(2) One hour's heating at 50° only produces a very slight change in α. After 55°, an increase in the rotatory power is observed and the rate of the increase becomes considerable as soon as 60° are reached. The increase is always much more rapid in the first minutes of heating. The slope of the curve representing the phenomenon is less marked as the time of heating increases. (Heating in sealed tubes.)

(3) When 10-cm tubes are used, the readings are no longer possible, on account of the darkening of the field, after an increase of, roughly, 0°80 in the angle of rotation is observed. This darkening occurs generally, whether the serum is heated for two hours at 58°, one hour at 59°, forty minutes at 60°, twenty minutes at 61°, five minutes at 64° or two minutes at 68°. It limits the readings, so that no greater increase in the angle of rotation was observed. However, these figures are not absolute, and refer to one kind of serum. Different sera may yield slightly different values.

These results are interesting if we compare them with the data obtained from viscosity measurements. From the latter we know that up to 50° C. the physico-chemical properties of the serum are not permanently affected. The polarimeter shows that no chemical modification occurs up to that temperature. The slope of the viscosity curve as a function of temperature begins to change after 50°, and reaches a minimum between 56° and 58°. At the same temperature, the angle of rotation shows a marked increase. After 59°, the viscosity increases, and this increase becomes very rapid when 62° are reached. The same phenomenon characterizes the rotatory power.

We therefore believe that it may be concluded that the alteration in the structure of the protein molecules, the chemical phenomenon which is followed by means of the polarimeter, is the underlying cause of the physical perturbation in the colloidal equilibrium of the serum on the one hand, and of the biological perturbation—the "destruction of the complement"—on the other hand. The darkening of the solution, which does not influence the rotatory power, is probably the optical expression of the physical changes in the solution which affect the viscosity.

INSTITUT PASTEUR, PARIS P. LECOMTE DU NOÜY

INHERITANCE IN LETTUCE

IN an investigation conducted at the Illinois Agricultural Experiment Station for five years, the author made crosses between representative varieties of heading, leaf and Cos types of cultivated lettuce. Crosses were also made between these and the lobed and unlobed forms of the wild *Lactuca scariola* L. found in central Illinois. Some crosses were grown to the fourth generation.

In making the crosses, Oliver's method of depollenation by means of a stream of water was employed. The investigation has shown that both cultivated lettuce and the wild forms of *L. scariola* are largely self-fertilized.

The Big Boston, May King and wild forms have anthocyanin pigment in their leaves and stems, while Grand Rapids and Paris White Cos have none. Five crosses were made involving pigmented and unpigmented parents. Inheritance was found to take place in simple Mendelian fashion in four crosses. Influences which interfered with normal segregation and recombination were apparently in operation in the cross unlobed Wild × Paris White Cos, and it was not determined conclusively how inheritance occurred. Anthocyanin pigment was dominant in all cases.

The plants which carried anthocyanin pigment in stems and leaves were found, without exception, to have ray florets with blue pigment on their undersurfaces. Anthocyanin in stems and leaves and in the ray florets were, therefore, inherited in the same manner. The two conditions are due either to one and the same gene or to two completely linked genes. The single-gene interpretation appears to be the more probable.

Six crosses were made which involved black- and white-seeded parents. Black seeds proved dominant in all crosses. Inheritance took place on a simple Mendelian basis, but in the cross May King × lobed Wild an influence was in operation which consistently caused a deficiency in the number of black-seeded plants in F_2.

Five crosses were made between the prickly wild forms and cultivated varieties. Inheritance of prickliness apparently took place on a simple Mendelian basis, but in four crosses the ratios deviated significantly in some families from the expected proportions. In the cross May King × Wild, the F_2 ratios deviated widely in 1915 but were approximately normal in 1916 and 1917. The prickly condition was dominant in all crosses.

In crosses of the unlobed Big Boston and May King varieties with the lobed wild *L. scariola,* two pairs of factors acting in a complementary manner were apparently involved. In a cross between the same lobed strain and an unlobed wild form, inheritance took place on a simple Mendelian basis. Lobed leaves were dominant in all three crosses.

Differences in leaf length, leaf width, width index, leaf area, time required to produce flowers, plant height and rosette habit were found to be inherited in a quantitative manner. The F_1 generations were found to be no more variable, as a rule, than the parental types. Increased variability and segregation were shown by the F_2 generations. Certain genes

of the wild forms were apparently more or less dominant to their respective allelomorphs of the cultivated varieties with respect to some characters. Skewed and multimodal effects were manifested by some frequency distributions. Paris White Cos was the only cultivated variety which gave evidence of having any quantitative characters dominant to those of the wild lettuce. F_3 and F_4 generations gave further evidence of segregation. In practically all crosses it was found possible to establish new types, of comparatively low variability, in F_3 and F_4, with higher or lower mean values, or both, than those of the parent varieties.

The wild forms of lettuce gave evidence of being more heterozygous for some quantitative characters than the cultivated varieties. This difference is believed to be due to the effect of artificial selection in promoting the development of fairly homozygous cultivated varieties, while in the wild forms there has been no restraint, other than that of natural selection, to the perpetuation of mutations which have probably occurred with respect to quantitative characters.

The investigation indicates that the growth of lettuce is highly susceptible to environmental influences.

Cultivated varieties apparently possess genetic combinations which respond more favorably to moist weather conditions than those of the wild forms.

The results of this and other investigations indicate that in many cases modified and deviating Mendelian ratios may be the result of linkage of quantitative genes with genes affecting fertility or sterility which are highly responsive to variations in environment.

Castle's proposed method for estimating the number of pairs of genes involved in quantitative inheritance is not adapted for the purpose so far as lettuce is concerned, and it is believed to be inadequate in practically all cases of quantitative inheritance.

The results indicate that cultivated lettuce probably developed from the wild *Lactuca scariola*. The differences can be accounted for very largely, if not entirely, by the appearance of mutations in dominant genes, coupled with the cumulative effects of artificial selection in perpetuating modifications which have served the purposes of man.

The method of nomenclature originally proposed for cultivated lettuce by Linnaeus and recently revived by Bailey (1924) is supported by the results of this investigation.

This preliminary report is made in order that the more important results of the investigation may be placed on record. A more detailed account of the experiments will be published at a later date.

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THE NATIONAL ACADEMY OF SCIENCES. III

A Pleistocene avifauna from Florida (illustrated): A. WETMORE (introduced by David White).

Mountain building in Fenno-Scandia and pre-Cambrian correlation: J. J. SEDERHOLM (by invitation). In Fenno-Scandia several different epochs of mountain building can be distinguished. The mountain chains of different age intersect each other and show no parallelism in their strikes. Thus at the Arctic coast three mountain chains of different ages, directions and character occur near to each other. In the "Karelides" of eastern Finland, old mountain chains with a prevalent north-northwesterly strike, the intensity of the diastrophism varies greatly in different zones. In some areas the rocks are slightly disturbed and feebly metamorphic; in others they are strongly folded, highly metamorphic and intimately injected with granitic veins, thus presenting the character which is common in the Archean. The character of the disturbances has been, as lately shown by Wegmann, very similar to those which have taken place in the Alps. There have existed simultaneously more or less resistant areas, and the folding has not been uniform or ubiquitous. The author thinks that there is in general no certain evidence of a ubiquitous folding in pre-Cambrian time. Much of the correlation of pre-Cambrian series in different parts of the world has been based on that wrong presumption and must therefore be revised. Rocks which show a "Proterozoic" type in some parts of the world may be expected to be extremely crystalline and intimately injected by granite in another, and a correlation based on the relation of the sedimentary deposits to epochs of diastrophism will be possible only if we are able to show which are really synchronous. Analogies in the character of sediments, caused by climatological differences, world-wide epochs of volcanism, etc., may give further criteria to their correlation. Only by a detailed comparative study of pre-Cambrian rocks in different parts of the world will it be possible to work out their correlation and succession. In Fenno-Scandia alone, at least three or four great cycles of pre-Cambrian sedimentation exist, separated by periods of diastrophism and base leveling. The length of pre-Cambrian time, as measured by the sedimentary record, must be longer than that of all post-Cambrian time.

The rock suites of the Pacific and the Atlantic Ocean basins: HENRY S. WASHINGTON. At each of various regions of the earth the igneous rocks of a given region resemble each other (in mineral and chemical characters), so that one region may be very different from, or may be very like to, other regions, so far as its rocks go. Such regions of related rocks are called petrographic provinces. The petrographic provinces on the largest scale are the various continents and the floors of the various ocean basins. All the continents are made up for the most part of granitic rocks, while the ocean floors are composed largely of basalts, which are very different in many respects from granites. We can judge of the kind of material that forms the ocean floors by the lavas that