of the air, and then the cloudiness, direction and velocity of the wind; whereas, for the ordinary moist earth, no matter whether the surface is naked or covered with living plants, it is the quantity of rain upon which the soil depends for its moisture that is the important additional consideration. The effects of the external elements on evaporation become less important, as explained in paragraph 5, in proportion as the precipitation is less and as the soil is more completely dried out by the previous favourable weather, and *vice versa*. For these reasons the rate of evaporation from a free surface of water not infrequently differs largely from that from the respective kinds of soil.

(8) Free surfaces of water, and soils that are continuously saturated, evaporate into the atmosphere on the average more water under otherwise similar circumstances than soils, whether naked or covered with plants, and whether watered artificially or naturally. Only at special times, viz. when the influence of the factors that favour evaporation is most intense, when the plants are in the most active period of growth, and when the soil contains a large percentage of water, can the land that is covered with plants show a larger evaporating power than the free-water surface.

(9) When a soil that is not irrigated is covered with plants, it evaporates a far greater quantity of moisture than when the surface is bare. In the former case the evaporation can not exceed the quantity received by the soil from the atmosphere before or during the period of growth. Swampy lands and those that are well irrigated, as also free surfaces of water, can, under circumstances favourable to evaporation, sometimes give to the atmosphere a greater quantity of water than corresponds to the precipitation that occurs during the same time.

(10) The evaporating power of the soil is, in itself, dependent upon its own physical properties; the less its permeability for water, or the larger its capacity for water and the easier it is able to restore by capillarity the moisture that has been lost, by so much the more intensive is the evaporation. For this reason the quantity evaporated increases with the percentage of clay and humus in the soil, whereas it diminishes in proportion as the soil is richer in sandy and coarse-grained materials.

(11) Soil that is covered with plants loses by evaporation so much more water in proportion as the plants are better developed, or stand thicker together, or have a longer period of vegetation, and *vice versa*.

In conclusion, Wollny repeats that the use of apparatus giving the total evaporation from free-water surfaces does not respond to the needs of the agriculturist [and we may add of the meteorologist], but that instruments must be used for measuring the evaporation from masses of earth that are wet with rainfall only, and free from stagnant wet soils. Lysimeters are recommended having a section of one-tenth of a square metre and a depth of soil one-half of a meter, and set out in the open air, sunk flush with the surface of the ground, and arranged so as to be easily weighed at any moment, and so that the drainage water can easily be measured.

The foregoing results of Wollny's laborious observations confirm us in the general conclusion that the quantity of water actually evaporated from a large surface of land, such as a definite watershed maintaining a single river, can only be determined by the following considerations. The quantity of water contained in the soil at the end of any given period in excess of what it contained at the beginning, plus the water that is carried off by drainage and river flow, plus whatever is evaporated into the atmosphere either directly or through the crops and forests, must equal the rain and irrigation water added to the soil during that time. As the soil content of water, the riverflow and drainage, and the rainfall can be severally determined by direct observation far better than the evaporation, the latter is to be determined by taking the difference between the rainfall and all other sources of loss or consumption.

LONDON UNIVERSITY COMMISSION BILL.

REFERENCE was made in our issue of July 9, to the Bill introduced by the Duke of Devonshire in the House of Lords, for the purpose of appointing a statutory Commission to make further provision with respect to the University of London. The Bill reads as follows:—

Whereas the Commissioners appointed to consider the draft charter for the proposed Gresham University in London, have by their report made recommendations with respect to the reconstitution of the University of London, and to the appointment of a statutory Commission for that purpose:

Be it therefore enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

I. *Appointment of Commissioners.*—(1) There shall be a body of Commissioners styled the University of London Commissioners, and consisting in the first instance of the following persons [names not yet announced].

(2) If and whenever any vacancy occurs among the Commissioners, it shall be lawful for Her Majesty the Queen to appoint a person to fill the vacancy; but the name of every person so appointed shall be laid as soon as may be before both Houses of Parliament.

(3) The Commissioners may, with the consent of the Treasury as to number, appoint or employ such persons as they may think necessary for the execution of their duties under this Act, and may remove any person so appointed or employed.

(4) There shall be paid to any person so appointed or employed such remuneration as the Treasury may assign, and that remuneration and all expenses of the Commissioners incurred with the sanction of the Treasury in the execution of this Act shall be paid out of moneys provided by Parliament.

II. *Duration and proceedings of Commissioners.*—(1) The powers of the Commissioners shall continue until the end of the year one thousand eight hundred and ninety-seven, and no longer; but it shall be lawful for Her Majesty the Queen, from time to time, with the advice of Her Privy Council, on the application of the Commissioners, to continue the powers of the Commissioners for such time as Her Majesty thinks fit, but not beyond the end of the year one thousand eight hundred and ninety-eight.

(2) The Commissioner first named in this Act shall be the Chairman of the Commissioners; and in case of his ceasing from any cause to be a Commissioner, or of his absence from any meeting, the Commissioners present at each meeting shall choose a chairman.

(3) The powers of the Commissioners may be exercised at a meeting at which three or more Commissioners are present.

(4) In case of an equality of votes on a question at a meeting, the chairman of the meeting shall have a second or casting vote in respect of that question.

(5) The Commissioners shall have a common seal which shall be judicially noticed.

(6) Any act of the Commissioners shall not be invalid by reason only of any vacancy in their body; but if at any time, and as long as, the number of persons acting as Commissioners is less than four, the Commissioners shall discontinue the exercise of their powers.

III. *Powers and duties of Commissioners.*—(1) The Commissioners shall make statutes and regulations for the University of London in general accordance with the scheme of the report hereinbefore referred to, but subject to any modifications which may appear to them expedient after considering any representations made to them by the Senate or Convocation of the University of London, or by any other body or persons affected.

(2) In framing such statutes and regulations, the Commissioners shall see that provision is made for securing adequately the interests of collegiate and non-collegiate students respectively.

(3) Statutes and regulations made under this Act shall have effect notwithstanding anything in any Act of Parliament, charter, deed, or other instrument.

IV. *Approval of statutes and regulations.*—(1) When any statute or regulation has been made by the Commissioners, a notice of its having been made, and of the place where copies of it can be obtained, shall be published in the *London Gazette*, and the statute or regulation shall be laid as soon as may be before both Houses of Parliament, and shall not be valid until it has been approved by Her Majesty the Queen in Council.

(2) If either House of Parliament within forty days, exclusive of any period of prorogation, after a statute or regulation has been laid before it, presents an address praying the Queen to withhold her assent from the statute or regulation, or any part thereof, no further proceedings shall be taken on the statute or regulation, or on the part thereof to which the address relates, but this provision shall be without prejudice to the making of a new statute or regulation.

(3) The Senate or Convocation of the University of London, or any other person or body directly affected by any such statute or regulation, may, within thirty days after the notification thereof in the *London Gazette*, petition Her Majesty in Council to withhold her approval of the whole or any part thereof.

(4) Her Majesty in Council may refer any such petition to a committee of the Privy Council, with a direction that the committee hear the petitioner personally or by counsel, and report specially to Her Majesty in Council on the matter of the petition.

(5) Thereupon it shall be lawful for Her Majesty by Order in Council either to declare her approval of the statute or regulation in whole or in part, or to signify her disapproval thereof in whole or in part. but any such disapproval shall be without prejudice to the making of a new statute or regulation.

(6) The costs of any petition under this section may be regulated by the committee to which the petition is referred.

V. *Power to amend statutes and regulations.*—After the expiration of the powers of the Commissioners the Senate of the University shall have power to make statutes and regulations for altering or supplementing any of the statutes or regulations made by the Commissioners. Provided as follows :—

(1) A statute made under this section shall be subject to the provisions of the last foregoing section, with the substitution only of the Senate for the Commissioners;

(2) A regulation made under this section shall be invalid so far as it is inconsistent with any statute made under this Act and for the time being in force.

VI. *Short title.*—This Act may be cited as the University of London Act, 1896.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

A DESPATCH (says the *Board of Trade Journal*) has been received at the Foreign Office from Mr. Martin Gosselin, Her Majesty's Chargé d'Affaires at Berlin, stating that a Government chemical dyeing school has recently been opened at Crefeld, which has cost about £20,000, exclusive of the machinery and fabrics, which have for the most part been presented by private manufacturers. The school contains laboratories for research and educational purposes, as well as a complete collection of dyeing machinery, and an exhibition showing the result of different processes.

THE following are among recent announcements :—Dr. Franz Boas to be lecturer on physical anthropology in Columbia University; Dr. Arthur Allen to be professor of psychology and pedagogy in the Ohio University; Dr. Bauer, professor of mineralogy at Marburg, to be Privy Councillor; Dr. H. Biltz to be extraordinary professor of chemistry at Greifswald; Dr. Linde, professor of physics in the Munich Technical High School, to be Ph.D. *honoris causa* of Göttingen University.

PLANS have been filed for the buildings of Barnard College in New York City. Three halls have been provided for. The central one is named Milbank Hall, in honour of the donor, Mrs. Anderson, *née* Milbank, and will cost 160,000 dols. Opposite the grounds of Columbia University will be Brinkerhoff Hall, costing 132,000 dols., the gift of Mrs. Brinkerhoff. The third hall for which the plan provides will correspond to Brinkerhoff Hall. Funds are not yet provided for it, nor a name assigned.

SCIENTIFIC SERIALS.

American Journal of Science, July.—Lecture experiment with liquid carbon dioxide, by C. Barus. The passage from the liquid into the gaseous state should be shown in full daylight, the tube containing the liquid being placed vertically in a wooden trough closed by plate-glass at both ends. This insures safety, and gives more light than a water-bath. The image of the tube is thrown upon a screen. Two different focal lines are obtained, one for the gas, the other for the liquid. Contrary to what might be expected, the one does not pass continuously into the other, that for the gas being always virtual, and that for the liquid real.—Percussion figures on cleavage plates of mica, by T. L. Walker. These figures, produced by a blow on the centre of a hexagonal plate with a blunt needle, have been described as being six-rayed stars with the rays at 60° to each other. Accurate measurements show that the angles may vary from 53° to over 63°, according to the kind of mica employed.—The seven-day weather period, by H. Helm Clayton. To extend the investigation of the seven-day weather period beyond the area of the United States, three stations were selected in the Arctic region, five in Europe, two in Asia, two in Oceania near the equator, three in middle South America, one in Mauritius, and one in Australia. The periods investigated were those of 7 days 6·43 hours, 6 days 3·95 hours, and 5 days 10·8 hours. Particular attention was given to a compilation of barometric minima at these stations during the last fifteen years. The results show that, on the average, twice in a period of 7 days 6·43 hours in America, and three times in Europe, waves of barometric minima, or storms, tend to begin near the poles, and sweep across the continents. There is a tendency at every station for the days of maximum frequency to remain on the same days of the period throughout the year.—The hydrology of the Mississippi, by J. L. Greenleaf. This is a valuable and interesting paper dealing with the drainage areas, rates of flow, and rainfall over the tributaries of the great American river. It is illustrated by diagrams representing the various factors in a concise and lucid manner. The largest drainage area is that of the Missouri. Then follows the Ohio, the Arkansas, and the Red River. Of these, the Missouri has the most striking peculiarities. Its drainage area has an average rainfall of 19·6 inches per annum. Although in flood it is a mighty torrent, its average volume is very poor considering its enormous drainage area of 527,700 square miles. Only 12 per cent. of the rainfall finds its way into the river. The rest is absorbed and evaporated by the extensive prairies. In the Ohio area the proportion is 30 per cent., and since the annual rainfall is 43 inches, it is not surprising that its discharge exceeds that of the Missouri. Near the Mexican Gulf we have the Yazoo and St. Francis Rivers, which carry off 70 per cent. of their rainfall, owing to its being quickly absorbed by the sandy soil, or stored in the swamps. There are other admirable diagrams showing the growing volume of water as each tributary enters, and giving the whole life-history of the river system in a very attractive shape.

Wiedemann's Annalen der Physik und Chemie, No. 6.—Electrolysis of water, by A. P. Sokolow. Helmholtz applied his theorem of free energy in thermodynamics to electrolysis, and concluded that the E.M.F. necessary to electrolyse water depends upon the density of the hydrogen and oxygen at the electrodes, and that when the liquid is free from gas the necessary E.M.F. may closely approximate to zero. The author endeavoured to find a more rigorous experimental proof of this conclusion than has hitherto been obtained. This was done by constructing a voltameter with platinum electrodes in which separate platinum wires were fused in close to the electrodes. Any polarisation of the latter due to a current, if leading to the formation of gas, would be gradually transferred to the wires through the separating liquid. This was found to be the case, and dissociation was obtained with E.M.F.s of a few hundredths of a volt.—Loss of energy in magnetisation by oscillatory condenser discharges, by Ignatz Klemenčič. Hysteresis and other losses have so far only been investigated with about a hundred oscillations per second. The author experimented with condenser discharges up to 2000 per second in order to obtain an approximate idea of the action of Foucault currents and hysteresis in iron and nickel at higher frequencies. The method used was that of discharging a condenser and interrupting its discharge at a certain stage by a dropping weight. This made it possible to determine the damping of the oscillations in a simple coil and in a coil with an iron or nickel core respectively. The results showed that even in thin iron wires the loss of energy was chiefly determined by the Foucault currents. The losses due to hysteresis in soft iron were considerably greater than those calculated from the hysteresis curves at lower frequencies. For steel and nickel, however, the losses were about the same.—On magnetic irregularity and the annealing of iron and steel, by A. Ebeling and E. Schmidt. Annealing, if done uniformly, may be sometimes useful; but if not uniform, it may be detrimental to magnetic homogeneity. The most uniform material is obtained by careful fusion. Wrought iron is not made magnetically uniform by annealing.—Transparency of bodies for Röntgen rays, by O. Zoth. This was determined by comparing them with a tinfoil scale containing grades of various thicknesses. The transparency of alcohol compared with tin was 600, that of water 300, cork 2450, ebonite 150, plate-glass 29, magnesium 36,