into the dark liquid and then bounce out again. To find out what really happens we have only to inspect the photographs of the drop as it enters the liquid. It forms a hollow bowl or crater six or eight times its own size (in diameter), the milk flowing up the steep sides in radial streams; surface tension then pulls down the walls of the crater, the milk streaming back from all sides towards the center of the crater from which a fountain rises, carrying the reconstructed milk drop upon its summit.

Even more interesting is the study of the difference in the nature of the splash in the case of a highly polished marble and one which has had its surface roughened with sand paper. In the former case we have what Worthington has named the "sheath" splash, which is characterized by a very curious flowing up of the liquid around the surface of the sphere as it enters the water, the marble entering the liquid with little or no sound and the production of no bubbles. If the surface is roughened the liquid does not glide up the surface but shoots off tangentially to the sides, forming the "basket" splash, which is distinctly audible, and is followed by a violent bubbling of the liquid. The author advises every one to have a bag of marbles hung up in the bath-room, and repeat these experiments in the bath-tub. In addition to the wonderfully interesting photographs there is much valuable and entertaining descriptive matter, and the theory of the phenomenon of the splash is very fully discussed in its relation to surface tension, gravity, viscosity of the fluid, etc.

As the author points out a kinetoscope capable of securing a continuous series of pictures showing all of the various phases of a single splash is much to be desired. Such an instrument ought not to be difficult to construct. It would not be necessary to have the film brought to rest for each exposure, as is the case in the ordinary instrument, provided the illumination was effected by properly timed electric sparks. The most interesting stages of the phenomena are over in about two tenths of a second, and it would be necessary to secure about one hundred photographs during this space of time. When run through the machine at the rate of seven per second we should have a quarter of a minute to study the phenomenon. The sparks could be timed by putting a make and break in the primary circuit of an induction coil, so arranged as to be operated by the mechanism which carried the film along.

R. W. WOOD

SPECIAL ARTICLES

A NOTE CONCERNING INHERITANCE IN SWEET CORN

IN the polymorphic species, *Zea mays* L., the sweet corns, called *Zea saccharata* by Sturtevant, have been considered as a single subspecies group characterized by a hard, translucent and more or less shriveled condition of the endosperm. Correns[1] has shown that this character is due simply to an inability to complete the formation of normal maize starch, and further, that the presence and absence of this starch-forming ability act as an independent character pair in inheritance. No other feature is peculiar to the group: varieties characterized by black aleurone cells, red pericarp, yellow endosperm and the other salient points common to dent and to flint corns, are all found in the sweet corns. Their claim as a subspecies group thus rests entirely on the first-mentioned character.

The following evidence, however, indicates that sweet corn varieties do not belong to a unit group, but consist both of dent corns and of flint corns which have lost their original starch-forming power. This condition may have come about through mutation in each of these groups, but from what we know of the early history of the sweet corns, it is more likely that the change took place among the flint types and was extended by hybridization.

The dent corns are distinguished by a corneous starchy part of the endosperm which lies at the sides of the kernel and surrounds

[1] Correns, C., "Bastarde zwischen Maisrassen mit besonderer Berücksichtigung der Xenien," *Bibliotheca Botanica*, 1901.

a zone of white starchy matter extending from the tip to the cap, where it forms a layer varying in thickness in different varieties. The shrinkage of this cap starch forms the indentation of the kernel. In the flint corns this soft starch at the cap is replaced by corneous starch, thereby giving the outer portion of the kernel a smooth appearance. Besides this absolute difference, most dent and flint varieties differ in other characters, although a few intergrading strains are found. In the first place, dent corns are found that possess from twelve to twenty-eight rows of kernels, while the older flint types have but eight rows. It is true that there are genuine dents and true flints that tend toward the production of twelve rows, but below this number with the dents, and above it with the flints, continual reversions indicate a hybrid condition. Dent corns are little given to tillering, while with flint corns it is characteristic. This trait is partly a physiological reaction due to the greater amount of soil fertility required by the large main stalk of the dent varieties, and partly an inherent trait capable of hereditary transmission. Flint corns are further characterized by the manner in which the ends of the spathaceous bracts (husks) enclosing the pistillate flowers are expanded into leafy parts from one to two feet long. In the dent corns these appendages are absent or only slightly developed.

The bearing of these opposite features in the dent and the flint corns on the matter in hand, is that *sweet corn with its numerous varieties runs the whole gamut of these characters*. Stowell's Evergreen, a large sweet variety with from sixteen to twenty-four rows, is an example of a "dent" sweet corn, while the Golden Bantam and Black Mexican, two small eight-rowed varieties, are examples of "flint" sweet corns. These varieties are typically dent and flints, respectively, in every character except starchiness. Moreover, when the character of starchiness is brought into kernels of these varieties by pollination with *either* dent or flint pollen, the hybrid kernels formed are indistinguishable from pure dent and pure flint kernels, respectively. It seems to make no difference with either variety whether dent or flint pollen is used, for, although the starchy character appears in the individual kernel as zenia through double fertilization, the dent and flint characters appear to be largely—I do not say entirely—determined by the plant character possessed by the female parent.

To determine whether Black Mexican sweet corn carries the "flint" character even though it has no "starch" character, it was crossed on a white dent variety. Both types were pedigreed corns; that is, they had been grown in isolated plots for at least five years, consequently they may be considered to have been pure. To remove all doubt on this point, however, kernels from the same ears that produced the plants that were crossed were inbred. The inbred ears all proved to be true to their respective characters.

The F_1 generation of this cross, although it showed the regular Mendelian ratio of starchy and non-starchy kernels, consisted both of dent and of flint ears. Neither the flint character nor the dent character was dominant, hence the appearance of the two types. We are forced to the conclusion that the flint character was brought into the combination by the sweet corn parent, and became manifest when it met the "starch" character of the dent corn parent. In like manner Stowell's Evergreen was shown to carry the "dent" character, by crossing with an eight-rowed starchy flint variety. The F_1 generation contained several dent ears which could only have been produced by the "starch" character of the flint variety meeting the "dent" character of the sweet variety.

It is evident that the internal structure of the corn kernel is based upon several unit characters. There are different patterns of corneous starch which produce pop, flint, dent and starchy varieties. These units seem to be partly independent and partly dependent on starchiness and on shapes of pericarp.

It may also be noted that evidence is accumulating that the above facts regarding sweet corn are largely accountable for the marked superiority in sweetness of most small sweet corn varieties. The "dent" sweet varieties require a longer time between pollination and the date they reach table condition than do the "flint" sweet varieties; and during this time the former kinds appear to change more of their carbohydrate compounds to starch.

E. M. EAST

CONNECTICUT AGRICULTURAL EXPERIMENT STATION

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
SECTION B—PHYSICS

THE annual meeting of the American Association for the Advancement of Science, Section B, was held in the Physical Laboratory of the Johns Hopkins University, at Baltimore, December 28–31, 1908. This was a joint meeting with the American Physical Society. Each organization held a short session for the transaction of routine business, but the eight sessions for the reading of papers were joint meetings of the two societies.

The presiding officers were Professor Karl E. Guthe, vice-president and chairman of Section B, and Professor Edward L. Nichols, president of the American Physical Society. Professor F. E. Nipher was elected a member of the council, Professor G. F. Hull, of the sectional committee, and Dr. L. A. Bauer, a member of the general committee.

The officers for the next annual meeting, to be held in Boston during the convocation week of 1909–10 are as follows:

Vice-president and Chairman of Section B—Dr. L. A. Bauer.

Retiring Vice-president—Karl E. Guthe.

Members of the Sectional Committee—K. E. Guthe, L. A. Bauer, A. D. Cole, E. L. Nichols, A. Trowbridge, E. B. Rosa, A. P. Carman, G. F. Hull.

In the afternoon of Tuesday, December 29, Professor Dayton C. Miller delivered an address, as retiring chairman of Section B, on "The Influence of the Material of Wind Instruments on the Tone Quality." This has been published in full in SCIENCE, January 29, 1909. It was heard with great interest by a fine audience of about one hundred and fifty. The other seven sessions were attended by from forty to one hundred persons, with an average attendance of about seventy. That on Wednesday forenoon was devoted to subjects of somewhat general interest and papers by Hayford, More and Bauer of the following program were given at that time.

The hotel headquarters for physicists proved a useful and enjoyable feature of the meetings. Hotel Kernan proved a pleasant gathering place and a large proportion of the visiting physicists were registered here. The most successful social event was the subscription dinner for Section B and the Physical Society, held on Tuesday evening at the Country Club. This was attended by about ninety and was generally declared to be the most successful social gathering of American physicists ever held. The success of the occasion was principally due to the care and zeal of Professor J. S. Ames, of Johns Hopkins University.

The titles and abstracts of the fifty-two papers presented at the several joint sessions are given below.

Fatigue of Metals Excited by Röntgen Rays: LOUIS T. MORE and R. E. C. GOWDY, University of Cincinnati.

The work is a continuation of the results previously obtained in the same subject and reported at the Chicago meeting of the American Association for the Advancement of Science (see also *Phil. Mag.*, 1907). A new method has been devised for measuring the secondary radiation given off by metals bombarded by X-rays. Previous results have been confirmed and extended.

To account for the secondary radiation, Professor J. J. Thomson has advanced the theory that the X-rays cause a disintegration of the metal and permit the expulsion of charged corpuscles. Our experiments make this theory doubtful. Iron, lead and copper plates with pure surfaces were used and then the plates were coated with thin films of the lower oxides of the metal and again with films of the higher oxides. The effect of this successive oxidation on the fatigue seems to show that chemical changes of the surface produced by the X-rays with the consequent changes of surface-electrified double layers, will account for the phenomena observed.

Errors in Magnetic Testing of Ring Specimens: M. G. LLOYD, Bureau of Standards, Washington.

This paper is mainly theoretical in character. Formulas are derived connecting the mean magnetizing force with the magnetizing force at the mean radius, and the actual hysteresis loss with the loss which would occur with uniform distribution of flux. Tables and curves illustrate the errors involved and serve to give the necessary corrections in particular cases.