Experiments on *Ciona intestinalis*.

IN NATURE of January 19, p. 84, there appears a letter from Mr. Cunningham in reference to the regeneration of the siphons of Ciona, in which he calls in question a statement of mine in a letter in the issue of November 24. In my letter I attributed the failure of Mr. Fox to get lengthened siphons after amputation to the fact that he cut off only the oral siphon.

Mr. Cunningham says that Dr. Kammerer did not confirm my view in his subsequent letter to NATURE (which incidentally I translated for him and sent to NATURE). This is true; but I received afterwards a letter from Dr. Kammerer in which he explicitly agrees with my explanation and says that he had not realised that Mr. Fox had only cut off one siphon.

It appears that Mingazzini—about whose work Mr. Cunningham learnt from the letter which I translated—succeeded even when he cut off only one siphon. It may, therefore, be the case, as Dr. Kammerer suggested, that Mr. Fox failed, not because he cut off only one siphon, but because he was dealing with a northern race of Ciona.

The importance of the reference to Mingazzini's work lies in this, that this work unequivocally supports Dr. Kammerer's statements: many were inclined to doubt their trustworthiness after the publication of Mr. Fox's letter.

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January 22.

The Stoat's Winter Pelage.

ABOUT a year ago there was some correspondence on this subject in NATURE. I mentioned (February 17, 1923, p. 220) that a stoat frequenting our flower garden had assumed white pelage during the winter of 1921–22, which was unusually mild. The present winter has been equally so thus far; we had eight and nine degrees of frost on two successive nights in November, and scarcely any since. A stoat has been hunting mice in the garden again this season; if it is not the same individual as before, it is probably of near kin to the other, but its coat is all brown at this date.

HERBERT MAXWELL.

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January 27.

Photoelectrons and a Corpuscular Quantum Theory of the Scattering of X-rays.

LORENTZ gives the radius of the spherical electron as ke^2/mc^2, where the value of k depends on the assumptions made as to the distribution of the electricity in the sphere and as to the manner in which it is held together. The value of k, however, is of the order unity for the various assumptions. The writer has recently shown, in a paper on a corpuscular theory of the scattering of X-rays (*Phys. Rev.* 22, 233, 1923), that if an X-ray corpuscle be considered tentatively as a mathematical point moving with the speed of light, and if the value of k be taken as $\sqrt{(8/3)}$, then the electron has a radius such that the mass-scattering coefficient for X-rays in matter is that given by Thomson's theory, namely, 0·2 per gram for the light elements.

As the experimental value of the coefficient is 0·2 for light elements, we may consider that when an X-ray corpuscle hits an electron it is scattered and that when it does not hit it is not scattered. Since on the corpuscular theory the X-ray corpuscle can only do one of two things, namely, hit or miss an electron, and since the hits are wholly accounted for by the experimental value of the scattering coefficient, and also since we cannot suppose any action taking place when the corpuscle misses the electron, it seems then that there can be no true absorption of X-rays in matter. As the true absorption is due to the photoelectrons and the characteristic radiations produced by the primary X-rays, it then follows that there can be no photoelectrons produced.

However, a true absorption coefficient is found experimentally, amounting to about a hundred times the scattering coefficient for certain wave-length X-rays in certain materials. This fact would, therefore, seem to be at variance with the corpuscular theory of scattering. The reply to this objection is that both Thomson's and the writer's scattering theories have been worked out only for the case of free electrons. The writer believes that the above deduction of no photoelectric effect from the corpuscular theory is quite true in the case of an electron vapour. Experimentally it is found that the true absorption coefficient becomes very small if not zero for elements such as hydrogen and helium, and the photoelectric effect must be small in these two gases. It is necessary for the electron to be bound to an atom in order for the photoelectric effect to take place. Furthermore, seeing that the photoelectric effect increases with the atomic weight and also with the energy of binding when a K, L, or any other absorption limit is passed, it seems that the chance of an electron being ejected photoelectrically (*i.e.* such that $mv^2/2 = h\nu - W$) increases with the energy of binding.

As there is no energy of binding in a vapour of free electrons there can be no photoelectric effect, and the production of photoelectrons in ordinary matter by X-rays is not inconsistent with the above theory of scattering. Since at least in the light elements all of the X-ray corpuscles which hit electrons are scattered, the photoelectric effect must be produced by some action between the corpuscle, the electron, and the nucleus to which it is bound.

G. E. M. JAUNCEY.

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St. Louis, U.S.A., January 2.

Colour Vision and Colour Vision Theories.

IN reply to Sir Oliver Lodge (NATURE, January 12, p. 50), I have made numerous experiments extending over years on the simple and compound yellow. The results are given in a paper on the simple character of the yellow sensation, *Journal of Physiology*, 1915, page 265. The identity of the compound yellow made with spectral red and green with the simple yellow from a physiological aspect is very remarkable. I have tried without success to distinguish physiologically between the two by means of colour fatigue, colour adaptation or after-images produced by pure spectral colours, but the effect on the compound colour is in every respect the same as that upon the simple colour.

These experiments have to be made with minute accuracy; for example, when on one occasion my assistant left the small aperture for reading the wavelength open and an imperceptible amount of white light was mixed with the compound yellow, the positive after-image at once changed to green. The positive after-image of any yellow object which also reflects white light changes from yellow to green; for example, a yellow card or paper, the lights in the street, the yellow flames of a fire, or a yellow tulip give a yellow after-image which changes to green; the positive after-image of the sun is first yellow, then green, then blue, then violet.

F. W. EDRIDGE-GREEN.

London, January 26.