

The brain-weight of man exceeds that of all animals except the elephant (4500 gr.) and the larger Cetaceæ (2500 gr.). The brain-weight of the largest apes is hardly a third of man's. Prof. Bischoff has worked with a considerable amount of material; his data comprise the weights of brain of 559 men and 347 women.

### PHYSICAL NOTES

EXPERIMENTS have been made by Herr Glan (*Wied. Ann.* No. 11) as to the action of gases and vapours on the optical properties of reflecting surfaces. No such influence (expressed in alteration of phases in reflection) is found to exist if the gases and vapours do not act chemically on the surfaces, or are not precipitated in visible quantity (as when the temperature is below the dew point).

DR. FUCHS describes a new interference photometer (*Wied. Ann.* No. 11) in which no polarisation of the rays at right angles to each other is required. It consists simply of two similar isosceles glass prisms joined by their basal surfaces, which enclose an air layer variable in thickness by pressure. A diaphragm reaches out in prolongation of the surface of junction. The observer looks obliquely towards this surface and sees one illuminated surface directly through the double prism, the other by reflection at the air layer. One light-source is fixed, and the other is displaced till the interference bands disappear.

THE polar differences in luminous phenomena of the discharge of electricity through gases were considered by Wiedemann and Rühlmann as possibly due, in part at least, to a gas layer (more or less condensed) on one electrode. Supposing that other kinds of envelopes with like action would essentially affect the phenomena, Herr Holtz has been able (*Wied. Ann.* No. 11), by covering one electrode, e.g. with silk, or placing a stretched silk disk before it, to verify this, and almost quite obliterate, in some cases, the polar differences.

IN a recent publication describing electrical researches, by Herr Goldstein, in Berlin, that author investigates the phenomena which occur when, in a space so far evacuated that the green phosphorescent light occurs with the discharge from the cathode, there are, not one, but several cathodes. He has met with a new form of electrical repulsion, not to be classified either with the mechanical repulsion in collision of ponderable masses, or with electrostatic or electrodynamic repulsion. (An abstract of the memoir appears in *Wiedemann's Beiblätter*, No. 11.)

APPLYING his theory of the potential energy of liquid surfaces to great cycle-operations in nature, M. van der Mensbrugge (*Bulletin of Belg. Acad.*, 9 and 10) has lately calculated that if evaporation subdivides the liquid of seas into spherules of e.g. 1-10,000th mm. diameter, each kilogramme of water presents a collection of spherules whose total potential energy is equivalent to 450 kilogrammetres, i.e. more than a million times that of a sphere of compact water also weighing 1 kilogramme. This shows what prodigious quantities of work-units are carried virtually into the atmosphere by water vapour, and there is to be added the potential energy acquired by this vapour in virtue of its weight. The author applies his theory to the effects of condensation, to glazed frost, to phenomena of rivers and waterfalls, &c. He anticipates important verifications of it from the examination of the Gulf Stream in the Gulf of Mexico projected by the United States, and recent soundings have tended to confirm it.

M. MONTIGNY (*Bull. Belg. Acad.* 9 and 10) has lately studied the effects of making bells vibrate with liquids in them (water, ether, alcohol, sulphide of carbon), or when wholly immersed in liquids. He found that (1) the sound produced was always more grave than the natural sound; (2) that the lowering of tone was more marked in both cases the more dense the liquid (thus it is less with ether than with sulphide of carbon); (3) that with all the liquids tried the alteration in sound of a given bell was much more marked when the bell was wholly immersed than when merely filled with the liquid; and (4) that in both cases the lowering of tone was more marked for grave than for acute notes. The general inference is that the rapidity of vibrations of a sounding body is considerably diminished by a liquid with which its walls are in contact, and that this diminution is more sensible when the contact is established on both sides of the vibrating body than when only on one side. The mode of action is related not only to the density, but to the compressibility of the liquid. The lowering of sound is more

sensible with water than with alcohol and ether; the latter being less dense and more compressible liquids. The form of the bell and the nature of its substance (that is its special elasticity and its density) are shown also to affect considerably the pitch of the sound produced in contact with liquids. M. Montigny is investigating whether air is a medium of too little density and too great compressibility to modify sensibly the duration of vibrations of sonorous bodies.

AT a recent meeting of the Franklin Institute (*Journal for December*), Mr. Griscom described his new electric motor, which, weighing about 2½ pounds, compares favourably with those of the old forms of fifteen times its weight. Its most essential advantage is in the field magnets; the shape of which is such that all the magnetic lines of force, including those nearest the neutral line, are brought into the best possible position for effecting the revolution of the armature. If a bar of soft iron is pivoted at one end to move in a horizontal plane, and a semi-circular magnet is placed concentrically with the circle the bar can describe, then a given force is exerted on the bar at a much greater distance from the poles when the latter is within the semicircle than when it is without. Herein (it is stated) is the secret of the power of Mr. Griscom's motor. The battery is inclosed in a strong waterproof box, gives no odour, and very little trouble in renewing. It is calculated that it will suffice for the sewing of a small family for one year; a professional seamstress would exhaust it more rapidly, but always in proportion to the exact amount of work done.

A NEW microphone, made by M. Boudet in Paris (*La Nature*, No. 394), has the general shape of a telephone on a support. It comprises a mouthpiece, in which is an ebonite plate 1 mm. thick, with a short bar of copper penetrating from its middle a short way into a glass tube in which are six little balls of retort carbon in a row; a second mass of copper following the last, and resting on a small spiral spring in a case. The pressure can be varied by means of a screw. The instrument is worked with six Gaiffe elements (peroxide of manganese and chloride of zinc) mounted in tension, and a Bell telephone. It is said to transmit the voice very distinctly without altering its timbre and without disturbing sounds being produced.

IN a note to the Vienna Academy (*Ann.* December 16) Prof. Stefan describes experiments on the influence of terrestrial induction in development of an electric current, and the excitement of the telephone by currents from a rotating coil. The coil used was 56 mm. in external diameter, and 11 mm. in width. The earth's influence is best shown by so connecting the apparatus with a galvanometer that the circuit is closed during one half of the coil's rotation, and broken during the other half; if the completion of the circuit correspond to the positive maximum of the electromotive force of the earth's magnetism, and the interruption to the negative, the galvanometer is positively deflected. The deflection may be reduced to zero by displacing the contact, and from the displacement and the number of rotations the potential may be inferred in absolute measure. Next the telephone was so connected with the coil that the full alternately opposite currents went uninterruptedly through the circuit. This gave a simple tone. With 100 rotations per second the horizontal component of the earth's magnetism did not suffice to excite an ordinary telephone, but it excited one having a horse-shoe magnet. (When the intensity of the field was doubled the ordinary telephone was also excited.) The tone corresponds to the number of rotations. When the coil was rotated 220 times in a second the ordinary telephone sounded. The telephone was shown to be less sensitive to currents whose intensity periodically changes than to interrupted currents (an ordinary telephone sounded with 100 rotations or fewer, when the circuit was closed only during a short time of each rotation).

### GEOGRAPHICAL NOTES

AT the meeting of the Geographical Society on Monday evening a paper was read on the discoveries made by Mr. Leigh Smith last year on the coast of Franz Josef Land, including also a general sketch of the rest of his voyage in the *Eira*. Mr. Smith appears to have reached the southern shores of Franz Josef Land with comparative ease about the middle of August, and to have examined it and several islands along a coast-line of over 100 miles of previously unexplored ground. The new continent, as some would fain believe it to be, does not present an attractive appearance, for the coast-line is described as consisting