Suburban Housing Association, Hutchinson, Kansas	$ 40,000
Triborough Bridge Authority, New York... (Loan, $37,000,000; grant, $7,200,000)	44,200,000
Total	$1,196,721,389

DOCTORATES CONFERRED IN THE SCIENCES BY AMERICAN UNIVERSITIES, 1932–1933[1]

IN assembling the data for the doctorates in the sciences conferred by American universities from year to year, a steady increase has been observed in the number granted, especially since 1919. The following figures for the past ten years summarize this trend: 1924, 611; 1925, 640; 1926, 748; 1927, 796; 1928, 842; 1929, 1,025; 1930, 1,074; 1931, 1,147; 1932, 1,241; 1933, 1,343.

From these totals it is seen that the so-called years of depression have had a stimulating effect upon higher education. The same fact is emphasized by the survey of graduate research students in chemistry, as shown by the statistics collected from about 130 American universities:[2] 1924, 1,700; 1925, 1,763; 1926, 1,882; 1927, 1,934; 1928, 2,081; 1929, 2,498; 1930, 2,795; 1931, 3,261; 1932, 3,348.

Each year it has seemed that the curve had reached a maximum and that the number of doctorates granted in the sciences must decrease. Apparently it is impossible at this time to predict whether this will happen, and if so, when.

This distribution of the doctorates by subjects shows no significant change last year, as compared with earlier years. The 1,343 doctorates granted in 1933 were distributed as follows: Chemistry, 417; physics, 123; zoology, 115; psychology, 101; botany, 79; mathematics, 78; engineering, 75; geology, 66; physiology, 39; agriculture and forestry, 36; bacteriology, 36; pathology, 23; anatomy, 17; entomology, 17; genetics, 15; horticulture, 15; anthropology, 13; pharmacy and pharmacology, 13; archeology, 10; astronomy, 10; geography, 10; public health, 10; medicine and surgery, 10; metallurgy, 9; paleontology, 6.

Each year there is a certain fluctuation in the number of doctorates granted by the various universities. Thus, this year Cornell showed an increase of 30 over last year, while Chicago showed a decrease of 43; Michigan showed an increase of 26, Harvard, 18, Illinois, 17, California Institute of Technology, 15, Columbia, 13, etc. These differences from year to year are really of little importance, for next year the order may be entirely different; however, a survey of the data for the past ten years shows that those universities which grant 20 or more doctorates maintain about the same relative positions from one year to another.

The following figures show the number of doctorates granted by the various universities for the academic year 1932–1933: Cornell, 110; Wisconsin, 87; Michigan, 81; Chicago, 73; Columbia, 71; Johns Hopkins, 68; Harvard, 63; Illinois, 63; California, 62; Minnesota, 62; Ohio State, 53; Yale, 50; Iowa, 48; California Institute of Technology, 36; Princeton, 32; Iowa State University, 31; Massachusetts Institute of Technology, 30; Pennsylvania, 24; New York, 21; Pittsburgh, 20; Stanford, 18; Northwestern, 17; Texas, 16; Washington University (St. Louis), 12; Duke, 11; Indiana, 11; Brown, 10; Cincinnati, 10; Maryland, 10; Pennsylvania State College, 10; Kansas, 8; Missouri, 8; Notre Dame, 7; Purdue, 7; Radcliffe, 7; Washington, 7; Catholic, 6; George Washington, 6; Nebraska, 6; North Carolina, 6; Colorado, 5; Michigan State College, 5; Rensselaer, 5; Rochester, 5; Virginia, 5; Western Reserve, 5; Clark, 4; Lawrence, 4; Rice, 3; Rutgers, 3; Vanderbilt, 3; American, 2; Boston, 2; Fordham, 2; George Peabody, 2; Oregon, 2; St. Louis, 2; Arizona, 1; Georgetown, 1; New York State College of Forestry, 1; State College of Washington, 1; Syracuse, 1; Tulane, 1.

Detailed data regarding the 1,343 doctorates granted in 1932–1933, giving the names of the recipients of the degrees and the titles of the theses, together with comparative statistics for the past ten years, will be found in *Reprint and Circular Series* of the National Research Council, No. 105. Earlier numbers of this series, containing such data for previous years, are: 26, 42, 75, 80, 86, 91, 95, 101 and 104.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A DEVICE FOR MEASURING INTENSITY OF ILLUMINATION

A TIMELY article by Nicholas,[1] calling attention to the economies that may be effected without loss of efficiency for animal work, prompts the writers to call attention to a home-made equipment for measuring intensity of illumination, in connection with plant work, which costs less than one third the amount asked by professional supply houses for a similar equipment.

The materials consist essentially of one Weston

[1] See SCIENCE, 72: 357 (1930), 74: 659 (1931), 76: 296 (1932) for a survey of the data on doctorates from 1898 to 1932.

[2] See *Jour. Chem. Education*, 10: 499 (1933) for further details of this study.

[1] SCIENCE, 78: 38–39, 1933.

photronic cell, a Weston galvanometer, model 440, a three-way toggle switch and small lengths of copper wire for shunts and connections. The cell is connected directly across the galvanometer, which may be shunted to give the desired range. The three-way switch will allow four ranges. It connects a shunt for each position, and the most sensitive range is obtained with the switch in the neutral or open position. Each position of the switch may be calibrated in terms of foot-candles by means of ordinary electric lamps of known candle power, at measured distances. (Incidentally, the equipment used by the writers was also calibrated against a similar one made by a professional supply house and it was found that the home-made device was fully as sensitive and showed no greater errors than the professional equipment.)

When the above-mentioned galvanometer is shunted with the proper resistance and used with the photronic cell, intensities of illumination from 10 to 15,000 foot-candles may be measured accurately and the deflection is strictly proportional to the illumination over these ranges.

This equipment, housed in a small wooden case, has been used daily in the field during the Irish potato growing season in southern Arkansas[2] for determining differences in amount of illumination, on plants variously treated, in order to ascertain the possible influence of intensity of illumination on the etiology of tip and margin burning of Irish potato leaves. The simplicity and sturdiness of the instrument, its sensitivity over a relatively wide range of illumination and ease of manipulation have commended it to the writers, aside from its relative cheapness.

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AN IMPROVEMENT OF THE CHAMBERS MICROMANIPULATOR

THE Chambers micromanipulator modified by Wright and McCoy works very well for making single cell cultures of bacteria after one manages to get the mouth of the pipette in focus of the low power objective. But much time and patience are consumed before this is accomplished. There is a coarse vertical adjustment operated by a screw, but for both horizontal movements the pipette must be manipulated by hand. The difficulty is that the pipette usually touches the side of the moist chamber before it can be centered and must be discarded for fear of contamination, if it does not break.

To provide a relatively fine adjustment for the horizontal movements, the fitting A (Fig. 1) was cut

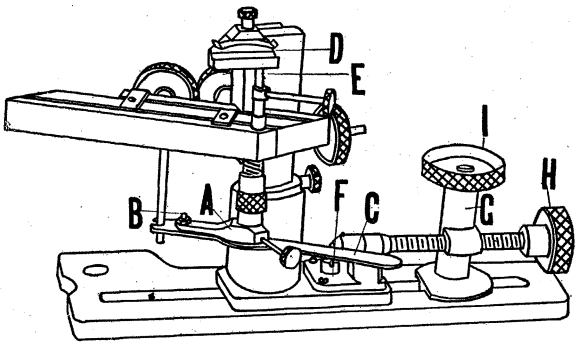

FIG. 1

off and the slotted lever C was secured to it by the bolt B and by engaging the notched end of C into the rod that extends downward from the instrument. A slot in the lever C also engages the screw head at the base of the rod E, which carries the pipette holder D. By moving the handle of the lever C back and forth, the pipette holder also moves back and forth. But its movement is limited by the slot in the lever C. This produces a limited movement of the pipette across the field (from 6 o'clock to 12 o'clock). To move the pipette from right to left, a second attachment is used. The fitting F is securely screwed into the base of the manipulator. The long screw attached to the knob H moves freely in this fitting (F), but engages a thread in the standard G. This standard (G) can be clamped to the runway at any place by turning the knob I. Then turning the knob H moves the pipette from right to left or *vice versa*.

These modifications were designed and made by Mr. Thomas McG. Aiken, of the Aiken Camera Laboratory, Pittsburgh. The writer merely explained to him the difficulties experienced.

The usual technique of blowing and sucking on a tube attached to the pipette was found too difficult by

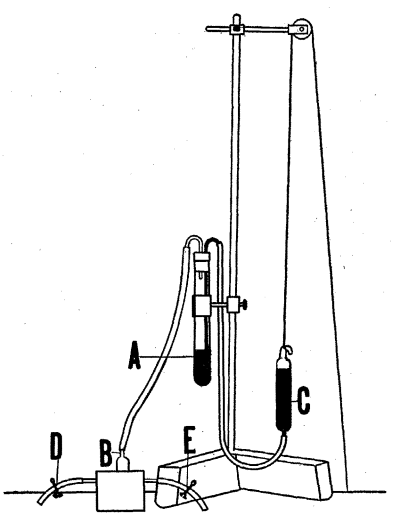

FIG. 2

[2] Fruit and Truck Branch Experiment Station, Hope, Arkansas.