RED COLOR IN APPLES[1]

IN 1936 the authors[2] published a paper identifying and describing the chemical nature of the red pigment of the Winesap apple, and a few months later Sando[3] confirmed these findings with the Stayman and Jonathan varieties. The red pigment of three varieties thus has been shown to be idaein, a glycoside which yields cyanidin and galactose on hydrolysis.

At the time the pigment was identified the work was carried out of the laboratory into the orchard in an effort to study the various factors involved in its formation and, if possible, to influence the color produced in certain varieties of moderate or low color. In the summer of 1936 we were fortunate in finding a substance which seemed to enhance the red color of the Stayman, and subsequent work in each succeeding summer has confirmed this result and developed a method of treatment which has been more or less effective in improving the red color of several varieties, including Stayman, Rome, Delicious, McIntosh, Jonathan and others. Under certain conditions even such varieties as Golden Delicious and Grimes Golden, which normally carry little or no blush, were affected by the treatment in such a manner as to increase *slightly* the amount of blush present on the fruit.

We are now conducting trials for the fourth consecutive season and believe that the tests have gone sufficiently far to indicate the general trend involved and to justify announcement of the method employed. The effective agent appears to be the thiocyanate ion applied in combination with any one of a number of substances representing the positive group. The materials are applied in relatively low concentration, as a spray, to the foliage and fruit on the tree during the growing season. Up to this year all treatments have been applied with a hand-sprayer, but at present the university power-spray outfit is being employed on somewhat larger-scale operations than have been tried heretofore. Many important questions remain unanswered and final evaluation of the procedure including practical application, if any, must await future work. This notice is being written to invite the attention of any or all interested in the improvement of color in fruits.

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A FIRE-FLY "SPINTHARISCOPE"

IT must be well known that the lantern of a fire-fly, teased by being held with the fingers, emits irregular flashes from minute point-sources in the lantern which follow the normal flash, the light of which fills the entire lantern. I am wondering, however, if the very astonishing spectacle presented by a fly which has been bitten by a spider has been described. Within a few minutes after a few "nips" have been made by the spider, if the fly is removed from the web, the lantern will be observed to glow with a faint green light which shows the same "shimmering" quality as the radium paint on the dial of a watch. Examination with an ordinary hand magnifying glass, of moderate power, shows the lantern filled with bright points of light, which at first sight appear to be in rapid vibratory motion, and at the end of half an hour we have a seething cauldron of hundreds of bright points, dancing and flashing, and giving an almost perfect picture of a screen of zinc sulphide under a terrific bombardment of "Alpha" particles (spinthariscope). The phenomenon persists with undiminished intensity for 48 hours but finally dies out, the fly apparently having returned to normal. The spinthariscope effect is frequently accompanied by an occasional normal flash, which ceases if the fly is decapitated, though the other effect continues.

The normal flash of the lantern is obviously due to the simultaneous excitation of all the luminous centers by nerve impulses from the brain, but the scintillations persist even after the lantern has been severed from the body. Both types of illumination cease if the fly is placed in a narrow glass tube through which a stream of carbon dioxide is flowing. I have produced the spinthariscope effect by inoculations with 1:1000 solution of snake venom, but in this case the fly did not recover.

Under a microscope, with a low power objective, the individual flashes of green light are seen against a black background and the strong vibratory movement, seen with a hand magnifier, appears to be due chiefly to the quenching of a flash at one point accompanied by the successive flash of a luminous center in its immediate vicinity. My impression is, however, that I have seen single flashes quiver, though in this case it may be merely the spreading of the chemical reaction which produces the light, from one part of a cell to another. The phenomenon, seen with the microscope, is really an amazing sight.

The spiders were, in most cases, small ones found in window webs, with bodies not much larger than a grape-seed, and they usually made their first bites on the leg joints of the fly. The sparkling green flashes appeared first along the upper edge of one or both of the two lanterns, sometimes on one side only. The phenomenon then spread rapidly throughout the entire volume of the lantern. It seems possible that some

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[2] *Jour. Amer. Chem. Soc.*, 58: 1511–14, 1936.

[3] *Jour. Biol. Chem.*, 117: 45–56, 1937 .