The significance of this evidence for more than 50 per cent recombinations may be further tested by calculating χ^2 from the following 2×2 table:

	Recessive in one factor only	Recessive in both or neither	Total
Repulsion	297	363	660
Coupling	191	163	354
Total	488	526	1014

$\chi^2 = 7{\cdot}401$.

The probability of getting so great a disproportion as measured by χ^2, with one degree of freedom, is less than 1 per cent, actually about 1 chance in 150 trials.

This method of testing the significance of the results is particularly valuable, as the resulting χ^2 is independent of any deviations of the single factors from the expected 1 : 1.

The evidence for more than 50 per cent recombinations is strengthened by the uniform behaviour of the 5 different types of buck used. Two of these (α and β) have dilute and wavy in repulsion. The remaining three types were in coupling.

Type of male	No. of males	Total offspring	Recombinations	Recombinations (per cent)
α	8	375	210	56·0
β	7	285	153	53·7
γ	1	133	69	51·9
δ	1	22	14	63·6
ω	8	199	108	54·3
Total	25	1014	554	54·6

All classes of buck agree in showing more than half of their progeny as recombinations.

One inconvenient consequence of recombinations exceeding 50 per cent is that in any chromosome in which they occur there must exist regions with recombinations so close to 50 per cent that no direct test can detect the difference. Tests of linkage with chromosomes having only a single marking factor must sometimes, therefore, fail; this consideration adds greatly to the importance of including as many factors as possible simultaneously in making linkage tests.

R. A. FISHER.
K. MATHER.

Galton Laboratory,
University College,
London, W.C.1.

REFERENCES:

J. Clausen, "Genetical and Cytological Investigations on *Viola tricolor* L. and *V. arvensis* Murr.", *Hereditas*, **8**, 1-156 (1926).

R. A. Emerson and M. M. Rhoades, "Relation of Chromatid crossing over to the upper limit of recombination percentages", *The American Naturalist*, **67**, 374-377 (1933).

S. J. Wellensiek, "The Occurrence of more than 50 Per Cent. Crossing Over in Pisum", *Genetics*, **11**, 509-518 (1929).

An Active Group of Sunspots and Unusual Conditions in the Ionosphere

IN NATURE of February 22, p. 311, a short account was given of an active group of sunspots which had been under observation at the Royal Observatory, Greenwich, with the Hale spectrohelioscope. The date of the central meridian passage of the centre of the group of spots was February 14·0, and some hours later a bright eruption, of major importance, visible in the hydrogen line, $H\alpha$, was observed from its first rapid development at $12^h\ 39^m$ to its termination about $13^h\ 27^m$ U.T.

It is of considerable interest that the Director of the Radio Research Station of the National Physical Laboratory has stated on inquiry from the Royal Observatory that there was a marked diminution of reflection from the ionosphere over a very wide area for a period of twenty minutes centred on $15^h\ 30^m$ on February 14.

At this time the Greenwich (Abinger) magnetic traces show general unsteadiness, but not to an unusual extent. On February $16^d\ 11^h$, however, a disturbance commenced which, although not prolonged or extensive, was characterised by some rapid movements in the horizontal force trace.

The facilities for observing solar eruptions on the disk have been greatly extended by the use of spectrohelioscopes devised by Dr. G. E. Hale, which are now installed at a number of observatories around the world. The effective use of these instruments, with respect to a daily watch kept throughout the twenty-four hours for solar eruptions, has recently been increased by a programme of observation organised by Commission 11 of the International Astronomical Union.

It may be expected that the next few years will yield a number of opportunities for testing any relationship that may exist between bright solar eruptions and distinctive conditions in the ionosphere, of which a hint is possibly given by the recent phenomena of February 14.

H. W. NEWTON.

Royal Observatory,
Greenwich.
Feb. 24.

Manufacture of Humus by the Indore Process

ON page 286 of the issue of NATURE of Feb. 15, in an article under the above title reviewing a recent lecture which was printed in full in the *Journal of the Royal Society of Arts* (Nov. 22, 1935), several sweeping statements relating to quality in plant and animal products and to immunity to disease are attributed to me. I made none of these statements. I never used the word immunity. The last section of my lecture dealt with the urgent need for the study of the factors on which quality and resistance to disease depend. My agricultural experience of nearly forty years in four continents has convinced me that quality in plant and animal products, as well as disease resistance in crops and live stock, are the natural reward of properly nourished protoplasm, and that *one of the factors* on which quality and disease resistance depend is an adequate supply of humus, prepared from vegetable and animal residues, in the soil. There are, of course, many other factors involved, such as the variety or breed, correct cultivation and management, the maintenance of the right condition of the soil, proper feeding, and suitable methods of plant and animal hygiene. This was the view set out in my lecture, and no other.

ALBERT HOWARD.

14 Liskeard Gardens,
Blackheath, S.E.3.

IN the article to which Sir Albert Howard refers I was endeavouring to give an outline of the argument put forward in his lecture; that argument was that more humus in the soil would (in conjunction with other favourable factors) produce a quality in crops which would make animals more resistant to disease.

Thus, on p. 28, we read ". . . we as a nation are spending large sums every year on the study of the