THE COLOURING MATTER OF THE TESTA OF THE SEED OF RAPE (BRASSICA NAPUS).

THE testa of the seed of this species of *Brassica* is dark brown in colour, so dark often as to appear almost black. Being curious as to the chemical nature of the colour in this outer seed skin, I made several very simple experiments (which, however, have been thoroughly successful) with a view to elucidate the matter. After trying many solvents I was able to dissolve out the greater part of the colouring material by the use of that very common solvent, viz. a 25 per cent. solution of hydrochloric acid.

I put two or three hundreds of rape-seeds into a large test-tube (boiling-tube), covered them over completely with the dilute hydrochloric acid, and let the whole stand for three days.¹

At the end of that time the solvent had acquired a very distinct pale brownish-violet (inclining to magenta) colour.

When a little of this dilute hydrochloric acid extract was mixed with as much *strong pure* hydrochloric acid, and gently heated, an intense yellow colour was developed, pointing to the very probable presence in the solution of iron in the ferric condition.

When potassium ferrocyanide was added to another portion, in a test-tube, of the original dilute HCl solution, a pale greenish-blue colour, which gradually darkened, was produced, and, after standing for about a day, the characteristic Prussian-blue precipitate indicative of ferric iron was observed to have settled to the bottom of the tube.

Potassium sulphocyanide confirmed the results obtained above, by giving, when added to the original solution, a well-marked blood-red coloration, showing the certain presence of a ferric compound in the liquid tested.

By these simple experiments I proved the presence of iron. I now wished to ascertain the nature of the iron compound in the testa which gave it its characteristic colour. I adopted the following simple method of investigation:—

I soaked for about a day a hundred or so of seeds. Then I took off the skins, which the soaking had rendered easily removable, placed them on a clean platinum foil, and heated to and kept at a white heat till all the water and organic matters were driven off, and nothing but ash remained. This ash—which was very small in quantity, of course—was reddish-brown in colour, and so was *undoubtedly*, in large measure at least, ferric oxide. When this red ash was treated with moderately strong hydrochloric acid, the intense yellow colour due to the

Section of testa of rape-seed showing thick corky cell-walls impregnated with hydrated (?) ferric oxide. ($\times 160$).

production of ferric chloride was developed, and the potassium ferrocyanide and the sulphocyanide give the characteristic tests recorded above.

No doubt, then, was left in my mind by these experiments that the iron existed in the state of ferric oxide (most probably hydrated ferric oxide or limonite) in the testa of the rape-seed. I was next anxious to know how the ferric oxide was distributed in the corky tissue of the testa. It soon occurred to me that this was also a very

¹ I know now that it was not necessary to let the seeds remain in the acid so long. By a little gentle and judicious heating for about twenty minutes sufficient of the colouring substance would be extracted to enable one to determine its nature.

simple matter to investigate. I embedded several testas in paraffin, and by means of my microtome cut several thin sections, mounted in water, and examined them with a medium microscopic power. The cell-cavities were entirely empty; the thick corky walls were quite red. There, then, in the walls, plainly enough, the ferric oxide was seen to be distributed.

How did the ferric oxide get into its place in these walls? This, I think, is the explanation. The iron was taken in from the soil, by the root hairs of the plant which produced the seeds, chiefly in the ferrous state, probably as ferrous carbonate or chloride. It was conveyed in the water stream through the parent plant to the seed, and there deposited as an accessory substance in the cell-walls of the testa amongst the corky matter while the process of wall-thickening was going on. It was afterwards, or during the process of deposition, oxidized and hydrated (?), and so the seed of *Brassica Napus* acquired its characteristic tough dark brown testa.

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THE TAIL-BRISTLES OF A WEST INDIAN EARTHWORM.

I HAVE recently received from Mr. Reginald Windle a small collection of earthworms from Bermuda, among which is a new species showing a remarkable peculiarity of structure which I have not observed, or seen recorded, in any other earthworm.

The posterior extremity, for the length of about half an inch (the worm measures about three inches), is furnished with bristles, which, as in *Urochata*, are disposed in an alternate fashion; the eight bristles on each segment do not correspond in position to those of the preceding or succeeding segments, but are placed so as to correspond to the intervals between them.

In my specimen the bristles at the end of the body were extremely conspicuous, and, when examined by a lens, appeared to end in a thickened head; the skin felt sticky when touched by the finger. When a portion of the body-wall was teased up in glycerine, and examined with a microscope, the bristles showed the very remarkable shape indicated in the accompanying woodcut (Fig. 1, *a*). The bristle is very large—compared with those upon the more anterior segments (*b*) and those of other

FIG. 1.—*a*, one of posterior setae; *b*, seta from about middle of body. Both drawn to scale with camera lucida.

earthworms—and the free end is bent into a hook, the point of which lies in a direction nearly parallel to that of the shaft. The whole bristle is enormously thicker than those which are found upon the anterior segments, and of a deep yellow colour. At about the middle of the shaft, where a slight swelling is commonly met with in the bristles of other earthworms, is a thickened rim which suggests the attachment of powerful muscles. The hooked end of the bristles accounts for the “sticky” feeling of

the skin, which I was first inclined to ascribe to a secretion of the cutaneous glands.

This curious modification of the posterior bristles has an evident relation to the habits of these creatures. All observers, from the time of Gilbert White onwards, have noticed that earthworms constantly, at night and in wet weather, lie outside their burrows with only the extreme end of the body fixed in the hole; when alarmed they dart back with great rapidity. Now it is quite clear that this movement depends upon the fact that the bristles at the posterior end hold that part of the body firm while the anterior part is being retracted. Probably the alternate arrangement of the bristles in *Urochæta* and in the Bermuda worm (which is a close ally of *Urochæta*, if not a species of the same genus) are useful to the worm in performing such rapid movements, inasmuch as they permit of a firmer hold of the ground. When these bristles become strong hooks, as in the Bermuda worm, the stability of the hinder end of the body must be enormously increased.

I have, however, no information as to the habits of these worms, so that I can only suggest a possible explanation of the presence of these remarkable hooks.

FRANK E. BEDDARD.

NOTES.

OUR readers will be glad to hear of the safety of Prof. A. C. Haddon, of the Royal College of Science, Dublin, who recently started for Torres Straits. He writes, under date September 9, reporting himself in good health, and well pleased with both the climate and his reception. If he is carrying out his original programme, he should be now busy among the islands in the middle of the Great Barrier Reef to the west side of the straits. His captures already embrace several new Actinæ and some probably new Nudibranchs; and he is also at work upon the habits and placentation of the Dugong. He is much interested in the natives, and struck by the alarming rapidity of their decrease and modification. They are fast dying out, and their customs with them, and the information to be obtained from the younger men concerning the doings of their forefathers is so unsatisfactory that Prof. Haddon is losing no opportunity of studying the anthropology of the islanders and of collecting material in illustration thereof.

It is understood that Prof. Giard is about to be appointed immediately to the new Professorship of Évolution des Êtres Organisés in the Sorbonne. His lectures will begin this month, and the first course will deal with embryological phenomena in relation to the Darwinian theory.

La Nature (October 20) prints an interesting article, by Dr. Camille Viguier, on the Zoological Station at the town of Algiers, the only institution of the kind which has yet been established on the southern coast of the Mediterranean. Eight years ago, when schools of law, science, and literature were formed at Algiers, Dr. Viguier resigned an educational office he held in France, in order to associate himself with the new Algerian schools, in the hope that he might be permitted to create a marine laboratory. This hope has been fulfilled, and, although the site has some disadvantages, he is, upon the whole, satisfied with the opportunities of research which have been provided for him. He calls especial attention to the fact that it is not necessary for naturalists to go to Algiers to profit by the institution. Those who write to him will receive, as soon as circumstances permit, and prepared in accordance with their directions, any animals that can be procured at Algiers.

THE Trustees of the British Museum have appointed Mr. Alfred Barton Rendle, late Assistant Demonstrator of Botany, Cambridge, an assistant in the Department of Botany at the

Natural History Museum, in the vacancy occasioned by Mr. H. N. Ridley's taking the office of Director of the Botanical Gardens at Singapore.

MR. H. BURY, who has recently been elected to a Natural Science Fellowship at Trinity College, Cambridge, began the study of biology at Eton, and obtained a First Class in the Natural Science Tripos of 1885 (Part I.), having previously gained a Foundation Scholarship at Trinity College. He spent the winter of 1886-87 at the Naples Zoological Station, and the results of his work, which has added much to our knowledge of the development of Comatula, have been recently published in the Philosophical Transactions, with five illustrative plates. He returned to Naples at the beginning of the present year to study the larvæ of other Echinoderms, and his observations will be published in an early number of the *Quarterly Journal of Microscopical Science*.

THE Princess Louise will open the Durham College of Science, Newcastle, on Monday next, November 5, at 12 o'clock.

IT is reported from India that Mr. Griesbach, the geologist of the Indian Survey, sent for a time to Afghanistan at the request of the Ameer, has been compelled by the rebellion of Ishak Khan to postpone his geological exploration north of the Hindu Kush, and to remain at Cabul.

ACCORDING to *Allen's Indian Mail*, it is the intention of the Government of India to utilize the services of Mr. J. Duthie. Hitherto that gentleman has confined his botanical researches to Northern India, but it is now proposed that his sphere shall include not only the whole country but also regions beyond the Indian frontier. Accordingly he was sent with the Black Mountain Expedition.

THE British Consul at Costa Rica, in the course of his last annual report, states that a National Museum has been established at San José, and several valuable collections of Indian relics, birds, insects, plants, &c., have been presented or purchased. It is intended that in course of time it shall contain specimens of all the natural products of the country. A national publication and exchange office has also been opened, and all countries are invited to exchange periodicals and publications with Costa Rica.

ACCORDING to a Reuter's telegram from New York, dated October 29, two slight shocks of earthquake had occurred at New Bedford, Massachusetts.

IN the Report of the Committee of Council on Education in Scotland for the past year we find that while 1595 schools taught history and geography only fifty-nine took up elementary science. Strange to say, agriculture is not taught in any of the Scotch training colleges. In the secondary schools, what are called the University subjects—that is to say, Latin, Greek, and mathematics—are very well taught, particularly mathematics. The Technical Schools (Scotland) Act of 1887 has opened, says the Report, to School Boards a new field of operations in regard to a branch of education to which public attention has of late been very closely directed. Only very few schools appear to intend to take action under the Act, chiefly, no doubt, because the Boards are opposed to any increased expenditure. Technical instruction is already given in many of the higher schools. The Report recommends managers of schools in which it is proposed to give technical instruction to secure, if possible, the co-operation of local manufacturers, and to combine with other Boards as pointed out in the Act of 1887.

THE recent meeting of the Congress of American Physicians and Surgeons at Washington seems to have been a great success. It lasted three days, Dr. John Shaw Billings acting as President. *Science* considers that the meeting marked a new departure in national gatherings of American medical men. "It was a con-