requests for study material for colleges, high schools and elementary schools were met with material for the instruction of nearly 260,000 pupils. The Local Flora Section, of about three acres, was opened on May 9. This area is planted on an ecological basis. The total budget of $165,690 represented a decrease of income of $22,782 as compared with 1932, a loss of approximately 12 per cent. The loss of available income as compared with 1930 was $46,873. During the year the sum of $10,232 was added to the endowment fund. The year was closed without a deficit and without vacating any positions.

DISCUSSION

A RARE SPECIMEN OF ZEA MAYS VAR. SACCHARATA[1]

A SPECIMEN of maize, collected by Earl H. Morris, archeologist, and identified by the writer as *Zea Mays var. saccharata,* is of special interest because of the fact that it is the only specimen of sweet corn so far identified from the numerous historic collections of corn recovered in the United States. This specimen is found in the American Museum of Natural History. Through the courtesy of the curator in chief, Dr. Clark Wissler, the writer secured the loan of this specimen for determination and study and it is described as follows:

Zea Mays var. saccharata
Aztec sweet corn
Specimen No. 29–0–9397

Length of ear 3.75 inches, diameter 1 inch at butt, tapering. Eight-rowed, regular. Kernels broad and shallow, measuring 5/8 of an inch broad, 2/8 of an inch long, cuneate to truncate, central area distinctly depressed, forming a marginal ridge, pericarp coarsely wrinkled, color pale amber, endosperm translucent, hard and brittle. Embryo completely disintegrated, color dark brown. Starch grains small, many poorly formed and tending to aggregate. Cob buff color. Ear enclosed in a husk 7¼ inches long, shank 2½ inches long bearing 5 nodes. The kernels are homozygous throughout and possess the severe wrinkling and translucent horny endosperm typical of sweet corn. The size, color and 8-rowed character are highly suggestive of Golden Bantam, a popular present-day variety.

The question has been raised as to the possibility of this being an immature specimen of field corn. The condition of the kernels in the upper half of the ear give evidence that the ear was plucked while still immature. The kernels towards the base of the ear are fully developed and show the wrinkled pericarp and translucent endosperm typical of sweet corn.

The specimen was collected by Mr. Earl H. Morris, who furnished the writer the following statement regarding its history.[2]

The ear of sweet corn from Room 139 of the Aztec Ruin, New Mexico, came from a refuse deposit laid down during the Mesa Verde phase of Pueblo III. The Aztec Ruin was built between 1110 and 1121 by a group of Chaco people, occupied for a time, then abandoned, and finally reoccupied by groups representative of the Mesa Verde strain of Pueblo culture. In accordance with Dr. Douglass' findings, the entire San Juan country was abandoned not long before or after 1300 A. D. In view of these facts it would be safe to estimate that the ear of corn in question was grown between the years 1200 and 1300.

The fact that sweet corn existed in pre-Columbian times is proved by this specimen. Since it is the only historic specimen so far identified in the numerous archeological collections of maize, doubt is expressed as to sweet corn being either a wide-spread or an important Indian food plant in the United States in the pre-Columbian period. The theory of its origin as a mutant of field corn is in harmony with the genetics of the corn plant.

The fact may also be noted that, among the numerous collections of historic corn from Peru, apparently but one specimen of sweet corn has so far been identified. This specimen was collected by M. Uhle under the direction of Dr. A. L. Kroeber, of the University of California, to whom we are indebted for the loan of this ear. This specimen, termed Huamachuco corn of the Inca period from northern Peru, was identified by Hendry[3] as sweet corn, a determination with which we do not wholly agree. This specimen we think belongs to the starchy sweet corn *Zea amylsaccharata* of Sturtevant. The starchy character of the endosperm is much more pronounced than in the pseudo starchy sweet corn of Jones. At any rate, it is interesting to note that sweet corn material is apparently rare in the maize collections from Peru, which seems to run parallel to the situation in the United States.

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[1] Journal Paper No. J 146 of the Iowa Agricultural Experiment Station, Ames, Iowa.

[2] Earl H. Morris, letter to author under date of November 20, 1933.

[3] Huamachuco corn by Hendry. *Jour. Amer. Soc. of Agron.*, vol. 22, 1930.

A CONCEPT OF COLLOIDAL SYSTEMS BASED ON PROBABILITY

THE two most important features upon which the nature of the colloidal state is generally predicated are the size and surface of the colloidal particle. This state is further characterized by the postulate of heterogeneity, which is a general, almost metaphysical hypothesis that the particle in the colloidal state is different from the medium in which it is dispersed.

Most formal definitions of colloids, or the colloidal state, are dependent on the concept of size of the particle. It has been pointed out that many reactions of colloids are not amenable to stoichiometric interpretations. The clear-cut proportionality between reactants usually prevalent in molecularly dispersed systems is almost entirely absent in colloids. Another difference between colloidal and crystalloidal systems is the ready reproducibility of the latter and the difficult reproducibility of the former when tested by the known indices.

The writer proposes a concept of the colloidal state based on a general probability hypothesis. A brief exposition is given below. An aqueous solution of sodium chloride is an example of a crystalloidal system. If one considers a hollow unit cube of 10 Å side length and moves this cube a distance of at least 10 Å, the probability is unity that the composition of this second cube is the same as that of the first cube. In fact, the composition of any cube of 10 Å side length is the same throughout the whole solution. So one may say that in an aqueous solution of sodium chloride one deals with a homogeneous system, homogeneous with respect to a unit cube of 10 Å side length. Theoretically, it is possible to choose a unit cube so small that moving it a distance equal to the length of a side of the cube gives a cube of different composition.

On the other hand, if one considers a colloidal system, such as a platinum hydrosol, the situation is different. It has long been known that the composition of platinum sols is complex. Pennycuick assigns them the general formula: $\chi Pt\ yPtO_2\ zPt(OH)_6H_2$. If one takes a unit cube of 10 Å dimension in a platinum sol and moves it a distance of 10 Å through the hydrosol, the probability of encountering a cube of similar composition is no longer unity, as was the case in crystalloidal sodium chloride solution. What the probability of finding a cube of similar composition is, is not known. It would be dependent on the history of the sol. The size of the unit cube chosen depends on the colloid under consideration.

A characteristic of colloidal systems which has been used to distinguish them from crystalloidal systems is the tendency of the former to change. The concept of probability can be applied in the following manner. Referring again to the system of aqueous sodium chloride, one sees that equilibrium is established almost instantaneously on dissolving the dry sodium chloride in water. Further, once equilibrium is established there is no tendency for the system to change in composition. In other words, the probability of change is practically zero. In contradistinction, a platinum sol is undergoing a slow, gradual change. Interpreted in the light of the above concept, a colloidal system is one in which the probability of change is greater than in a crystalloidal system. Changes due to the addition of electrolyte or those due to temperature and pressure are not considered. One deals with closed systems in which the tendency to change is a function of time. In equilibria of this nature probability can serve as a measure of this tendency to change.

The writer offers the above concept simply as a philosophical approach to colloids and not as an experimental index of distinguishing them from crystalloids.

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THE SMALL LINEAR UNITS

IN SCIENCE, Vol. 79, No. 2043, page 184, Dr. J. F. McClendon comments as follows:

> A more serious error is often made in the conception of the micro-meter, which is a millionth of a meter and not a thousandth of a millimeter. A micro-meter is abbreviated μ, and the micro-micro-meter μμ. Many persons imagine that a micro-meter is a thousandth of a millimeter and suppose that a micro-micro-meter is a thousandth of a micro-meter, whereas it is a millionth of a micro-meter.

Dr. McClendon's argument seems to be based on the assumption that the prefix "micro" means millionth, whereas the Greek μικρός merely indicates small, little, trivial. It is true that science repeatedly uses the prefix to mean millionth, and in this specific case the argument is supported by many standard reference books. The "Handbook of Physics and Chemistry" (eighteenth edition, page 1630) gives, "Micromicron (μμ) 1×10^{-12} meter." Other items in the same table show clearly the consistency of this notation.

On the other hand, Professor Manne Siegbahn, of the University of Uppsala, discussing "Spectroscopy" in the fourteenth edition of the Encyclopoedia Britannica (Vol. 21, page 183) mentions the "micron (μ), which is one-thousandth of a millimetre." In Webster's New International Dictionary (page 1337) under "measure" may be found "micron 0.001 mm" and "micromillimeter, micromil, 0.000001 mm." Again, on page 2548, under "Arbitrary Signs Used in Writing and Printing, VII, Miscellaneous," "μ micron, μμ thousandth of a micron." Many textbook writers have adopted this notation. See Grimsehl: "A Text-book of Physics," Vol. III, page 646;