Santa Fé trail will go across the top of the dam, which will serve as a bridge across the Colorado. At Black Canyon, the dam will form a wall of smooth cement, 700 feet in height.

THE final report on the production of electricity in the United States in 1932, released by the Department of the Interior through the Geological Survey, shows that a total of 83,153,000,000 kilowatt-hours was produced for public use in 1932. Of this total 41 per cent. was produced by the use of water power and 59 per cent. by the use of fuels. The proportion of the total output produced by the use of water power was more in 1932 than ever before. The total output in 1932 was 9.4 per cent. less than in 1931, which in turn was 4.4 per cent. less than in 1930, and the output in 1930 was 1.5 per cent. less than in 1929, the year of maximum output. The output by the use of water power in 1932 was 11.4 per cent. greater than in 1931, and the output by the use of fuels was about 20 per cent. less than in 1931. The total output in 1932 was about 14.5 per cent. less than in 1929; the demand for electricity has therefore held up well in comparison with other industries during the three years of the depression. The increase in efficiency in the use of coal, oil and gas in the generation of electricity, which has been accomplished consistently each year since 1919, was continued during 1932. The average amount of coal and coal equivalent of oil and gas consumed in generating 1 kilowatt-hour of electricity at public-utility plants was 1.51 pounds. In 1919 the consumption of coal per kilowatt-hour was 3.2 pounds. The steady continuation of this increase in efficiency, especially during these three years of unfavorable load conditions, speaks well for the operators of public-utility power plants.

DISCUSSION

HAILSTONE DAMAGE TO BIRDS

ON Thursday night, April 20, 1933, Baton Rouge, Louisiana, and vicinity was visited by a local thunder storm accompanied by considerable hail. Most of the hail fell between 8:30 and 9 o'clock in the evening. The hailstones varied in size a great deal, the maximum size reported being as large as "hens' eggs," according to the newspapers.

The center of the storm apparently passed through the city of Baton Rouge, coming from the west and traveling slightly northeast from here. Hail was reported about twenty-five miles west of Baton Rouge and about twenty miles east. The width of the hail-storm apparently was not over twenty miles across.

Many thousands of dollars worth of damage was done in the city of Baton Rouge, with relatively little damage at distances north and south six to eight miles away.

One of the interesting results of this storm was the enormous destruction of bird life. On the morning following the storm, many dead birds were found on the campus of the Louisiana State University and reports from the immediate vicinity out from Baton Rouge showed even a heavier mortality. Immediately north of Baton Rouge in the suburb Istrouma in an open area, approximately five acres in size, one man collected 26 bob-whites which had been killed by the storm. These were spotted by pointer dogs, so it is likely that this represents the major portion of the birds killed in this area.

Meadow larks, sparrows, mocking-birds, Virginia cardinals and other birds were found by students on the campus and could be seen killed along the highways leading to the city. The number of birds actually killed on the highways would probably average one bird to each half mile, but a highway represents a very narrow strip of territory and one not containing many birds. It does, however, give a little idea of the mortality which must have taken place in the surrounding neighborhood. From this it can be seen that the total destruction of the birds over the entire area visited by hail must have been enormous.

An interesting item in this connection is also the fact that apparently a large flock of scarlet tanagers must have been passing through this vicinity on the night of this storm. Aside from the bob-whites which were spotted by dogs, there were more scarlet tanagers reported as having been killed than any other one species of bird. The total number of tanagers reported to the zoology department, excluding all possibilities of duplication, was twenty-seven. This number merely represents the number of males killed and seen. The female with her dull color is not identified by the laymen. It was only the scarlet-colored males that were noticeable. It is probably safe to say that an equal number of females in the same area were killed. Three of these scarlet tanagers were captured alive with merely a broken wing. One of them was kept alive in the department for nearly two weeks. One of the other two is still living at the present writing.

This mortality represents simply the birds killed within territory frequented by persons and does not include a large amount of wooded, swampy or other territory not frequented by people. It is probable that of scarlet tanagers alone, including the entire

area covered by the storm, several thousand birds must have been killed or injured.

A few birds were apparently injured through the nervous system, as several of these birds were brought into the laboratory alive and with no visible anatomical injury, but yet were absolutely unable to fly or run. While some of these birds, notably a Virginia cardinal, seemed to recover to the extent of eating normally, they apparently never regained their power of flight, although kept for some little time.

An interesting note in respect to the scarlet tanagers is the fact that the captive birds seemed to adjust themselves to their environment within a cage very readily and quite completely, behaving like cage-raised birds almost from the start of their captivity.

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ON THE STRUCTURE OF THE ANTHOCEROS PLASTID IN REFLECTED LIGHT

IN a number of recent papers the writer[1] has spoken of the living plastid as being composed of a more or less visually homogeneous chlorophyll impregnated cytoplasm in which there appeared one or more starch-containing cavities. In addition it seemed possible from Zirkle's[2] account of plastid structure that a system of canals might be present. No attempt has been made to understand the submicroscopic structure of the plastid cytoplasm or the chlorophyll-cytoplasm relationship.

The fixed plastid may appear as a honeycomb structure[3] or it may be transversed by definite and regular plates.[1] More usually it appears as a homogeneous cytoplasm in which starch grains and pyrenoids are embedded.[4]

Due to the appearance of the living plastid and to the more common appearance of the fixed plastid it was concluded that the platework structure was an artifact in the sense that fixation brought into prominence a structure not visible in the living cell. Since, however, in many cases of apparently good fixation this platework is an extremely regular structure it was concluded that it must represent surfaces of physiological activity.

Through the kindness of the Leitz Company I have recently been enabled to study the appearance of the anthoceros plastid with the reflected light of the ultropak. My study has of necessity been rather superficial but it nevertheless has yielded certain results which because of their bearing on the nature of plastid structure seem worthy of publication. It has further clearly demonstrated the need of examining material by reflected as well as transmitted light before attempting to definitely decide upon the structure of living bodies. It is hoped that laboratories equipped with the ultropak may in the near future undertake studies upon living material.

Two rather different but interlocking appearances of the same anthoceros plastid may be obtained with the ultropak depending to a certain extent upon the shadows cast by the metal disks interposed between the light source and the objective. The plastid may appear as an aggregate of green vesicles. If one adds to the preparation an alcoholic solution of iodine the vesicular appearance disappears. The plastid now seems to be a homogeneous mass of differentiated cytoplasm in which blue staining starch grains may be observed. Apparently each one of the vesicles of the living plastid is a starch grain surrounded by its own mass of starch-elaborating, chlorophyll-impregnated cytoplasm.

With other shadows cast by rotating the metal disk the spaces separating the vesicles become the more prominent structure in the plastid. We now have what appears to be homogeneous green mass, in which one clearly distinguishes narrow canals or plates of some darker green substance marking out regular patterns in the lighter green ground cytoplasm. The picture thus obtained coincides well with the fixed and osmicated haematoxylin stained platework.

In the center of many plastids the region of pyrenoids is clearly visible. In some this region is quite filled with something, in others it appears quite empty, while still other plastids show regions of bright spots not at all understood.

Not considering the pyrenoid region, it appears that the starch-containing region of the anthoceros plastid is composed of starch grains surrounded by their own individual mass of chlorophyll impregnated cytoplasm. These individual vesicles are separated from each other by a space of cytoplasm apparently differentiated from that surrounding the starch grain. We may define the anthoceros plastid as a localized region of chlorophyll impregnated cytoplasm, in which small vesicles of starch-elaborating cytoplasm are separated from each other by regions of yet differently formed cytoplasm.

Just what influence this concept of the plastid will have upon the writer's ideas of the similarity between the plastid and the golgi zone is as yet too early to say. Some recent personal communications with Dr. Severinghaus may, however, be of interest. It seems that from the work of Bowen, Nassonov and Severinghaus the animal secretion may arise in little vesicles of cytoplasm so differentiated from the remainder of the cell that it reduces the osmium tetroxide. If this

[1] T. E. Weier, *Biol. Bull.*, 62: 126–139; *Am. Jour. Bot.*, 19: 659–672, 1932.

[2] C. Zirkle, *Am. Jour. Bot.*, 13: 301–341, 1926.

[3] B. M. Davis, *Bot. Gaz.*, 28: 29–109, 1899.

[4] McAllister, *Am. Jour. Bot.*, 14: 246–257, 1927; R. A. Harper, personal communication.