whereabouts. The locality was the gold-fields of Spreunfontein, in the Prince Albert district.

ERNEST H. L. SCHWARZ.

Cape Town, August 1.

Definitions of Instinct.

I HAVE read with interest the abstract of Mr. C. W. Purnell's paper which you published in last week's NATURE (p. 383). I think he is in error in supposing that young birds do not afford us examples of truly instinctive activities. The way in which a young moorhen swims with accurate coordination, before the down is well dry after hatching, and before it can walk steadily, is very instinctive. I would suggest to Mr. Purnell that there is a wide field for observation open to him among his native birds. If he will hatch some of them out in the incubator, and carefully note what they can do prior to experience, and how their activities are modified by experience, he will help to solve some of the difficult problems of habit and instinct.

I have myself advocated a restriction in the meaning of the term somewhat similar to that for which he argues. I shall be obliged if you can find space for the provisional scheme of terminology thus suggested in *Natural Science* for May 1895, which I have since somewhat extended and amended. To bring it into line with modern biological thought, a good deal of stress is laid on the question of heredity, and on the distinction between the definiteness which is congenital and that which is acquired. It may be premised:

(1) That the terms *congenital* and *acquired* are to be regarded as mutually exclusive. What is congenital in its definiteness is, as prior to individual experience, not acquired; the definiteness that is acquired is, as the result of individual experience, not congenital;

(2) That these terms apply to the individual. Whether what is acquired by one individual may become congenital through inheritance in another individual, is a question of fact which is not to be settled by implications of terminology;

(3) That the term *acquired* does not exclude an inherited potentiality of acquisition under the appropriate conditions. Such inherited potentiality may be termed *innate*. What is acquired is a definite specialisation of an indefinite innate potentiality;

(4) That what is congenital and innate is *inherent* in the germ-plasm of the fertilised ovum.

Congenital movements and activities: those the definite performance of which is antecedent to individual experience. They may be performed either (1) at or very shortly after birth (*connate*), or (2) when the organism has undergone further development (*deferred*).

Congenital automatism: the congenital physiological basis of those movements or activities the definite performance of which is antecedent to individual experience.

Physiological rhythms: congenital (and connate) rhythmic movements essential to the continuance of organic life.

Reflex movements: congenital, adaptive, and coordinated responses of limbs or parts of the body: directly evoked by stimuli.

Random movements: congenital, more or less definite, but not specially adaptive movements of limbs or parts of the body; either centrally initiated or directly evoked by stimuli.

Instinctive activities: congenital, adaptive, and coordinated activities of relative complexity, and involving the welfare of the organism as a whole; specific in character, but subject to variation analogous to that found in organic structures; similarly performed by all the members of the same more or less restricted group, in adaptation to special circumstances frequently recurring or essential to the continuance of the race; often periodic in development and serial in character.

Imitative movements and activities: due to individual imitation or similar movements or activities performed by others.

Impulse (Trieb): the affective or emotional condition, whether congenital or acquired, under the influence of which a conscious organism is prompted to movement or activity, without reference to a conceived end or ideal.

Instinct: the congenital psychological impulse concerned in instinctive activities.

Control: the conscious inhibition or augmentation of movement or activity. While the power of control is innate, its special mode of application is the result of experience, and therefore acquired.

Intelligent activities: those due to individual control or guidance in the light of experience through association (voluntary).

Motive: the affective or emotional condition under the influence of which a rational being is guided in the performance of deliberate acts.

Deliberate acts: those performed in distinct reference to a conceived end or ideal (volitional).

Habits: organised groups of activities, stereotyped by repetition, and characteristic of a conscious organism at any particular stage of its existence.

Acquired movements, activities, and acts: those the definite performance of which is the result of individual experience. Any modifications of congenital activities which result from experience are, so far, acquired.

Acquired automatism: the individually modified physiological basis of those the performance of those acquired movements or activities which have been stereotyped by repetition.

C. LLOYD MORGAN.