In a recent number of the *Annalen der Physik* there appears an important paper by Prof. Quincke on "Electrische Schaumwände der Materie." The subject-matter is a continuation of the work which has been done on the structure of "foam" walls and chambers, but in particular he points out an analogy between these and the electrical "dust" figures, which he regards as being due to the formation of foam chambers by electrical emanations of positively or negatively charged particles. Ordinary foam chambers made by precipitation or other methods he regards as being of two kinds: (1) those formed quickly in viscous fluids, and which may take a variety of forms, (2) those formed slowly in less viscous fluids, and which consist of globular cells connected by tubes. When the charged knob of a Leyden jar is presented to a cake of resin, he supposes that an electrical emanation of charged particles is emitted, and these particles are attracted to the plate of resin. By their impact they melt the resin locally to form an oil-like substance which solidifies around the charged particle, and thus produces a "foam" chamber with electrified walls. These chambers are rendered visible by dusting with the usual mixture of red lead and sulphur. He regards those upon which the sulphur is deposited as being similar to type (1), and those upon which the red lead settles as being similar to type (2).

Nearly all the optically-active carbon compounds that have been prepared hitherto have been substances of relatively complex composition. The two simplest, lactic acid, $CH_3.\mathbf{C}H(OH).CO_2H$, and *sec.*-butyl alcohol, $CH_3.\mathbf{C}H(OH).C_2H_5$, contain three and four carbon atoms respectively; in each case also three of the four radicles attached to the asymmetric carbon atom $\mathbf{C}$ are compound radicles, and only one (the hydrogen atom) is simple. Special interest attaches therefore to the two simple substances, ammonium *d*- and *l*-chloroiodomethanesulphonates,

$$\mathbf{C}HClI.SO_3.ONH_4,$$

which have been prepared and separated in an optically-active form by Prof. Pope and Mr. Read (Trans. Chem. Soc., 1914, vol. cv., p. 811). In these substances three of the radicles are simple, and only one is compound; none of the four radicles contains a carbon atom, and the percentage of carbon amounts to less than 5 per cent. The two acids were separated by fractional precipitation from the ammonium salts by the addition of brucine; after reconverting into the ammonium salt the dextro-acid gave the molecular rotation $[M]_{5461}$ $+43°$. The active material is remarkably stable; the optical activity is not changed by boiling alone or with acids or alkalis, or by heating with water in a sealed tube to 130–150°.

*Engineering* and the *Engineer* for April 17 contain articles dealing with electric power supply in London. Messrs. Merz and McLellan have investigated this subject recently, and have presented a report to the London County Council. Apart from traction stations there are seventy generating stations at present in London, containing 585 engines. The report states that there are practically only two ways of effecting important economies in electricity generation in London; first, to allow the extension of eight or ten of the best existing stations, and gradually to abandon all the others; secondly, to abandon all sites in or near the metropolitan area, and to concentrate the production of electricity for all purposes well outside. The primary distribution system throughout London should be standardised. Assuming all existing stations for the supply of light and power to be in the hands of one authority, the final conclusions are that it would pay to shut them all down, sell most of the plant, and generate all energy on sites down the river. Considering only the central area, it is estimated that the saving in working costs with this scheme would be about 18 per cent., or 170,000*l.* a year.

The editor of the new quarterly, *Isis,* devoted to the history and organisation of science, asks us to say that the annual subscription is 30 francs per annum, and not 24 francs as stated in a note in Nature of April 9 (p. 143).

A copy has been received of the second supplement, 1911–13, to the catalogue of Lewis's Medical and Scientific Circulating Library, 136 Gower Street, London, W.C. A classified index of subjects, with the names of those authors who have written upon them, is included.

## OUR ASTRONOMICAL COLUMN.

Comet 1914*a* (Kritzinger). — The following ephemeris of comet 1914*a* (Kritzinger) is published by Prof. Kobold in *Astronomische Nachrichten,* No. 4727:—

*12h. Berlin M.T.*

| | R.A. (true) h. m. s. | Dec. (true) ° ′ | Mag. |
|---|---|---|---|
| April 23 | 17 38 35 | +8 45·2 | 9·5 |
| 24 | 42 30 | 9 40·7 | |
| 25 | 46 27 | 10 36·6 | |
| 26 | 50 25 | 11 32·7 | 9·4 |
| 27 | 54 23 | 12 29·0 | |
| 28 | 17 58 23 | 13 25·4 | |
| 29 | 18 2 24 | 14 21·9 | |
| 30 | 18 6 27 | +15 18·3 | 9·3 |

The Variable 081041, −41° 3911, H.V. 3372.—Prof. E. C. Pickering communicates some interesting facts relative to the spectrum and magnitude of the star C. DM. −41° 3911, this star having previously been found by Mrs. Fleming to be peculiar, and also later independently by Miss Cannon. In identifying this object Miss Mackie has found that it is a variable, and in this paper the magnitudes are given for the period 1890 to 1912. The nature of the variation is indicated by a curve. Prof. Pickering describes the object as a very curious one At first sight it might appear to be a variable star with a period of about twenty years, and varying from the eleventh to the fourteenth magnitude. He points out that ordinary variables of long period have a very different spectrum and undergo all their changes in less than two years. In this case the variations may prove to be irregular and to resemble those of the three stars of the class of R. Coronæ. The position of the star for 1900 is R.A. 8h. 10·8m., and declination −41° 24′, and additional observations of both its magnitude and spectrum are required to settle the peculiarity above mentioned.

The Solar Constant of Radiation.—No one interested in this subject should fail to read an address delivered before the Philosophical Society of Washington by Prof. C. G. Abbot, the retiring president, and reported at length in *Science* of March 6. The address forms a valuable apercu of the subject from Herschel's pioneer actinometric observations down to the experiments made late last summer under the joint auspices of the Smithsonian Institution and the U.S. Weather Bureau on the employment of *ballons-sondes* in pyrheliometric investigation. With regard to the solar constant, the mean value of 690 measurements made in connection with the Astrophysical Observatory of the Smithsonian Institution during the period 1902–13 is stated to be 1·933 calories per sq. cm. a minute, a value which is probably accurate to 1 per cent. It will be noted that this period covers one sun-spot cycle, and it is also stated that the Mount Wilson measures indicate that the solar radiation is more intense at spot maximum than at minimum, the sun thus showing affinity with variable stars of the *o*-Ceti type.

THE ACTION OF GRAVITY ON GASEOUS MIXTURES.—M. G. Gouy, in a recent communication to the Paris Academy of Sciences (*Comptes rendus*, vol. clviii., pp. 664–8) extends to the terrestrial atmosphere his researches on gaseous mixtures which during 1912 led him to the conclusion that pressure could not be the cause of the general displacement of the Fraunhofer lines towards the red. We may direct attention to the fact that the suggestion he then made that perhaps the explanation of this phenomenon would be found in the Doppler effect has received striking confirmation on purely spectroscopic grounds very recently in the work of Mr. Evershed (NATURE, March 19, p. 69). The present paper affords a mathematical demonstration of the impossibility of stratification according to density by the action of gravity on the gases in the earth's atmosphere where the pressure exceeds that of a Crookes tube as the final result indicates that under these conditions the effect of gravity on the composition of the air is too slow to produce sensible effects.

## GROWTH AND CULTIVATION OF HOPS.

THE close attention which is being given in many foreign countries to the scientific study of plants of economic importance is evidenced in the two reports on the hop lately published by Dr. J. Schmidt. Although the cultivation of hops in Denmark is at present restricted to about 100 acres, Dr. Schmidt, of the Carlsberg Laboratory, Copenhagen, was recently commissioned to visit this and other countries with the object of collecting information on the most modern methods of cultivation, and also to collect data and material likely to prove of value in the work of breeding improved varieties of hops for cultivation in Denmark. In 1910 the physiological department of the Carlsberg Laboratory began a series of investigations on the hop plant (*Humulus lupulus*, L.), with a view of obtaining information of theoretical and practical interest regarding this plant. These reports by Dr. Schmidt are the first-fruits of this work.

In the first report, the growth in length of the stem and its diurnal periodicity is dealt with. One of the first problems for investigation that presented itself was to ascertain if the foreign varieties of hops obtained from southern regions which are being grown in the experimental garden attached to the Carlsberg Laboratory have a different rate of growth in the northern climate of Denmark from the wild-growing plant of that country. In the course of making these investigations, which are not yet concluded, the experiments detailed in this first report were made.

Dr. Schmidt was at the outset inclined to the belief—a belief, by the way, which is firmly held by the practical hop-growers of Kent—that the growth of the hop stem, or "bine," would be strongest during the night. Observations on a number of plants soon showed, however, that the reverse is the case. The least growth took place during the six hours 9 p.m. to 3 a.m., which proved that darkness was not the dominant factor of growth. It might have been expected that the growth-promoting factor of darkness would first show itself as an "after-influence," and that consequently the greatest growth would be during the following morning period, 3 a.m. to 9 a.m. It was found, however, that the strongest growth occurred during the period 3 p.m. to 9 p.m., immediately preceding the darkest period, the value for the rate of growth increasing evenly from the minimum of the latter period to the maximum of the afternoon period.

In the two main series of experiments, which were carried out in 1911 from the end of April, to the end of June, and in 1912 during July, the plants, growing in an unheated glasshouse, were kept as far as possible under natural conditions. The measurements were made continuously at 6 o'clock in the morning, 12 o'clock noon, 6 o'clock in the afternoon, and at 12 o'clock at night. The diurnal oscillations of temperature were followed by means of a thermograph.

Further experiments made seemed to show conclusively that the influence of the temperature on the rate of growth under natural conditions predominates over the influence of humidity; as the author remarks, "the growth-promoting power, which high humidity is known to have under natural conditions, is 'covered' by the influence of the temperature, so that it appears as if only the temperature was of any importance for the rate of growth of hop-stems."

The results of the investigations are summed up as follows:—"The growth in length of hop-stems under natural conditions has a very distinct diurnal period, the rate of growth being smallest during the night, greatest during the day. This periodicity is determined by outer factors, among which the temperature has such a predominant influence that under natural conditions it determines the rate of growth."

The second report deals with investigations into the rotational movement of the hop-stem. In experiments with vigorous three-year-old hop-plants, in an unheated glasshouse, the stems were found to show, during May and June, a rotational movement amounting on an average for one to two weeks' observations to about 120° an hour, or one-third of the rate of the minute hand of the clock. The following table records the facts observed with two hop-plants, one (No. 14) obtained from Germany, the other (No. 36) from England:—

| | No. of whole days under observation | Total rotation in degrees | No. of turns | No. of turns in 24 hours (Average) | No. of degrees an hour (Average) |
|---|---|---|---|---|---|
| Plant No. 14 | | ° | | | ° |
| Shoot *a* ... | 9 | 24865 | 69 | 7·7 | 115 |
| ,, *b* ... | 9 | 25875 | 72 | 8·0 | 120 |
| ,, *c* ... | 11 | 29810 | 83 | 7·5 | 113 |
| Plant No. 36 | 13 | 37600 | 104 | 8·0 | 120 |

The rotational movement proved to have a very distinct daily periodicity, the rate being greatest during the day, least at night. This daily periodicity is determined by external factors, among which the temperature is of such dominating importance that

[1] Johs. Schmidt: (1) "The Growth in Length of Hop-stems and its Diurnal Periodicity" (*Comptes rendus des travaux du Laboratoire de Carlsberg*, 10me vol., 2me livraison, 1913).
*Idem.* (2) "The Rotational Movement of Hop-stems and its Diurnal Periodicity" (*l.c.*, 3me livraison, 1913).