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## THE FLUORESCENT COLORS OF PLANTS<sup>1</sup>

THERE are many fluorescent substances in plants. It was in one of these, quinine, that Sir John Herschel (1845) recognized the peculiar property of emitting "superficial light" of a different character from that transmitted. Twelve years earlier, Sir David Brewster (1833) demolished the Newtonian view of the nature of leaf-green by studying its absorption spectrum. By this means he was led to find that, on observing the light transmitted through increasing densities of chlorophyll, the color of the beam changed from green through yellow and orange to red. "This mode of examining a spectrum by reflection from the particles of a fluid exhibits the phenomenon of opalescence in a very interesting form," he said, adding that he had observed this opalescence or imperfect transparency "almost always in vegetable solutions," and compared it to that in flourspar, already well known to the mineralogists, and which prompted Sir George Stokes, nineteen years later, to propose, though reluctantly, as giving way to the blandishments of some evil spirit, the term fluorescence. Of the fluorescence of this mineral he remarked, "the brilliant blue of the intromitted pencil is singularly beautiful," and when we look at this specimen before us we can hardly blame him for his rhapsody, nor for his failure to interpret to the satisfaction of later physicists the phenomenon which so intrigued his thought. To grasp clearly the nature of fluorescence was the work of Sir George Stokes, who, my friend and colleague Professor A. S. Eve tells me, was given to working in the "back scullery and a small one at that," using the leaves of laurel and other plants which grew in his garden; and thus was led to the establishment "of a great principle with accommodation and apparatus which would fill the modern scientific man with dismay." This principle is now the food of scientific babes and sucklings, into which happy company we are each of us introduced when we venture into a new field. If their cries are not always intelligible, they at least know what they are after. It will be agreeable, I believe, to recall the experiment which Stokes did, and which gave him the clue to the mystery of fluorescence. It was this. He put some chlorophyll solution into a test tube, and

<sup>1</sup> Address of the vice-president and chairman of Section G—Botany—American Association for the Advancement of Science, Cincinnati, Ohio, December, 1923.