

American scientific development. Following are the titles of the papers. This meeting was presided over by Dr. Thorndike, and the discussion was led by Dr. L. C. Karpinski followed by Dr. W. H. Welch, Dr. Joseph Mayer, Dr. Victor H. Paltsits and others. Discussion proved of great value and importance.

"Influence of the Mathematics of the French Revolution on Mathematics in American Colleges," by Dr. Lao G. Simons, Hunter College.

"Popularization of Science in the American Revolutionary Era," by Dr. Evarts B. Greene, Columbia University.

"A Century of American Geodesy," by Dr. Florian Cajori, University of California.

"Medical Practice in the Old South," by Dr. Richard H. Shryock, Duke University.

Dr. Shryock's paper was given at 12:30 at the complimentary luncheon (by Duke University) conference on the history of science. Dr. H. W. Tyler, of the Massachusetts Institute of Technology, presided.

Following is an extract of the council record.

The Council of the History of Science Society met at the Hope Valley Country Club, Durham, North Carolina, on December 30, 1929, at 4:15 P. M., with President Lynn Thorndike in the chair. There were present the president, Professors Crew, Cajori, Karpinski, Shryock, Simons, Tyler, Welch and Secretaries Brasch and Mayer. Dr. d'Irsay was also present as a guest. The minutes of the last meeting were read and approved.

The following new officers and council members were elected: *President*, Dr. Henry Crew; *vice-presidents*, Dr. William H. Welch, Dr. Berthold Laufer; *members of the council to serve until December, 1932*: Dr. Victor Robinson, Dr. Henry G. Gale, Dr. Richard H. Shryock, Mr. George E. Roberts, Dr. Alfred C. Lane.

The report of the treasurer and corresponding secretary was read and approved. Mr. Brasch gave an account of his efforts to secure a translation of the work of Copernicus and the nominal expenses involved. The report was accepted and placed on file. It was voted to extend the thanks of the council to the Carnegie Corporation of New York for the appropriation of \$7,500 to establish a revolving fund for publications; to authorize the incoming president to appoint a committee of three to be known as the revolving book fund committee to have general responsibility for the administration of the fund, major matters of policy to be passed upon by the council. It was further voted that, if a

translation of the Copernicus manuscript entitled "De Revolutionibus, etc.," is published under the auspices of the History of Science Society, it should be a complete rendition of the original.

In the absence of the editor of *Isis*, the president read two communications from him, after which the following actions were taken: Voted that the council authorize the appointment by the president of an executive committee of five members, the incoming president to be the chairman for the year 1930 and to select the other four members;¹ that the executive committee take up with Dr. Sarton the question of drafting an agreement between him and the History of Science Society regarding the conduct of *Isis*.

President Thorndike presented an interesting account of his contact with the Comité Internationale d'Histoire des Sciences in London, after which it was voted to give consent to the use of the name of the History of Science Society in connection with the International Congress of the History of Science and Technology to be held in London in July, 1931, without involving the History of Science Society in any expense.

Dr. Mayer reported informally regarding the work of the endowment committee and read extracts of letters commenting on the tentative draft of the endowment project previously circulated to the council. The report of progress was accepted and placed on file.

Dr. Thorndike was elected delegate to the American Council of Learned Societies for term of four years.

Mr. Brasch was reelected treasurer and corresponding secretary for 1930.

Dr. Mayer was reelected recording secretary for 1930.

It was voted that the executive committee be asked to take up the question of a redistribution of the functions of the treasurer and the secretaries and report back to the council.

The meeting was adjourned at 6:30 P. M.

After the large amount of important matters of business and election of officers, the members of the council enjoyed a unique and fine Southern dinner prepared under the direction of Dr. Shryock. Following this, the members of the council were taken back to hear President James H. Robinson's address.

The History of Science Society will meet with the American Association for the Advancement of Science in Cleveland in 1930.

FREDERICK E. BRASCH,
Corresponding Secretary
JOSEPH MAYER,
Recording Secretary

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A MICROSCOPE-CENTRIFUGE

THE centrifuge has been used in experimental study of living cells for several types of investigation. First, to determine relative specific gravity and total

volume of granules (which are stratified under centrifugal force) present in living cells. Second, to

¹ At a later date the president reported the following appointments to the executive committee: R. C. Archibald, F. Cajori, H. G. Gale, H. W. Tyler, H. Crew.

surface of slide in which cells are thrown by the centrifugal force. The slide, cut to proper size, is laid on a flat strip of metal, D , with holes at H and H' for passage of light, and held down by the clamp G . Its position in the direction of the centrifugal force can be adjusted by the screw J . The slide can be focused by moving the whole bar, D , up and down on the focus screw F , and additional focusing during centrifuging is obtained by changing the vertical position of the ocular. If the cells are illuminated continuously, the image in the eyepiece, while the centrifuge is running, would be whirling in a small circle. However, if we illuminate the cells for a few microseconds every time they reach a position in the revolution under the light, the appearance will be that of a succession of images, a moving picture. The cells will appear stationary; the granules within will be seen to move under the centrifugal force.

The illumination is a 2,000 volt condenser discharge in mercury vapor at atmospheric pressure or above. The lamps can easily be made by sealing a tungsten wire into one end of a pyrex capillary tube which is partly filled with mercury. A portion of the tube near the other end of the capillary is enlarged to a small bulb and an iron wire pushed down the capillary to the proper distance from the tungsten to form the other electrode for the condenser discharge. This iron electrode is then sealed in with deKhotinsky cement, leaving the bulb filled with air. A heating coil around the capillary, not shown in the illustration, protected from air currents by an enclosing pyrex tube, boils the mercury in the capillary, forming mercury vapor through which the discharge takes place. A reservoir condenser is kept continually charged to 2,000 volts from a transformer and rectifying tube. The discharging condenser, of lower capacity, is in parallel with the reservoir condenser through a high resistance. With each revolution of the centrifuge the contact point *C* on the bakelite disk (*E*) discharges the 2,000 volts through the mercury lamp, and during the remainder of the revolution the condenser is again charged through the

The diagram shows a vacuum tube circuit. An 110V AC source is connected to a 2500 V. transformer. The secondary winding is connected to a network of capacitors (.04 mfd., .01 mfd.) and a resistor (megohm). A rotating contact is connected to the resistor. The circuit also includes a UX 852 vacuum tube and a mercury (Hg) vapor source.

FIG. 2. Lighting system for microscope-centrifuge.
Explanation in text.

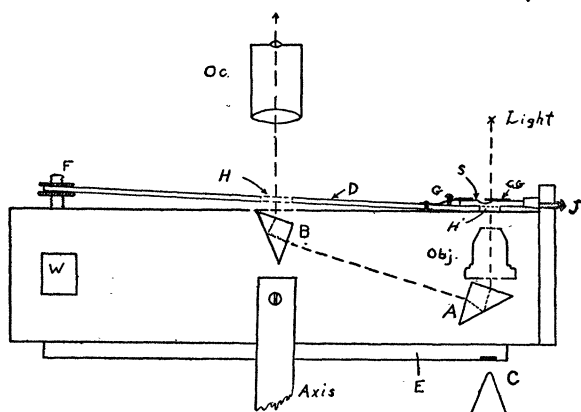


FIG. 2. Lighting system for microscope-centrifuge. Explanation in text.

high resistance and is ready for another discharge. The wiring diagram and lamp are shown in Fig. 2.

The image is remarkably steady with high power objectives ($\times 62$) and we have obtained photomicrographs with the microscope-centrifuge, using a $\times 62$ objective, of bacteria and chromosomes in dividing

cells which can hardly be distinguished from those taken when the cells are at rest.

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SPECIAL ARTICLES

OBSERVATIONS ON THE GROWTH OF CHILDREN

A CLEAR understanding of the statistics of growth can not be obtained through a study of single measurements taken on masses of children of the same age—by the so-called generalizing method, but requires the study of individual amounts of growth. If the generalized series is considered as representative of individual growth, two assumptions are made; the

large and the calculation shows that a standard variation of about 0.5 cm or more must be assumed for irregular variations of stature. This variability of stature, so far as it is not due to chance, has been calculated from observations of children born in various years. It will be understood that the numbers of cases are observations repeated annually, many taken on the same individuals, not all distinct individuals.

Hebrew Orphan Asylum, N. Y.	2,275 boys (born between 1894 and 1916) $\Sigma = \pm .51$ cm
“ “ “ “	2,178 girls (“ “ 1889 “ 1916) $\pm .45$ cm
Ethical Culture School, N. Y.	1,248 boys (“ “ 1889 “ 1916) $\pm .49$ cm
“ “ “ “	1,154 girls (“ “ 1891 “ 1915) $\pm .53$ cm
Newark Academy	3,817 boys (“ “ 1870 “ 1898) ± 1.13 cm

one that the traits of the population represented by children of different ages remain the same from year to year; the other that all children pass through the period of growth at the same rate. Neither of these assumptions is admissible. Observations in Europe show clearly that the size of the body is undergoing secular changes. From the middle of the past century until the beginning of the present century the average stature in Europe increased in every single country. Recent observations also show that the stature of growing children, comparing the years 1880 and 1921, has considerably increased.¹ Besides these increments, which are probably due to better control of diseases of childhood, perhaps also to general improvement in hygienic conditions, there are minor changes which occur from year to year. I have studied the statures of individuals born during the period from 1870 to 1916 from this point of view. When the general variability of stature is known and the number of individuals of each year is given, it is possible to determine statistically what the variability of average statures from year to year would be if there were only accidental causes at work bringing about variations. As a matter of fact, the variability from year to year is on the whole too

The available material is not sufficient to allow us to determine whether there are any cycles of these changes, or what the actual differences of stature from year to year are. We may, however, be certain that variations do exist.

It seems likely that these changes will not influence the course of individual development materially. Much more important is the uneven rapidity with which children pass through the period of development. I have pointed out before² that the variability of physiological age increases very rapidly during life. At the time of birth it may be measured by a few days. That is to say, the total period of gestation differs only by a small number of days. The eruption of the first teeth differs by several weeks. The time of eruption of later teeth is even more variable. The time of reaching maturity varies by more than a year and that of senescence by seven or eight years. While it is not admissible to assume that the variability of any one of these phenomena indicates a general variability in physiological age of the whole organism, all the data combined show that the variability of physiological status increases rapidly during the course of life.

The curve of growth for the body as a whole, as

¹ Robert Rössle and Herta Böning, “Das Wachstum der Schulkinder,” *Veröffentlichungen aus der Kriegs- und Konstitutionspathologie*, Viertes Band, Heft 1, pp. 24 et seq.

² Franz Boas and Clark Wissler, “Statistics of Growth” (Report of the U. S. Commissioner of Education for 1904), Washington, 1905, p. 40.