

Shull, which shows that some of the unit characters of the mutants have a much greater variability than the corresponding features of the parent form, and the greater amplitude of the fluctuations is coupled with a decreased correlation. Thus the coefficient of variability of *nanella* is 31.84 ± 3.16 per cent., while of *Lamarckiana* it is 5.37 ± 0.44 per cent. The greater variability of the mutants does not, however, seem to result in any diminution of the gap that separates them from the parent form, and no movement in this direction has been observed in the long period which has elapsed since the new species came into existence. A bibliography is added.

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PROCEEDINGS OF THE CLUB

WEDNESDAY, MAY 31, 1905

The meeting was held in the evening at the American Museum of Natural History, President Rusby in the chair and eleven persons present.

A report was received from President Rusby of the favorable action of the Council of the Scientific Alliance on Professor Richards' application for a grant from the Herrman fund. Attention was called also to the movement on the part of the Alliance toward raising a fund of \$10,000, the income of which would be used to lighten the present assessments of the individual societies.

A communication from Dr. A. J. Grout, President of the Hulst Botanical Club of Brooklyn, requesting that it be allowed to coöperate with the Torrey Club in the excursions was referred to the Field Committee with power.

The following were elected to membership: Miss Madeline Pierce, Miss Mary McOuat, Miss Anna M. Clark, Miss Clara K. Hicks, Mr. C. C. Doorly, and H. J. Goeckel, Phar.D., New York City; Miss Dorothy Young, Passaic, N. J.; and Norman Taylor, Yonkers, N. Y.

On motion, a resolution was adopted authorizing the member-

ship committee, during the summer interruption of meetings, to receive applications for membership accompanied by the fee, and to accord such applicants all the privileges of regular membership.

The first paper on the scientific program was by Dr. C. Stuart Gager, and was entitled "Preliminary Notes on the Effect of Radio-activity on Plants." Plants grown in the presence of radium are subject to four different influences: (1) the α -rays, composed of a stream of material particles bearing a charge of positive electricity; (2) the β -rays, made up of a stream of particles $1/2,000$ the size of those of the α -rays and carrying a charge of negative electricity; (3) the γ -rays, analogous to X-rays, but much more penetrating; (4) the emanation, which in a process of "decay" gives off α -rays as described, and eventually the β - and γ -rays mentioned above. The emanation behaves like a very heavy gas and may be condensed on a solid surface at a temperature of 150° C. The influence of radium upon plants, therefore, is of the nature of radiant energy.

The radium was employed in the form of the salt, radium bromide, of three strengths of activity, 1,500,000, 10,000, and 7,000, enclosed in sealed glass tubes; and also in the form of celluloid rods and cylinders covered with Lieber's radium coating of 10,000 and 25,000 activity. The glass shuts off practically all the α -rays; the β -rays penetrate through the glass more easily, while the γ -rays pass through glass very readily. By the use of the coated rods and tubes all three kinds of rays as well as the emanation are available.

The experiments indicate that the rays act as a stimulus, which varies in intensity with the strength and amount of radium used, the thickness of the seed-coats, distance of exposure and the intervention of moist soil between the radium and the plant. If the stimulus ranges between a minimum and an optimum, germination and subsequent growth are accelerated. Within these limits the rate of alcoholic fermentation is at first increased, but continued exposure may result in over-stimulation and consequent decrease in rate.

By over-stimulation, germination and growth of seeds, gemmae of *Hepaticae*, and pollen-grains are retarded and may be com-

pletely inhibited. Under the influence of the rays, chloroplasts change their position in the cell, as under too intense illumination, and they are eventually destroyed, as is embryonic tissue in stems and roots.

Results similar in kind to the above are obtained by the use of radio-tellurium in a sealed glass tube. The influence here is confined chiefly to the α -rays. Experiments with a rod coated with polonium, which gives off α -rays exclusively, have thus far given negative results.

Growth is retarded and may be inhibited by growing plants in an atmosphere containing the radium emanation, such as may be drawn from a cylinder lined with Lieber's coating.

Photographs of the experiments, and specimens of the various radio-active preparations were exhibited. The paper was the occasion of considerable discussion. The second paper entitled "Some interesting Plants from Colombia" was by Dr. H. H. Rusby.

In view of the lateness of the hour Dr. Rusby stated that he desired to reserve his paper, as planned, for some future meeting when he could take the time to treat it more adequately, and for the present he would show some of the more interesting specimens and comment briefly upon them.

The collections were made by Herbert H. Smith, who spent four years collecting in the United States of Colombia near the town of Santa Marta, which is about fifty miles from the coast in the Sierra Nevada mountains. Although this territory was collected over quite extensively by Karsten, whose collections are at St. Petersburg and consequently not readily accessible, and by Wm. Purdy and various orchid collectors, Mr. Smith's efforts disclosed many novelties.

The total collection studied contained about 3,000 numbers, embracing between 2,300 and 2,400 species, of which number about fifteen per cent. are likely to prove new to science.

The specimens exhibited were most interesting, embracing arborescent Violaceae, handsome twining Bignoniads and Senecios, showy Vacciniaceae, numerous anomalous Compositae, and many other things unfamiliar to collectors in temperate climes.

Adjournment followed.

EDWARD W. BERRY,
Secretary.



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