retary of the Pan American Institute of Mining Engineering and Geology, has been commissioned by the Chilean Government to study fuel technology at the Pennsylvania State College. He plans to spend ten months in studying methods of reducing coal to liquid fuel and metallurgical coke.

BY unanimous vote of the council of the American Association of Pathologists and Bacteriologists, the annual meeting planned for April 1 and 2, at the University of Chicago, has been cancelled. According to a statement issued by Dr. Howard T. Karsner, *secretary,* this action was determined by the great pressure of work due to depleted staffs, the presence of many members in the military service, limitations on transportation, doubt concerning hotel accommodations and the probability that any program that might have been arranged would not be comprehensive. The authorities of the University of Chicago were willing to proceed with arrangements, but the council deemed cancellation patriotic and wise. The council will meet early in April to transact necessary business. Nominations for membership, together with supporting data and not less than two letters of recommendation, should be in the office of the secretary not later than April 1.

AN Associated Press dispatch dated January 27 reports that a joint resolution requesting President Roosevelt to issue a proclamation designating February 11 as Thomas Alva Edison Day has been introduced in the House by Representative Frank L. Sundstrom of New Jersey. Mr. Sundstrom stated that the celebration of Mr. Edison's birthday this year was being directed toward helping to increase war production.

IT is reported in the *Journal* of the American Medical Association that essays for the Lucien Howe Prize of the Medical Society of the State of New York must be received by the chairman of the committee on prize essays, Dr. Charles G. Heyd, 292 Madison Avenue, New York, not later than March 1. One hundred dollars will be presented for the best original contribution on some branch of surgery, preferably ophthalmology, during the annual meeting of the medical society in Buffalo in May.

BY the will of Mrs. Anna Burr, the bulk of her estate of the value of $2,000,000 is bequeathed to the Lankenau Hospital of Philadelphia in memory of her husband, the late Edward H. Burr, one of the chief owners of the old Link-Belt Company. The fund will be used for cancer research.

The Biological Bulletin is publishing, as a separately bound supplement to its February issue, a serial list of all the holdings of the Marine Biological Laboratory Library. It covers approximately eighty pages, and lists with cross references the 2,259 titles of journals in the library. Titles are listed alphabetically to conform to the arrangement of the stacks in the library, and hence should serve as a guide book to the library itself as well as an aid in securing microfilm copies of articles.

DISCUSSION

THE HARDY-WEINBERG LAW

ONE of the basic relations in the genetics of populations is expressed by the statement that in a very large random-mating population in which two alleles A and A′ occur in the frequencies p and q (= 1 − p) the three types AA, AA′ and A′A′ are expected to remain in equilibrium from generation to generation at frequencies of p^2, 2pq and q^2, in the absence of mutation or selection. This theorem, of which a special case was discovered by Pearson (1904), is known in its general formulation as Hardy's law, or Hardy's formula (*e.g.,* Sinnott and Dunn, 1939, Sturtevant and Beadle, 1939, and Dobzhansky, 1941). It is the purpose of this note to point out that the important population formula was independently and simultaneously recognized by the Stuttgart physician, Wilhelm Weinberg (1862–1937). On January 13, 1908, Weinberg gave a lecture before the "Verein für vaterländische Naturkunde in Württemberg" under the title "Über den Nachweis der Vererbung beim Menschen." In the course of a keen exposition of both the difficulties to be met by students of human heredity and of statistical approaches which should help to overcome these difficulties, he derived the equilibrium law. The full lecture was printed in the Jahreshefte of the Verein, Volume 64: 368–382 (1908), and appeared sometime before the fall of 1908 as judged by the stamped entry on the title page of the volume which I have consulted: "Academy of Natural Sciences of Philadelphia, Sept. 28, 1908." Hardy's note in SCIENCE is signed April 5, 1908, and is published in the July 10, 1908, number.

The following is a translation of the relevant section of Weinberg's communication making corrections for three minor typographical errors:

> Quite different is the situation when one considers Mendelian inheritance under the influence of panmixis. I start from the general premise that there are originally present *m* each of pure male and female representatives of type A and correspondingly *n* of each pure repre-

sentatives of type B. If these cross at random one obtains, by applying the symbolism of the binomial theorem, the following composition of the filial generation:

$$\frac{(m\,AA+n\,BB)^2}{(m+n)^2}=\frac{m^2}{(m+n)^2}\,AA+\frac{2\,m\,n}{(m+n)^2}\,AB+\frac{n^2}{(m+n)^2}\,BB$$

or if $m+n=1$

$$m^2\,AA+2\,m\,n\,AB+n^2\,BB.$$

If now the male and female members of the first generation are crossed at random among themselves one obtains the following frequencies of the various cross combinations:

$$m^2\cdot m^2\cdot(AA\times AA)=m^4\,AA$$
$$4m^2\,m\,n\,(AA\times AB)=2\,m^3n\,AA+2\,m^3n\,AB$$
$$2m^2n^2\,(AA\times BB)=2\,m^2n^2\,AB$$
$$4\,(mn)^2\,(AB\times AB)=m^2n^2\,AA+2\,m^2n^2\,AB+m^2n^2\,BB$$
$$4m\,n\,n^2\,(AB\times BB)=2\,m\,n^3\,AB+2\,m\,n^3\,BB$$
$$n^2n^2\,(BB\times BB)=n^4\,BB$$

or the relative frequencies

$$AA:m^2\,(m+n)^2$$
$$AB:2m\,(m+n)^2n$$
$$BB:(m+n)^2n^2$$

and the composition of the second filial generation is again

$$m^2\,AA+2\,m\,n\,AB+n^2\,BB.$$

Thus we obtain under the influence of panmixis in each generation the same proportion of pure and hybrid types. . . .

While Weinberg's paper, like Mendel's, appeared in an obscure journal, its failure to be recognized can not be ascribed to this fact alone. His later contributions dealing with extensions of the statistical treatment of the genetics of populations are found in the "regular" journals. These papers have received some attention (*e.g.*, Sewall Wright, 1930) and in them Weinberg refers to his 1908 pioneer work. However, both Weinberg and Hardy were ahead of contemporary thought and similar problems were not generally considered for at least eight years. At that time perhaps Hardy's name and the prominent place of his publication both helped to leave Weinberg's contribution neglected.

Hardy as a mathematician did not follow up his discovery by any further consideration of its genetic implications. Weinberg in 1909 reformulated his theorem in terms valid for multiple alleles—at a time when no case of multiple alleles had been discovered in man nor in plants and even Cuénot's demonstration of multiple alleles in the mouse had remained unnoticed. He also for the first time investigated polyhybrid populations and recognized their essentially different method of attaining equilibrium. Considering these facts it seems a matter of justice to attach the names of both the discoverers to the population formula.

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THE SHOT-PUT AND THE EARTH'S ROTATION

IN SCIENCE for August 28, 1942, Joseph O. Thompson cites with skepticism a recently published statement[1] to the effect that the earth's rotation enables an athlete to put the 16-pound shot farther toward the east than toward the west. As a matter of fact there was nothing new about the statement. Artillerists in all the world's armies have been aware of the very definite effect of terrestrial rotation upon the ranges of projectiles for generations and have corrected the aim of long-range guns accordingly as a matter of regular routine.

The effects upon the ranges of athletic projectiles are not large but they are definitely larger than the precision of measurement which is implied when a hammer throw is recorded in the record book as, for example, 176 ft. 11⅛ in. or a shot-put as 52 ft. 6 3/16 in. These effects have nothing to do with the drag of the air and are in addition to any consequences deriving from the fact that gravity itself depends partly upon the centrifugal forces of our rotational motion. They are due rather to the fact that the gravitational pull upon the projectile is applied in a constantly changing direction as the earth turns, and to the further fact that the landing surface does not await the arrival of the projectile in the same relative position as it occupied when the firing occurred, but instead drops away from the projectile to the eastward or rises to meet it from the west, thus either extending or curtailing the measured range. Nonmathematical explanations are, of course, incomplete.

A few years ago the writer of this note published an article[2] upon this and other inaccuracies in the metrology of sport, inaccuracies which have, beyond the slightest doubt, imposed definite and calculable handicaps upon some competitors while favoring others. Reprints of this article were sent to all the several hundred committeemen of the Amateur Athletic Union of the United States in the faint hope that improvements in the handling of the data of field sports might result. One committeeman acknowledged receipt of the reprint but there has been nothing to indicate that any of them read it.

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THE WATER HYACINTH IN CALIFORNIA

THE water hyacinth, *Eichornia crassipes* (Mart.) Solms, which became a serious hindrance to navigation in the streams of Florida, has been known from a few isolated localities in California for a good many years. In 1922 Jepson[1] reported it as occurring at

[1] *Collier's*, July 4, 1942, page 6.
[2] *Scientific American*, April, 1937.
[1] W. L. Jepson, *A Flora of California*, 1: pt. 6, 247, 1922.