as in the two former cases. Thus measurement of capacity at a given frequency may contain all the above components. In any case, by drying or purification, it is necessary to get rid of, or reduce to a small percentage, the third form of capacity before the other two can be confidently isolated.

For technical purposes it is often immaterial to distinguish between the first two forms of capacity, provided the third form can be reduced sufficiently far. But measurement and separation of the first two forms is opening up a new chapter in the study of the attributes of non-metallic matter itself.

The connexion between the properties of matter in an outside field and its other physical properties, however, is not directly through the specific capacity or permittivity, but through the attraction set up between the field and the dielectric, as the result of which the energy is stored, the relative value of which was shown by Boltzmann to be equal to $\frac{\epsilon - 1}{\epsilon + 2}$.

This value must again be corrected for the molecular attraction, which should then be a fairly direct measure of the interatomic attraction after allowance is made for polarity.

At present there is no suitable name for this important quantity, which is closely connected with cohesion and other physical properties of matter (see the above *Phil. Mag.* communication, etc.), nor for the other forms of capacity mentioned above. The time is arriving when it is very desirable that the whole subject of dielectric nomenclature should receive consideration.

This letter is rather belated; but I have been unwell and unable to take up the correspondence sooner.

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The Electrical Layers of the Atmosphere.

PROF. MILLIKAN has recently directed attention to a remarkable property of cosmic rays, in his presidential address to the American Association for the Advancement of Science, at Cleveland.[1] He observed that "somewhere in the atmosphere below a height of 15·5 km. the intensity of the ionisation within a closed vessel exposed to the rays goes through a maximum, and then decreases".

Unfortunately, Prof. Millikan did not connect this behaviour with other data which appear to be closely associated with it. In 1925 I directed attention to the fact that three different phenomena pointed to the conclusion that the atmosphere consists of two layers.[2] These zones can be distinguished

(1) *Electrostatically*—the negative zone lying above the positive one.

(2) *Optically*—at sunrise and sunset when the air is very clear and the observer is situated at least 2½ kilometres above sea-level.

(3) *Thermally*—the stratosphere or zone of uniform vertical temperature lying above the troposphere or zone in which the temperature falls with increasing height.

It appears from Prof. Millikan's data that there is still another phenomenon, (4) *the absorption of cosmic rays*, that points to the same conclusion.

It is surely time that geophysicists and meteorologists seriously considered these phenomena. In central Europe the dividing layer is situated at from 7 km. to 12 km. above sea-level, judging from thermal measurements in winter and summer respectively. The most probable explanation appears to me to be that:

(1) Cosmic rays cause ionisation of the air most readily where it has attained a certain pressure.

(2) The movements of the gaseous ions result in gaseous diffusion potential layers, analogous to the liquid potential layers in electrolytes studied by Nernst, the light negative ions rising above the slower and heavier positive ions.

(3) A state of electrostatic strain is set up between the layers, and where sufficiently violent local vertical movements lead to engulfment of portions of the upper zone by the lower, negative thunder clouds surrounded by a concentrated positive sheath may be observed.[3]

The ozone in the air may very possibly be formed in the region of maximum absorption of cosmic rays, since its concentration in the neighbourhood of mountain peaks exceeds that at sea-level.[4] The Heaviside layer of the wireless expert has been placed so much higher than the junction of the two zones (85-95 km.) that it seems possible that it corresponds to the position of maximum conductivity in the negative zone.

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[1] NATURE, Jan. 31, 1931, p. 167.
[2] NATURE, Sept. 12, p. 394, and Sept. 26, p. 480.
[3] Reynolds, NATURE, May 30, 1925, p. 836.
[4] Reynolds, *Jour. Soc. Chem. Ind.*, Mar. 28, 1930, p. 168.

Disease in Nature.

IN the discussion in NATURE of April 25 between Mr. Ramsbottom and a reviewer, on the occurrence of disease among animals and plants in Nature, one factor appears to have been ignored, and that is the drastic operation of natural selection in weeding out not merely diseased individuals but also any that carry a weakness reducing their fitness to their environment. When the reviewer argues that parasitism may not be a disease but only an "innocuous *modus vivendi*", is he not begging the question? Relatively innocuous parasitisms persist just in the proportion that the parasite does not enfeeble the host, but no distinction of kind can be made between them and definitely lethal diseases. Animals or plants carrying a 'disease', that is, some lowering of the normal vitality, whether genetic, parasitic, or environmentally caused, are so promptly and thoroughly eliminated that examples will be observed very rarely, because such a very small proportion of individuals of any species are closely examined. We hear, for example, of grouse disease because so many thousands of grouse are shot each year. What about rinderpest and East Coast fever? They have taken heavy toll of African game without any intervention of man.

Man interferes with Nature by taking off the pressure of selection. Our civilisation prides itself on rearing as many as possible of the children born, and from this alone follows the prominence of disease and the relative low ratio of human beings possessed of "exuberant positive health". A native tribe in Central Africa would strike the ordinary observer as exuberantly healthy; the medical officer in close touch with them would tell a different story.

So far as my own observation goes, of plants perhaps more than animals, disease certainly exists in Nature if you look closely for it, but the individuals affected are so immediately suppressed that cases rarely fall under observation. Let me give a parallel which avoids the question-begging term 'disease'. A given species of plant in a certain district may seem to be true to type and free from variation; but bring it into cultivation and grow on all the individuals, then variations immediately disclose themselves. Baur has shown