

and for the geologist the two types of movement—vertical uplift and lateral thrusting—are by no means rivals. Both are required to explain the facts, and both are probably due to temperature changes in the depths, expansion providing the local uplift, and the concomitant weakening and fusion of the crust localising the forces of lateral compression set up by the general contraction of the earth.

CLIMATOLOGY OF THE INDIAN OCEAN.—An interesting series of charts of the Indian Ocean showing atmospheric pressure, winds, and currents has been compiled by Dr. P. H. Gallé and published by the Royal Dutch Meteorological Institute (*Mededeelingen Ven erhandelungen*, 29 a). The data have been obtained from the log-books and meteorological registers of the Dutch Navy and Dutch merchant vessels. The author has entered the mean values for January and July in one degree squares. In view of the number of observations, the results in most cases are fairly satisfactory, but Dr. Gallé admits that more accurate mean values could be obtained by further data, and one of his objects in publishing the charts is to invite wider co-operation. Observations are very scanty in some areas, particularly about lat. 30° S., between long. 60° and 90° E., and in winter about lat. 50° S. A comparison of mean values for pressure at land stations around the Indian Ocean, as given by Hann, Lockyer, Braak, and others, with the oceanic pressures, shows a fair agreement, but in places there are striking differences. These the author thinks are due in cases to prevailing local onshore winds and in other cases to a failure to apply accurate corrections for altitude on shore stations. In some of the coast regions two values are given where the divergence was found to be considerable. In regard to winds, these observations show that in the west wind belt of the "forties," the strength and stability of the air currents is not so marked as generally supposed. Further papers in this series are promised.

THE INVERSE STARK EFFECT.—Dr. R. Ladenburg, in the *Zeitschrift für Physik* of September 20, describes the behaviour of the D absorption lines in a strong electrical field. A new form of quartz sodium lamp enables the D lines to be produced with great intensity, and with a breadth of only 0.1 Å, without reversal, so that, using a large Lummer Gehrcke plate, broad interference maxima are obtained. The light from the lamp is passed through an absorption bulb, between two parallel metal surfaces a short distance apart, across which an electric field so high as 160,000 volts per cm. can be produced. The bulb is evacuated in an electric furnace, and pure sodium vapour is introduced. The D<sub>1</sub> and D<sub>2</sub> absorption lines then appear on the continuous background of the interference maxima, and when the light passes perpendicular to the lines of force, the absorption lines are shifted by the field towards the red. The shift amounts to 0.025 Å at 160,000 volts per cm., and is proportional to the square of the field intensity. The phenomena form a typical example of the purely unsymmetrical quadratic effect, which is to be expected according to Bohr's theory with lines unlike those of hydrogen, when the external electric field is small compared with that due to the electrons of the atomic kernel.

SPECTROSCOPY AND ATOMIC STRUCTURE.—The progress made during the past three or four years in the endeavour to discover a structure for the atom of each element which would, on the quantum theory, give a spectrum identical with that found experimentally, has been so rapid that none but specialists have been able to follow it in detail. An article of forty pages in the September and October issues of

the Journal of the Franklin Institute by Dr. Paul D. Foote, of the Bureau of Standards, giving an account of the atomic models which have been suggested, will be welcomed by many who have not the opportunity to consult the original memoirs. He deals in turn with the "hydrogenic" atoms, the atoms with several electrons, the assignment of quantum numbers, *i.e.* integers, the necessity for the introduction of "effective" quantum numbers not integral, the orbital and precessional frequencies, and the representation of the orbits of luminous and X-ray frequencies. Figures of the orbits conceived by Bohr for helium, lithium, neon, sodium, argon, copper, krypton, xenon, and radium are reproduced with the warning that they are based on questionable assumptions.

VISCOSITY OF GLASS.—In a recent note on the viscosity of glass (*Comptes rendus*, Paris Academy of Sciences, 1924, p. 517) M. Henry Le Chatelier has shown that the law of the phenomenon can be represented as a function of the temperature by the very simple formula  $\log(\log \eta) = -Mt + P$ , where  $\eta$  is the viscosity,  $t$  the temperature, and M and P constants for a particular glass. Fifteen days later, S. English published in the Journal of the Society of Glass Technology (1924, p. 205) an extensive paper giving numerous viscosity data for different kinds of glass for temperatures ranging from 500° to 1500° C. Applying the formula given above to these data, M. Le Chatelier (*Comptes rendus*, 1924, p. 718) shows that for each glass the results can be expressed by two straight lines meeting at an obtuse angle, the temperature of inflexion varying from 750° C. to 950° C. according to the nature of the glass. To explain these facts, it is assumed that there are two allotropic varieties of each glass possessing different laws for the viscosity variation. This hypothesis was put forward by M. Le Chatelier in his first paper as affording the best explanation of his experiments: it explains equally well the results given by English, which are more numerous and cover a wider range of temperatures.

THALLOUS THALLIC HALIDES.—In the Proceedings of the Cambridge Philosophical Society, vol. xxii, part 3, Mr. A. J. Berry describes some experiments on the sesqui-halides of thallium, TlX<sub>3</sub>.3TlX, no definite proof of the individuality of which had formerly been given. Solutions of thallos and thallic chlorides containing the two halides in varying proportions were prepared and the composition of the crystals deposited from such solutions determined. It was found that while the composition of the liquid phase could be varied over a wide range, the composition of the solid phase deposited was practically constant. The solution of thallic chloride was prepared by dissolving thallic oxide, obtained from the recrystallised sulphate by oxidation with alkaline potassium ferricyanide, in normal hydrochloric acid. After prolonged heating, the excess of thallic oxide was removed by filtration, and the ratio of thallium to chlorine found to be 1:3.1. The compound TlBr<sub>3</sub>.3TlBr was easily obtained, but TlBr<sub>3</sub>.3TlBr was difficult to prepare in a state of purity. TlBr<sub>3</sub>.3TlCl was prepared. No evidence of the existence of complex ions was found. The substances, mostly red, become very much lighter in colour on cooling in liquid air, and the phenomenon is very strongly marked.

ERRATUM.—In the paragraph referring to "A Biochemical Basis to Disease Resistance" in NATURE of November 1, p. 657, line 11, the sentence "immune forms are comparatively high in total nitrogen and total ash" should read "susceptible forms are comparatively high in total nitrogen and total ash."