A Possible Connexion between the Troposphere and the Kennelly-Heaviside Layer

SEVERAL experimenters have noticed the existence of a correlation between alterations in the propagation of radio waves and the establishment of certain meteorological situations : but, until now, no definite result could be obtained. I have therefore investigated directly the relation of the Heaviside layer, on which the propagation of radio waves depends, to meteorological conditions.

From May 1931 until June 1932, I made, at short intervals, daily observations on the reflection height of waves of 100 metres in wave-length by means of a device invented by me some time ago.[1] The waves of 100 metres wave-length, as is well known, are generally reflected in the E region during daylight, and generally from some time just before or after sunset until sunrise their reflection takes place in the F region.

The time near sunset when the reflection is passing from the E region into the F region often presents remarkable variations from one day to another : the reflection from the E layer sometimes continues for a long time after sunset, until midnight even, for waves of 70-50 metres wave-length ; at other times, after disappearing by sunset, reflection appears again a few hours after sunset itself. This is evidence of the existence of remarkable increases of ionic density in the E region, even after the action of ionising solar radiations has ceased. The examination of the data which were obtained from about 330 days' observations has led to the following conclusions :

The abnormal increases of ionic density in the E region are accompanied by particular isobaric situations, characterised by the presence of barometrical depressions at the place of observation or in the north of it. In anticyclonic conditions, or conditions with depressions in the south, the reflection of 100 m. waves from the E region ceases in the shortest time ; from noon onwards ionic density gets rapidly smaller. In 330 days' observations I found only some ten exceptions to the above general rules.

The existence of a connexion between the troposphere and the first ionised layer (E) is therefore clearly suggested ; its nature will be the subject of future investigations.   IVO RANZI.

Institute of Physics,
    University of Camerino, Italy,
        July 25.

[1] *Nuovo Cimento*, **8**, No. 6, p. 258, July 1931.

An Optically Active Inorganic Salt

IN 1914, Werner[1] described the resolution into optically active forms of dodecammine-hexol-tetra-cobaltic hexabromide, $[Co[(HO)_2Co(NH_3)_4]_3]Br_6$. This has remained until recently the only example of an inorganic (that is, carbon-free) salt the molecular dissymmetry of which has been proved by optical resolution. A second optically active inorganic salt, which, although also of the ' complex ' type, is of much simpler composition than Werner's salt, has now been obtained.

Sulphamide, $H_2NSO_2NH_2$, has long been known to act as a weak dibasic acid. When certain rhodium salts are treated with sulphamide dissolved in sodium carbonate solution, co-ordination occurs with the formation of sodium di-aquo-rhodium-disulphamide, $Na[(H_2O)_2Rh(HNSO_2NH)_2]$, a compound of the ' diammino-tetracido ' type in which each sulphamide residue occupies two co-ordinate positions. This salt should be capable of existence in two isomeric forms, one having the two water molecules in the 1 : 2 or *cis* positions in the six-co-ordination octahedron, and the other having these molecules in the 1 : 6 or *trans* positions. The first isomeride is dissymmetric, and should be resolvable into optically active forms, whilst the second possesses a plane of symmetry and should be non-resolvable.

When an aqueous solution of this sodium salt was treated with *dextro*-nor-ψ-ephedrine sulphate, the alkaloid salt of the complex anion was slowly precipitated ; the first fraction thus obtained, on treatment with sodium hydroxide, gave a *lœvo*-rotatory sodium salt having, for the mercury yellow line, $[\alpha] = -9.6°$ and $[M] = -34°$. Treatment of the racemic sodium salt similarly with *dextro*-phenyl-ethylamine hydrochloride gave the amine salt, which in turn furnished a dextro-rotatory sodium salt having $[\alpha] = +8.9°$ and $[M] = +31°$. Although it is not claimed that these represent the optically pure enantiomorphs, the resolution proves the presence of the 1 : 2 or *cis* isomeride in the sodium diaquo-rhodium-disulphamide.

Platinum compounds of similar composition have also been prepared, and their resolution is now being investigated.

                                                F. G. MANN.
The University Chemical Laboratory,
        Cambridge, Aug. 22.

[1] *Ber.*, **47**, 3087 ; 1914.

Dimensions of Fundamental Units

THE recent world-wide discussions upon the electrical and magnetic units and their dimensions have focused attention once more upon the discrepancies which occur in the various textbooks. It has always seemed to me that there was no justification for regarding the three magnitudes, mass, length, and time, as necessarily fundamental, and a system in which quantities expressed in those dimensions have fractional indices is unsatisfactory. If we take the course of regarding quantity of electricity as a fundamental, and introduce Q for its dimension, we get the following table :

Quantity.				Dimension.
Quantity	.	.	.	Q.
Current	.	.	.	$Q.T^{-1}$.
Magnetising force	.	.	.	$Q.T^{-1}.L^{-1}$.
Magnetomotive force	.	.	.	$Q.T^{-1}$.
Magnetic Flux	.	.	.	$M.L^2.Q^{-1}.T^{-1}$.
Flux density	.	.	.	$M.Q^{-1}.T^{-1}$.
Permeability (μ)	.	.	.	$M.L.Q^{-2}$.
E.M.F.	.	.	.	$M.L^2.Q^{-1}.T^{-2}$.
Resistance	.	.	.	$M.L^2.Q^{-2}.T^{-1}$.
Sp. Ind. Capacity	.	.	.	$Q^2.T^2.M^{-1}.L^{-3}$.
Pole strength	.	.	.	$M.L^2.Q^{-1}.T^{-1}$.

It will be noticed that the introduction of a new dimension has automatically wiped out all fractional indices ; but this is not all. Examination of the dimensions shows that wherever Q appears in the numerator, M appears in the denominator and vice versa. Consequently, if M be regarded as a function of Q, the former would disappear entirely from the table, and everything in mechanics, as well as in electricity and magnetism, could be put in terms of Q, L, and T.

Further, on the assumption that magnetism is due to spinning electrons, we obtain for μ the expression $\mu = \tau eh/4\pi m$, where τ is a pure number. Here again, then, on the above assumption, Q and M will cancel.

It seems to me that these simplifications are too striking to be merely a matter of coincidence.

                                            WILLIAM CRAMP.
    The University,
Edgbaston, Birmingham,
        Aug. 9.