Line.	$\nu_{calc.}$	$\nu_{obs.}$	Line.	$\nu_{calc.}$	$\nu_{obs.}$
$\left(\frac{9\cdot24}{6\cdot7}\right)$	14968	14970	$\left(\frac{22\cdot24}{5\cdot7}\right)$	24843·9	24843·96
$\left(\frac{9\cdot15}{6\cdot6}\right)$	17014·0	17014·3	$\left(\frac{7\cdot19}{5\cdot5}\right)$	24939	24935
$\left(\frac{6\cdot10}{4\cdot7}\right)$	19807	19805	$\left(\frac{7\cdot21}{5\cdot5}\right)$	25159	25157
$\left(\frac{14\cdot14}{5\cdot8}\right)$	19935	19932	$\left(\frac{11\cdot22}{5\cdot6}\right)$	25213	25215
$\left(\frac{7\cdot11}{5\cdot5}\right)$	22527	22529	$\left(\frac{9\cdot18}{4\cdot8}\right)$	25822	25820
$\left(\frac{7\cdot18}{4\cdot8}\right)$	23977	23980	$\left(\frac{15\cdot15}{5\cdot6}\right)$	25846	25849
$\left(\frac{10\cdot20}{5\cdot6}\right)$	24261	24260	$\left(\frac{13\cdot20}{5\cdot6}\right)$	26053	26047

The ν-region beyond 26047 has thus far not been swept systematically. When this is done, I have but little doubt that ninety or more of the one hundred and five lines of helium will be accounted for. In these circumstances one would feel justified in asserting that the absence of mutual repulsion between the electrons is not (as I first thought) an exception but rather the rule. A simple estimate will show that if the usual Coulomb repulsion law were valid in any of the considered stationary states, the mutual energy of the electrons would contribute several thousand units to ν. Since it is hard to explain away so many coincidences as due to chance, we are driven to the belief that the electrons within the atom do not repel each other even with a small fraction of the force usually attributed to them. In other words, the field of force of a bound electron seems to be entirely engaged by the nucleus, at least in the case of helium and probably of lithium, but possibly also in that of the higher atoms.

LUDWIK SILBERSTEIN.
129 Seneca Parkway, Rochester, New York,
July 26.

The Primitive Crust of the Earth.

IN reference to the letter of Dr. Harold Jeffreys (NATURE, July 29, 1922), I wish at once to say that nothing in my letter published on July 8 was intended to express my adhesion or non-adhesion to those who support the planetesimal hypothesis. Even if we think that the earth originated in a rain and concentration of solid planetesimals, we may, with Prof. R. A. Daly, regard its complete fusion at a later stage as a very probable event. At some time or other, the earth may well have possessed a crust consolidated from "igneous" fusion. Prof. J. Joly now suggests to us, with his unfailing brilliance of outlook, the recurrence of such a crust after successive meltings of the globe. What I have urged, however, is that the oldest rocks traceable by geologists must not be regarded as a record of a primitive crust. They are sediments, invaded again and again by igneous matter from below. We cannot conclude from our Archæan schists, which are so often converted into composite gneiss, that there was ever a crust formed of crystalline rocks about the globe. The "extent of the crust accessible to geologists" is, of course, much more than the film 2·5 km. thick stated by Dr. Harold Jeffreys. Owing to the great movements that bring up antique masses from the depths, rocks that consolidated finally under several miles of sediments now form a large part of the surface. But so far no planetesimal sediment has come to light, although matter of the mineral composition demanded by the hypothesis is associated with many igneous upwellings.

In support of the concluding remarks of Dr. Harold Jeffreys, attention may be directed to "A Critical Review of Chambertin's Groundwork for the Study of Megadiastrophism," by W. F. Jones, published in the *American Journal of Science* for June of the present year.

GRENVILLE A. J. COLE.
Carrickmines, Co. Dublin, July 29, 1922.

Peculiarities of the Electric Discharge in Oxygen.

SEVERAL years ago I described (*Phil. Mag.*, April 1908) a discontinuity in the electric discharge in oxygen at pressures near to 0·8 mm. Namely, when a current (0·0025 amp.) was passed in a discharge tube (diam. 2·4 cm.), the electric force in the positive column suddenly changed on slightly lowering the pressure from about 11 volts per cm. to about 20, an effect which could be reversed by raising the pressure.

Some experiments which I have made recently, with the assistance of Mr. E. P. Cardew, have shown that at pressures in the same neighbourhood, with a fixed circuit (battery and resistance), the discharge is not uniquely determined, but can be one or the other of two distinct types, distinguished by a remarkable difference in the values of the electric force within the positive column, one of these values being about twice the other. The magnitude of the current with the higher electric force in its positive column is less than the other, since the potential difference of the electrodes is greater in its case; but the currents tend to equality when the electrodes are so near that the positive column tends to disappear. The two discharges differ only slightly in appearance: the positive column of the smaller one with the higher electric force being somewhat shorter and a trifle paler than the other—both being without striæ in general.

To give an example. With a battery of 990 volts and external resistance 363,000 ohms, electrodes 21·8 cm. apart in a tube of 27 mm. diameter, and pressure 0·75 mm., the currents observed were 1·19 and 0·883 milliamperes; their positive columns were nearly 15 and 14 cm. long, and the electric force within them about 9 and 18·5 volts per cm. respectively. In this and in many other cases, by means of a certain arrangement, the discharge could be made to change from one form to the other without stopping the current or altering the circuit.

The region of pressures within which alternative currents have been so far observed are from 0·64 to 0·91 mm. The two types of discharge differ in stability according to the pressure and the magnitude of the currents, so that the discharge tends to assume one type rather than the other. But the one having the high electric force in the positive column is much more definite and invariable than the other for a given pressure, being in this respect similar to discharges in other gases, so that that electric force can be determined with much more precision, and is in fact nearly the same as in hydrogen.

Since these effects hold good for a large range of current, it is obviously possible, by adjusting the external circuit, to make two discharges of the same arbitrary magnitude (of the necessary order) pass through oxygen, between electrodes at a given distance apart, at any given pressure within the range in question, one of which will have the high electric force in its positive column and the other the low.

P. J. KIRKBY.
Saham Toney Rectory, Watton, Norfolk,
July 26.

© 1922 Nature Publishing Group