

British Earthworms.

I ENTIRELY concur with Dr. Hurst's view that the supposed new species, described by the Rev. Hilderic Friend as *L. rubescens* is in reality Savigny's *L. festinus*. I may add a further reason for discarding the term *L. terrestris*, Lin., and substituting *L. herculeus*, Sav., for our common large worm. Savigny himself used "Enterion terrestre" to indicate a worm differing considerably from *L. terrestris*, Lin., in the position and extent of the clitellum; moreover it belongs to the genus *Allolobophora* and not to *Lumbricus* at all.

With regard to the second "new" species, *A. cambrica*, recently described by Mr. Friend, I believe that it is merely a variety of *A. chlorotica*, Sav.

According to the description it appears to differ from the latter species in three points:—(1) colour; (2) extent of clitellum; (3) number of spermathecae.

(1) Now, amongst my collection of British worms I find one, of which a water colour sketch taken from the living specimen closely resembles Mr. Friend's description of the colour of *A. cambrica*. My notes as to size, habits, &c., agree with his description. I have carefully re-examined my specimen, and find that it agrees perfectly with *A. chlorotica*; or, in other words, I find that *A. chlorotica* may vary—as Hoffmeister knew that it did vary—so much as to resemble *A. mucosa*, and I may suggest that it is a mimetic resemblance.

(2) Further, with regard to the clitellum of *A. chlorotica*; in the table given by the Rev. Hilderic Friend, it is stated to cover somites 29–36. As a matter of fact the next somite, 37, is nearly always included. This brings *A. cambrica*, Friend, into harmony with *A. chlorotica*, Sav.

(3) Thus the only differential character left is the number of spermathecae; and I cannot agree to the validity of a new species on this single character; several specimens should be examined to settle the point, as variation in this feature is known to occur.

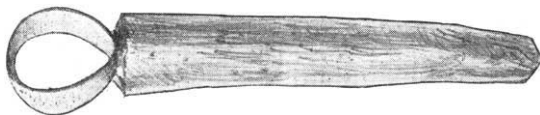
I take a certain amount of credit to myself for the useful faunistic studies on the earthworms of Great Britain, now being pursued by the Rev. Hilderic Friend, for, if I mistake not, I put him in the way of recognizing their specific characters, when, some years ago, I named for him, with remarks thereon, sundry consignments of some scores of worms which he sent to me for that purpose.

WM. BLAXLAND BENHAM.

The Dept. of Comparative Anatomy, Oxford,
November 21.

Egyptian Figs.

THE accompanying sketch represents an instrument used in Egypt for removing the "eye" or top of the sycamore fig. It is a piece of hoop iron, blunt on one edge and tolerably sharp on the other, and fixed into the end of a stick. The fruit of *Ficus sycomorus*, or "Egyptian fig," seems to be invariably infested with the insect *Sycophaga crassipes*, Westw.; which I am informed by Rev. T. F. Marshall, who has kindly given me the name, is the same insect supposed to effect caprifigation in Malta, judging from specimens which I sent him. This fig never produces ripe seed in Egypt, though it has been introduced from the earl est times. Not only are the ancient coffins made of the wood, but it was adopted as the sacred "Tree of Life."



It probably came from Yemen, where Dr. Schweinfurth saw many seedling trees growing spontaneously. The tree bears three crops per annum, in May, June, and August—September. Boys cut off the top of the figs of the first two crops only. Dr. E. Sickenberger, one of the professors in the School of Medicine, Cairo, informs me that the figs have no pleasant flavour until the operation has been performed:—"They then become very sweet, but remain smaller than when not cut open. The object is to let the insects escape. Those that are left become watery and tasteless, and are full of *namoos* or *sycophaga*." In his first description Dr. Sickenberger described the instrument as "a kind of thimble made of iron plate

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ending in a spatula like a finger-nail. It is fixed on the thumb of the right hand. The operation is only made on fruits which shall be picked up the following day. The day after the operation the fig is quite ripe. The male flowers in those figs are all aborted, and the females have never perfect seeds. The figs of the third generation are larger, of an agreeable taste, and sweet-cented; but they are not operated upon, only because in August and September, though the trees are much fuller of fruit than in May and June, the people have so much to do at that time. They are seldom sold, and only eaten by the owners of the trees, or else they are abandoned to the field-mice, birds, and dogs, which latter are very fond of them. These *nilg* fruits are full of *sycophaga*."

It will be seen that the instrument he has sent me is of a different shape to the one he describes; and the chief interest lies in the fact that Pliny also describes the process as closely corresponding with this modern method. He even uses a similar term "nail" (*ὄνυχας*): *πέπτειν οὐ δύναται ἂν μὴ ἐπικινσθῇ· ἀλλ' ἐχόντες ὄνυχας σιδηροῦς ἐπικινύουσιν· ἃ δ' ἂν ἐπικινσθῇ, τέταρταια πέπτειται* (*Nat. Hist.* xiii. 14). Further, the Prophet Amos describes himself as *bōlās sigmīm*; and the authors of the LXX, writing in Alexandria, appear to have understood the expression and translated these words by *κνίσων σιγάμινα*. This is the same verb as that which Pliny uses; so that it would seem to be pretty certain that Amos performed identically the same operation on the figs as is still done in Egypt at this day. It will be noticed that the idea was to ripen the figs. It does not really do this, because there are no seeds; but it does make the fig sweeter. It also liberates the insects, and without doing this the figs would be uneatable. Jerome is the only author, as far as I know, who alludes to "grubs" being inside the fig.

GEORGE HENSLOW.

Iridescent Colours.

THE article "Iridescent Colours" on p. 92 puts me in mind of a notice which I published thirty years ago, while I lived in the United States. It was entitled "Harmonies of Form and Colour" (*Stettiner Entom. Zeitung*, 1862, pp. 412–414), and a portion of it refers to the subject of the above-mentioned article in NATURE, and may be of interest to its readers:—

"A fundamental observation, which proves the influence of the intensity of light upon colour, may be made on some insects of metallic coloration, inhabiting a large area from north to south. About six years ago, while in Southern Russia, I took a walk during sunset, and was struck by the brilliancy of some metallic red *Chrysomela*, abundant in that locality. I found that it was the common *C. fastuosa*, which I did not recognize at once, because in the environs of St. Petersburg, where I lived at that time, it occurs in its metallic-green variety, with an iridescent blue stripe on each of the elytra. Still farther north it assumes a more violet metallic colour. The same is the case with *Chrysomela cerealis* and *C. graminis*. The first of these species is represented in St. Petersburg in the blue variety (*C. ornata*, Ahrens), while the typical variety, occurring farther south, has purplish-red metallic stripes. It is evident therefore that the metallic colouring of these wide-spread species is gradually intensified from north to south, in the order of the colours of the spectrum. We may imagine the area which these beetles occupy, like an immense rainbow, reflected from their backs, violet in the north, red in the south; the violet perhaps connected in some way with the magnetic phenomena prevailing in the polar regions. The longicorn beetle (*Callidium violaceum*) undergoes the same variation: violet in the north, blue in central Europe." C. R. OSTEN SACKEN.

Heidelberg, Germany, November 27.

The Afterglow.

THERE has been for three weeks past a very remarkable renewal of the afterglow. There is a quite deep secondary red glow after the stars are fully out. I should say that no such afterglow has been seen since 1886, or three years after the Krakatō eruption. There is also a great extension of the white hazy atmospheric corona around the sun, very marked also around the moon. I am unable, however, to make out any of the pink colour on the outer edge of the haze, which was so char-

acteristic of "Bishop's Ring," and distinguishable at Honolulu for two years. Apparently there has recently been a great reinforcement added to the material in the upper atmosphere, which produces the afterglows.

Is this owing to the August eruption in Alaska, which is said to have distributed ashes at a distance of 250 miles?

Prof. C. J. Lyons, in charge of tidal observations in Honolulu, reports the period of highest mean tide to have extended itself this year into November, or fourteen months later than the last similar period. The mean sea level is now over ten inches higher than it was last April. It is also somewhat higher than has been shown by any previous tide registers in Honolulu. Mr. Lyons regards this as of special importance, taken in connection with the oscillation of the earth's axis, now established by the combined observations at Berlin and Honolulu.

Honolulu, November 8.

SERENO E. BISHOP.

OSMOTIC PRESSURE.

OF the various properties which have found a common explanation in the new theory of solutions, there are none perhaps to which more interest attaches than to osmotic pressure; and although, on account of the experimental difficulties, the observations as yet accumulated on this subject are but scanty, they have so largely contributed to the novel ideas involved in the new theory, that they merit special attention.

Since accounts of osmotic pressure are finding their way into few English text-books, it may be worth while glancing at the main features which have led up to the present state of the question.

It has long been known that if an aqueous solution—say, of sugar—be separated from pure water by a piece of animal membrane, that movements of the water and of the sugar take place through the membrane. If the solution be contained in an open vessel, the base of which is composed of membrane, on partially immersing the vessel in water it is easy to see that more water enters the vessel than solution leaves it. The level of liquid within rises above that without the vessel, different pressures being thus set up on opposite sides of the membrane.

To this process wherein currents pass through a membranous septum, the terms "osmosis," "osmose," and "diosmose" have been applied. The last of these is perhaps to be preferred, as it serves to indicate that two currents are involved in the phenomena. Investigations carried out as indicated above were concerned with the measurement of what was termed the "endosmotic equivalent." That is the ratio of the amount of water passing *into* the solution to the amount of dissolved substance passing in the opposite direction. Consistent measurements of this quantity could not be obtained, however, for it was found that the nature of the membrane exercised a marked influence upon its magnitude. The kind of membrane employed, or, with the same membrane, its thickness or freshness, or even the direction in which water passed through it, was of importance. Thus in illustration of the last point, water passes more readily outwards through eel's-skin, more readily inwards through frog's-skin.

To obtain quantitative relations in this field it thus became essential to eliminate the influence of the membrane, and more recently this end seems to have been attained by the use of membranes artificially prepared.

These artificial membranes differ from those of animal origin in the remarkable particular that although they allow water to pass through, they present a barrier to the passage of certain dissolved substances. On this account they have been termed semi-permeable membranes, and by their use measurements of osmotic pressure have been made possible.

To carry out such measurements the first point to be solved was to obtain a membrane of sufficient strength.

The substance which has been found to be most satisfactory as a membrane-former is copper ferrocyanide. When aqueous solutions of potassium ferrocyanide and copper sulphate are carefully brought into contact a pellicle of copper ferrocyanide is formed where the two solutions meet. In this condition the pellicle is much too fragile to sustain even slight differences of pressure; but by the following simple device, employed first of all by W. Pfeffer, satisfactory results have been obtained.

If a cell similar to the ordinary porous pot of a voltaic battery be lowered into a solution of copper sulphate while at the same time a solution of potassium ferrocyanide be poured into its interior, the two solutions meet somewhere within the walls of the cell and deposit a film of copper ferrocyanide. Little diaphragms of membrane are thus produced stretching across the pores of the cell-wall, which furnishes the necessary support, and by taking suitable precautions a membrane may thus be obtained capable of withstanding a pressure of several atmospheres.

The behaviour of a solution when separated from pure solvent by such a semi-permeable membrane differs markedly from what takes place when an animal membrane is employed. In the latter case, at the outset water adds itself to the solution; the level of liquid and the pressure on the solution-side of the membrane thus rise until a maximum pressure-head is attained, which, roughly speaking, is greater the stronger the solution used. Seeing, however, that dissolved substance is continually escaping from the solution through the membrane, as soon as the maximum is reached the pressure-head begins to fall until eventually it vanishes, the levels of liquid on either side of the membrane being the same.

If, on the other hand, a semi-permeable membrane be employed, as before, a maximum pressure is attained; but since dissolved substance cannot leave the solution, this maximum pressure as well as the concentration of the solution remain constant.

When this constant state of things is established the excess of pressure on the solution-side of the membrane over that on the solvent-side, whatever it may mean, is termed the "osmotic pressure" of the solution. It is therefore customary to reserve the term *osmose* to phenomena relating to semi-permeable membranes; *diosmose* being used in cases where, as with animal membranes, dissolved substance as well as solvent can traverse the membrane. It is obvious that when the pressure is established as indicated above, the original concentration of the solution has been altered by the entrance of solvent, and the observed osmotic pressure refers of course to the solution having the final concentration. If, however, we imagine the vessel containing the solution to be closed at the top, a quantity of air being imprisoned over the solution, pressure may be set up by compressing this air, only a small quantity of solvent being allowed to enter. If, further, the air enclosure be tapped by a manometer, measurements of the pressure may be taken, and by making the air enclosure and the volume of the manometer small enough the quantity of solvent entering while pressure is being established may be neglected, the original concentration of the solution remaining practically unaltered. This is the principle of the method employed in measuring osmotic pressure in absolute units.

The question now arises, "Are these measurements really independent of the nature of the membrane? Has the difficulty which beset the older experiments been overcome?" To this question an immediate answer is for the coming, for, as pointed out by Prof. Ostwald, it follows from theoretical considerations that if the membrane employed is really semi-permeable, the observed osmotic pressure of a given solution must be the same, no matter of what material the membrane is com-