There is a possibility of geographical differentiation in such a colony, especially if it be a very isolated outpost. I add, therefore, the chief dimensions of the skulls, in mm. :

Length along face, premaxilla to occiput, 310, 311 ; condylobasal length, 297, 299 ; zygomatic breadth, 185, 196·5 ; least inter-orbital breadth, 93·5, 96 ; nasal, 152·5, 147·5 ; greatest combined breadth of nasals, 38·5, 40 ; occipital depth (median), 89, 86 ; mandible, 242 ; mandibular tooth row, including canine, 180·5 ; ditto excluding canine 144 ; maxillary tooth row, including canine, 164, 166·5 ; ditto excluding canine 136·5, 142 ; 3rd upper molar, 21, 22 ; 3rd lower molar, 27.

In the above list the first number refers to skull 1929.176.1, the second to skull 1929.176.2, of which the lower jaw is missing. JAMES RITCHIE.

Royal Scottish Museum,
Edinburgh, July 7.

X-Ray Spectra and Chemical Combination.

THE element sulphur offers a very interesting case for the effect of chemical combination on X-ray spectra. Lindh has already established remarkable changes in the K-absorption edges of this element with varying valency (see Siegbahn : " Spectroscopy of X-rays ", pp. 146-147). The $K\beta$ lines of this element also show peculiar changes, especially regarding relative intensity and structure of β_1 and β_χ lines in various chemical compounds of sulphur. In the course of a study of the X-ray spectrum of sulphur and its compounds, I have made the surprising observation that one line, with the wave-length 5043 X.U. (apparently identical with the $K\beta_3$ line listed by Hjalmar), is emitted by certain sulphur compounds, but not by pure sulphur or by certain other chemical compounds of this element.

It has been found that sulphates of lithium, sodium, potassium, rubidium, cæsium, silver, and mercury, as well as the sulphides of sodium, potassium, strontium, barium, and cadmium, give quite an intense $K\beta_3$ line, whereas in the sulphides of copper, silver, magnesium, zinc, mercury, lead, and molybdenum this line is entirely suppressed. For sulphates of copper and magnesium and the sulphide of calcium a faint indication of this line is obtained. In all cases a copper anticathode was used.

The ordinary spectral lines so far known are all of atomic character, that is, they are emitted on transitions between levels belonging to the atom of the free element. In some cases, especially with light elements, an influence on the wave-length and the structure of the lines by adjacent atoms has been found. The observations here reported seem to indicate the existence of a new type of X-ray lines arising from transitions within a *molecule*.

Details of this communication will be published elsewhere. G. B. DEODHAR.

Physical Laboratory,
University of Uppsala, July 11.

Mortality amongst Plants and its Bearing on Natural Selection.

IN a communication in NATURE of May 31, p. 817, Prof. E. J. Salisbury describes some exact quantitative observations on the mortality which takes place in the seedling condition of flowering plants, and he points out the bearing of these facts upon natural selection. The sycamore furnishes another good instance of this high infant mortality, since almost every year the tree produces an abundance of viable seeds. The winged indehiscent fruits provide a very efficient means for seed-dispersal, and seedlings bearing the first pair or two of young foliage leaves are plentiful in almost every situation throughout the summer. It is well known from experience that only a very small fraction of these seedlings will ultimately survive, or even pass beyond the two-leaved stage, and grow into trees.

Some light might be thrown upon the problem as to which, if any, characters possessed by the seedlings are of help in bringing about this apparent survival of the fittest, if observations were made upon the *causes* of this excessive mortality. Is it due, for example, to unfavourable climatic conditions, too much or insufficient light, overcrowding, insect or other animal enemies, fungus pests, etc. ? Information upon this point, which so far as I am aware has not previously received attention, cannot fail to be of interest. A. W. BARTLETT.

Armstrong College,
Newcastle-upon-Tyne,
July 14.

Simultaneous Electronic Transitions in X-Ray Spectra.

IN a letter to NATURE of Oct. 26, 1929, by D. Coster and M. Wolf, the results were published of some investigations on the fine structure of X-ray absorption edges of copper and zinc.

Whereas with copper a very complicated fine structure was easily obtained, in the case of zinc, in the beginning, no fine structure at all could be observed. Mr. Suekichi, however, recorded a fine structure of the zinc-K-edge of zincblende when this crystal was used as analysing crystal (NATURE, Mar. 29, 1930, p. 509). In the meantime, in continued experiments, I have succeeded at last in observing also a fine structure in the case of zinc, when metallic zinc foil was used as absorbing screen. This fine structure of zinc, however, seemed to be less pronounced than that of copper.

Experiments are in progress to measure the variations in the absorption coefficients in the fine structure range of the K-edges of copper and zinc in order to draw more definite conclusions about the probability of simultaneous electronic transitions in both elements.

M. WOLF.

Natuurkundig Laboratorium der
Rijksuniversiteit,
Groningen.

The Quantum Theory of Chemical Valence.

DR. J. C. SLATER has shown in a most valuable paper (*Phys. Rev.*, Vol. 34, p. 1293 ; 1929) that one can develop the complete theory of atomic states (multiplets) in a simple way without the application of the methods of the group theory. This is of considerable importance ; for the difficulties of these methods interfere greatly with the understanding of the simple relationships which are derived. I should like to point out (no doubt Slater has already done so himself) that one can treat the theory of the interaction of several atoms in the same simple way and indeed more exactly than merely to the first approximation. One obtains the results first obtained by Heitler and London with help of the methods of the group theory and, furthermore, the valence forces between atoms in all various excited states. In the interest of the further propagation of Slater's ideas, I shall in the near future publish these considerations in greater detail in the *Zeitschrift für Physik*.

M. BORN.

Institut für theoretische Physik,
Göttingen, July 11.