Letters to the Editor.

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Correlation of Upper Air Variables.

I DO not see that Prof. Mahalanobis (NATURE, September 1, p. 323) has given any good reason for the statement that the correlation coefficients that I have obtained from the English balloon ascents are to be taken as the upper limit of what is possible, excepting that Capt. Douglas working on a different system in one specific instance has obtained a lower value. I freely admit they may be wrong; unless one has a very large sample one always has to reckon with the casual error of a correlation coefficient, but there seems no reason why I should not equally well accept Dr. Chapman's conclusion that they are too low.

Taking Prof. Mahalanobis's equation (1) (Memoirs of the Indian Meteorological Department, vol. xxiv., pt. ii., p. 12), transposing it somewhat, and rearranging, we get the following expression for the correction for the observational errors:

$$\frac{s_a}{s_b}\left\{r_{ax}r_{x_1y_1}-r_{ay}\right\}+\frac{s_b}{s_y}\left\{r_{by}r_{x_1y_1}-r_{bx}\right\}$$
$$+\tfrac{1}{2}\left\{\frac{s_a^2}{s_b^2}r_{x_1y_1}+\frac{s_b^2}{s_y^2}r_{x_1y_1}-2r_{ab}\frac{s_a s_b}{s_x s_y}\right\}$$
$$-\tfrac{1}{2}r_{x_1y_1}\left\{r_{ax}\frac{s_a}{s_x}-r_{by}\frac{s_b}{s_y}\right\}^2$$

where x and y denote the true departures from the mean, x_1 and y_1 the observed departures, and a and b the errors.

Let us take the special case of the correlation between pressure and temperature at a fixed height between 4 and 8 kilometres. Here $r_{x_1y_1}$ is equal to 0·85 and the ratios s_a/s_x and s_b/s_y are known to have a value of about 1/5.

Substituting approximate numerical values the correction is

$$0{\cdot}20(0{\cdot}85r_{ax}+0{\cdot}85r_{by}-r_{ay}-r_{bx})+0{\cdot}04(0{\cdot}85-r_{ab})$$
$$-0{\cdot}02(r_{ax}-r_{by})^2.$$

Owing to its comparatively high numerical coefficient the first bracket is the important one, and a negative correction requires that r_{ax} and r_{by} should be negative and r_{ay} and r_{bx} positive. I can see no reason why the correlation values should be anything but casual; they will certainly be small. Moreover, x and y are positively and highly correlated and therefore r_{ax} and r_{ay} are likely to have the same sign; so are r_{bx} and r_{by}, hence it does not seem likely that the term can supply a large correction either positive or negative.

In the second bracket the coefficient r_{ab} is certainly positive for the special case where a and b refer to the errors of temperature and pressure at about 6 kilometres height. This is apparent because y_1 is calculated by Lagrange's formula and a positive value of (a) increases the value of y_1 and therefore increases (b), but the casual error of y_1 due to faulty calibration or incorrect working up will prevent the correlation between a and b being as high as 0·85 and the term will be positive. The third bracket is the square of a small quantity multiplied by 0·02 and is insignificant. Thus it appears probable that on the whole the computed correlation coefficients are somewhat too low.

There can be no reasonable doubt that the correlation between certain variables in the upper air is very high, and any theory of the genesis of cyclones and anticyclones to be satisfactory must account for such correlation.

I should like to add that I have never thought that the seat of atmospheric disturbances was in the stratosphere, but, since upper air observations have been available, have held that the winds of the general circulation in the upper part of the troposphere are responsible for the formation and maintenance of cyclones. This fits in satisfactorily with the known variations of temperature. W. H. DINES.

Benson, Wallingford, Berks.

Greek Orthography in Scientific Names.

IT is difficult, as correspondents in NATURE have noted, to preserve orthography in scientific names derived from the Greek. A good example of the confusion which has been allowed to become inevitable occurs in the similarity of the generic title of two very dissimilar shrubs. *Chionanthus Virginica* has been named from χιών—snow—because of the masses of white blossom it bears at midsummer; while *Chimonanthus fragrans*, flowering in midwinter, ought to be written *Cheimonanthus*, from χειμών, winter. To each of these Greek generic names a Latin adjective has been tacked, which serves to distinguish the species, but may offend the scholar.

HERBERT MAXWELL.

Monreith, Whauphill,
Wigtownshire, N.B.

X-Rays and Crystal Symmetry.

IT has long been recognised that angular measurements do not always carry one beyond a determination of the system, and that other methods of investigation are needed if the crystal is to be assigned to its class of symmetry. But different methods do not always give the same result, so that some principle of discrimination has to be adopted. In the past the principle universally applied has been that of greatest common measure, the crystal being correspondingly relegated to the highest class, the symmetry of which is common to the various symmetries observed (in most cases this leads to the lower of two observed symmetries, since the symmetry of one is generally wholly contained in that of the other). It must be noted that all class assignments are provisional and liable to modification (necessarily in the direction of lower symmetry) as new evidence is forthcoming.

The above symmetry has hitherto always been regarded as the true symmetry of the internal structure. This view has been somewhat questioned by E. T. Wherry (*Amer. J. Sci.*, 1922, vol. 4, p. 237) and repudiated by R. W. G. Wyckoff (*ibid.* vol. 3, p. 177; vol. 4, p. 469). It is much to be regretted that considerations of space prevent any discussion of Wherry's paper, for it is in many ways suggestive. The issue raised by Wyckoff is, however, more clearly defined. As a result of a renewed X-ray examination of sal-ammoniac he finds that there is no possible model which will simultaneously satisfy Tschermak's symmetry, deduced from surface studies, and the X-ray data (a model can be found to agree with either of two higher symmetries, the ambiguity arising from an impossibility of placing the hydrogen atoms on account of their small scattering power). This leads to an entirely new definition of symmetry, as being that of the constituent parts (the atoms) as revealed by X-rays. The evidence of such surface phenomena