have been unfortunate in timing it, and have missed the continuous spells of strong sunshine.

We could not hope to attack the problem so successfully here as in India, and it would be interesting to have some Indian work on the subject. The experiments of Mr. and Mrs. Howard in conjunction with Mr. Leake on the "fertilising influence of sunlight" may be expected to throw a great deal of light on a very important problem.

E. J. RUSSELL.

Rothamsted Experiment Station, Harpenden.

The Spectrum of Bacterial Luminosity.

IN the course of some experiments on the phosphorescence of minerals, especially with regard to the emission of ultra-violet radiation, it was suggested to me by Prof. Strutt that it would be of interest to examine the spectrum of the light from luminous bacteria. Through the kindness of Sir James Dewar, Prof. Strutt was enabled to furnish me with a dish containing bacteria produced from fish which, when viewed in a darkened room, were seen to glow with a greenish-blue light bright enough to enable one to read a watch. The dish was placed in front of the slit of a quartz spectrograph of rather crude design, constructed with lenses of short focal length so as to utilise the light available to the fullest extent. A special rapid photographic plate was first exposed to the radiation from the bacteria for forty-six hours, and then to the light from a cadmium spark for one second.

The plate when developed exhibited strong evidence that the spectrum of the light emitted by the bacteria consisted of a continuous spectrum extending from wave-length 5000 (the lower limit of the sensitiveness of the plate) to wave-length 3500 tenth-metres, together with a well-marked bright band of wave-length 4000 approximately. Practically the same result has been obtained from bacteria produced from meat. The greater portion of the radiation is absorbed by a film of nitroso-dimethylaniline.

Mr. J. E. Barnard, in his article on luminous bacteria (*NATURE*, April 10, 1902), states that the light emitted by these organisms is confined to a small portion of the visible spectrum, and never extends into the ultra-violet or infra-red. The photographs I have obtained indicate that in some cases these bacteria emit ultra-violet radiation, and I hope with another spectroscope, now in course of construction, to obtain more definite information.

R. W. FORSYTH.

Royal College of Science, South Kensington, S.W.,
March 1.

Self-fertilisation and Loss of Vigour.

SOME of your readers will remember that in the introduction to "Cross and Self-fertilisation of Plants," Darwin inserts a report by Sir Francis Galton on seven tables of measurements relating to the relative heights of the offspring of cross and self-fertilised plants. "It is a very remarkable coincidence," says Galton, "that in the seven kinds of plants the ratio between the heights of the crossed and the self-fertilised ranges in five cases within very narrow limits. In *lea mays* it is 100 to 84, and in the others it ranges between 100 to 76 and 100 to 86."

If Table A of Darwin's book be referred to, it will be found that these ratios recur in many more than five cases. I write to suggest—with great diffidence, as I am a mere amateur in such matters—that the persistence of these ratios is capable of simple explanation on the basis of the Mendelian theory of heredity.

The distribution or "array" of a Mendelian family, crossed at random, is given by the expansion of $(3D+R)^n$, where n = the number of pairs of characters involved, and the powers of D and R respectively represent the number of dominant and recessive somatic characters of each individual. If, now, each individual be self-fertilised, the array can be shown by simple algebra to become $(5D+3R)^n$. Similarly, in the next self-fertilised generation, the array becomes $(9D+7R)^n$, and so on. The average number of dominant characters in each generation is, consequently, $\frac{3}{5}n$; $\frac{5}{9}n$; $\frac{7}{13}n$, &c., which give the ratios 100 : 83 : 75, &c.

It is surely something more than a "remarkable coincidence" that these ratios agree in so many cases with the ratios observed by Darwin?

A. B. BRUCE.

School of Agriculture, Cambridge, February 19.

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Vision and Colour Vision.

WITH reference to the comment on my lecture at the Royal Society of Arts in *NATURE* of February 17, I did not give the evidence in favour of the visual purple being the visual stimulus transformer on account of the time at my disposal. This evidence is very strong, and the facts are inexplicable on any other hypothesis. Many physiologists have tried to assign different functions to the rods and cones, but these theories have failed because all the functions which were said to be the exclusive property of the rods have been found, only gradually diminished, in the fovea, in which only cones are present. For instance, von Tschermak, Hering, Hess, Garten, and others, have found the Purkinje phenomenon, the variation in optical white equations by a state of light and dark adaptation, the colourless interval for spectral lights of increasing intensity, the varying phases of the after-image, in the fovea, only gradually diminished. The complete absence of any qualitative change between the foveal and extra-foveal regions is a very important fact in support of the hypothesis that the visual purple is the visual substance. There is also the fact, mentioned by Helmholtz, that a perceptible interval elapses before we see with the fovea, after the rest of the retina, when the eye has been previously some time in darkness. Hess has also pointed out that the recurrent image is present, but retarded at the yellow spot. All these observations and many others agree with my statement that the visual purple can be seen between but not in the cones of the fovea.

F. W. EDRIDGE-GREEN.

Hendon, February 19.

The Methods of Bird Fanciers.

MAY I ask for information on the following matter?

Happening to be walking in a poor quarter of Acton (Chiswick) with a friend, we were astonished to see hanging outside a house, on either side of the door, two small bird-cages completely enveloped with dark cloths carefully fastened. The cages evidently contained birds, for from one of them came the song of a chaffinch.

Had the birds suffered the torture of having their eyes put out to make them sing, or is this a method resorted to instead of blinding them?

The caging of wild birds is so very cruel that it should be exposed in all its barbarous ways.

Some of the wild birds are kept in such small cages that there is scarcely room for them to turn round.

E. L.

It is customary for bird fanciers amongst the lower classes to match one chaffinch against another, often in public-houses, the bird which sings the largest number of notes being adjudged the victor. When the cages are carried about they are usually wrapped up in dark cloths, and it is said that one of the objects of keeping the birds in the dark is that they should imagine it is night while they are covered, and that on the cloth being removed, thinking it is day, they burst forth into song. As it is believed by some that birds sing better when they are blinded, it may be, as "E. L." suggests, that the covers were used in the case mentioned either to avoid practising the cruelty of putting out the birds' eyes or so that the fancier might not render himself liable to the punishment for doing so. More likely the birds that were kept covered were newly caught, and the object was to prevent them from dashing themselves against the bars of the cages in their endeavours to escape. As has often been pointed out, one reason for the smallness of the cages used is to lessen the danger of the birds killing themselves, as in a larger space they could begin to fly and would strike with greater force.

WILFRED MARK WEBB.

Title of the Natural History Museum.

IN *NATURE* of February 24 (p. 489) Mr. Hobson suggests as both "suitable and adequate" that it should be called the "British Museum of Natural History."

Why not omit "British" and "of," re-arrange the order of the words, and call it "The Natural History Museum," adding "London" if necessary?

Torquay.

F. HOWARD COLLINS.