This renders it possible to deal with the triangulation of all three of these countries in one grand computation,—a possibility not equalled anywhere else in the world at present.

More than 15,000 miles of precise leveling has been done in the United States in the past decade, all of the highest standard of accuracy. The total for the United States previous to 1912 was 30,000 miles, of which a part was of a lower grade of accuracy than the recent work. This leveling is primarily for engineering purposes for the control of surveys upon which good maps depend. But in due time the reviewer believes it will be found of much value to science as a means of measurement of the slow geological changes in the relative elevation of different parts of the earth's surface. Such changes may be detected at the coasts by direct reference to the mean surface of the sea. In the interior of a continent the precise leveling, repeated for this purpose, will furnish the only means for determining changes in relative elevation comparable in accuracy with the shore studies just referred to.

Among the more important improvements in apparatus made in the past ten years may be mentioned: (1) improvements in the precise leveling instrument, which many years of use had already shown to be the best instrument for its purpose in the world; (2) improvements in the precise level rods; and (3) improvements in the half-second pendulum apparatus and its auxiliaries intended to enable one to make the observations more rapidly and economically without any reduction of accuracy.

The brief statements which have been made show the character of the information given in the report, and some of the reasons why all who are interested in geodesy should have a copy. The report contains numerous especially well prepared maps showing the places at which each of the various classes of observations—astronomic observations, triangulation, gravity determinations, precise leveling—have been made. It also contains the best available summary, in several separate topical lists, of the bibliography of geodesy and closely related subjects in the United States in the past decade.

JOHN F. HAYFORD

SPECIAL ARTICLES

A HAPLOID MUTANT IN THE JIMSON WEED, "DATURA STRAMONIUM"

THE normal Jimson Weed is diploid (2n) with a total of 24 chromosomes in somatic cells. In previous papers[1] the finding of tetraploids (4n) with 48 chromosomes and triploids (3n) with 36 was reported, as well as unbalanced mutants with 25 chromosomes represented by the formula (2n + 1). The finding of two haploid or 1n plants, which we are now able to report, adds a new chromosomal type to the balanced series of mutants in *Datura*. This series now stands: 1n, 2n, 3n, 4n. Since a series of unbalanced mutants has been obtained from each of the other balanced types by the addition or subtraction of one or more chromosomes, it is possible that a similar series of unbalanced mutants may be obtainable from our new haploid plants, despite the great unbalance which would thereby result.

The haploid individuals were two from a number of plants of abnormal appearance secured in an attempt to induce chromosomal irregularities by the application of cold as a stimulus. The large amount of bad pollen consistently found in its flowers—80 per cent. and more empty grains have been counted—indicated, even before chromosome counts were made, that we were not dealing with a mutant of a previously known type. A detailed study of the assortment of chromosomes and of the possible breeding behavior is being undertaken. The cytological data so far as obtained, however, may be briefly summarized.

The late prophase, or metaphase, of the first division in pollen-mother-cells shows 12 unpaired chromosomes only. The cortex of the lateral roots also shows 12 chromosomes.

The 12 chromosomes in the pollen-mother-cell undergo a "reduction" into 3+ 9, 4+ 8, etc. These reduced groups divide in the second division forming usually 4 nuclei and subsequently 4 cells. The resulting young pollen grains with less than 12 chromosomes apparently all abort.

[1] SCIENCE, 1920, N. S. 52: 388-390; *Amer. Nat.*, 1921, 55; 254-267; *Amer. Nat.*, 1922, 56: 16-31.

Non-reduction takes place in some cells, as already described in triploid plants[2], resulting in 2 giant cells from each pollen-mother-cell instead of the 4 pollen grains expected after reduction. The pollen-mother-cells are about half the volume of the pollen-mother-cells of diploid Daturas. Apparently the giant cells form the surviving pollen grains of the haploid. Since they are half the size of mother-cells from which they arise (or one quarter the size of the mother-cells of diploids) they are equal in size to normal pollen grains of diploids and may be expected to function in the same manner.

Haploidy is the normal condition in gametophytes of all plants and is a regular occurrence in the males of such insects as honey bees, which, however, fail to undergo reduction at the formation of gametes. It has been reported as an occasional phenomenon in sporophytes of ferns.

A haploid plant in *Datura* is a genetic novelty among flowering plants for two reasons: first, it is a sporophyte and yet has the somatic chromosome number characteristic of the gametophyte of the species; and second, the chromosomes while in monosomes, or sets of one each, still undergo a process of reduction though without synaptic mates.

A. F. BLAKESLEE
JOHN BELLING
M. E. FARNHAM
A. DOROTHY BERGNER
CARNEGIE STATION FOR
EXPERIMENTAL EVOLUTION

THE MASS OF THE ELECTRON AT SLOW VELOCITY

ALL assumptions regarding the form of the electron in motion, with the possible exception of the Parsons magneton, lead to expressions for the longitudinal and transverse masses such that the mass of the electron at slow velocity is a constant, m_o, independent of the direction in which the inertia test is applied.

An experimental confirmation is being carried out with an apparatus similar to that previously used by one of the authors[1] except that the cold cathode is replaced by an incandescent filament to assure the presence of all possible velocities at the same time.

If an electron beam accelerated by a given discharge voltage emerges from a tube in the anode into the region between two horizontal metal plates forming an electrostatic field and if the electrostatic field be produced by the same voltage as the discharge, or a constant fractional part of it, then the point where the beam will strike the lower (positive) plate is independent of the discharge voltage and hence independent of the velocity of the electrons provided the transverse and longitudinal masses be equal. This will be the case for velocities below 10,000 volts.

Visual results show the position of the spot on the phosphorescent screen deposited on the lower metal plate to be independent of the exciting voltage, thus confirming the equality of the masses at slow velocity. The photographic record of spot position and a more complete description will be given later.

The method is equally applicable to electrons of high velocity. The experimental work of verifying the expressions for the transverse and longitudinal masses at high velocity is being continued.

L. T. JONES
H. O. HOLTE

THE HYDROGEN-ION CONCENTRATION OF SOILS AS AFFECTED BY DRYING[1]

MUCH interest has been manifested of late in the determination of the concentration of hydrogen-ions in agricultural soils and in the study and possible correlation of data thus secured. It was my privilege to attend the meetings of the American Chemical Society in New York last fall and, in one of the sections, to listen to a somewhat lengthy discussion of the probable effect of drying and heating soils on their P_H values. The discussion was of necessity largely a matter of opinion due to the paucity of experimental data bearing directly upon this phase of the subject.

During the past few months, in connection with research projects relating to the subjects of acidity and aluminum toxicity in soils, the

[2] Belling, John, and A. F. Blakeslee: "The assortment of chromosomes in triploid Daturas." In press for *Amer. Nat.*

[1] L. T. Jones: *Phys. Rev.*, 8, p. 52, 1916.

[1] Contribution 286 of the Station.