cloth, and in addition to reduce the leaf area on the twig bearing the fruit. Such fruits when harvested were pale yellow and weighed only about one third as much as untreated fruits. The seeds were germinated during the winter 1933–34 in flats in the lath-greenhouse. The number of seeds producing more than one embryo was from 51 per cent. to 100 per cent. below expectancy: *Sweet orange,* Lamb ♀ × Valencia ♂, 51 per cent.; Lamb ♀ ♂, 51 per cent.; Hamlin ♀ × Temple ♂ 75 per cent.; Hamlin ♀ × Ruby ♂, 85 per cent.; Temple ♀ ♂ 100 per cent.; *Sour orange,* Bittersweet ♀ ♂ 95 per cent.; *Grapefruit,* Triumph ♀ ♂ 66 per cent.

The progeny from treated ("starved") self-pollinated grapefruit and sour orange fruits segregated for leaf characters. In the first case distinctly sweet orange and grapefruit types, as well as intermediates, are in evidence; and in the second case sour orange, intermediates and sweet orange types are observable. These two varieties are commonly considered as naturally occurring hybrids with the sweet orange, and this segregation of leaf characters tends to confirm this belief, and also indicates that the progeny is in most cases apparently of seminal origin.

Additional work is being done on an extensive scale, but this will require experiments covering several years. It is especially desirable to carry through the progeny to the fruiting stage. Histological study of treated and untreated material also will be of importance in attempts to check the results. These preliminary results, which may or may not be firmly established by experiments now in progress, are published now as a suggestion of possible value to others faced with the same problem in citrus breeding.

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THE ERGOT ALKALOIDS. THE ULTRAVIOLET ABSORPTION SPECTRA OF LYSERGIC ACID AND RELATED SUBSTANCES

THE fact that the four ergot alkaloids—ergotinine, ergotoxine, ergotamine and ergotaminine—give almost identical ultraviolet absorption spectra has already been determined by Harmsma,[1] who devised a spectrophotometric method for the determination of these substances. In connection with our own investigations of the structures of the ergot alkaloids, we have had occasion to study the ultraviolet absorption spectra of lysergic acid and several of its derivatives. The resulting curves are shown in the accompanying plate. On inspection, it will be noted that both dihydrolysergic acid and the alcohol, α-dihydrolysergol, give similar curves, whereas, in the case of lysergic acid, the bands and maxima are considerably displaced. The curve for α, β-dimethyl indole was also found to be very close to those of the above dihydro derivatives. Finally, the carboline derivative, 3, 4, 5, 6-tetrahydro-3-methyl-4-methyl-4-carboline-5-carbonic acid, obtained by the condensation of abrine with acetaldehyde gave a curve also closely approaching these. It is therefore apparent that the structure which all these substances have in common and which appears mainly to be responsible for the observed effects is the indole nucleus. In the case of lysergic acid, the displacement of the bands is apparently due to the double bond which is removed on hydrogenation to the dihydro derivatives. The strong influence noted indicates conjugation of this double bond with one of those contained in the indole nucleus.[2] There is a close resemblance between the lysergic acid curve and those derived from the ergot alkaloids by Harmsma.[3]

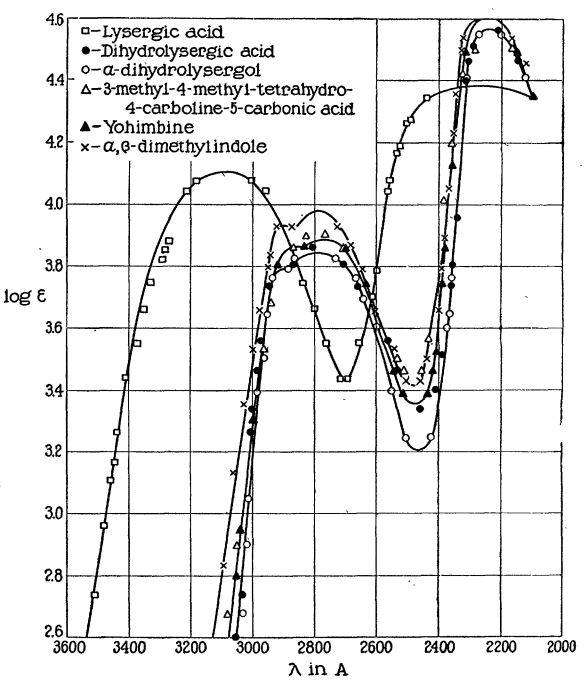

FIG. 1. ε is the molecular extinction coefficient. Alcohol with a slight excess of ammonia was the solvent used.

Recently Kharasch, Stanger, Bloodgood and Legault[4] have attempted an interpretation of the structure of lysergic acid from similar absorption spectra studies made with ergotocin and its derivative. Be-

[1] A. Harmsma, *Pharm. Weekbl.*, 65: 1114, 1928.

[2] Ramart-Lucas and P. Amagat, *Bull. Soc. chim.* (4) 51: 965, 1932. A. Hillmer and P. Schorning, *Z. physik. Chem.*, Abt. A, 167: 407, 1933; 168: 81, 1934.

[3] A similar curve was observed with ergotinine by V. Brustier, *Bull. Soc. chim. d. France* (IV) 39: 1538, 1926.

[4] M. S. Kharasch, D. W. Stanger, M. D. Bloodgood, and R. R. Legault, SCIENCE, 83: 36, 1936.

cause of the close resemblance of the curves obtained with hydrogenated ergotocin and yohimbine (our own recent determination with the latter is given in the above curve), they have drawn conclusions regarding the closely related skeletal structures of the two alkaloids. However, as we have shown above, in so far as the absorption curves of hydrogenated lysergic acid and yohimbine are concerned, such conclusions must relate only to the indole nucleus common to both. In their rejection of a structural relationship between ergotocin and the harmala (carboline) alkaloids because of the different absorption spectra obtained with harmol, harmine and harmaline, they did not consider the modifying influences of the double bonds present in the third carboline (pyridine) ring and which are conjugated with the indole ring system in these particular alkaloids. As we have shown above, in the case of the tetrahydrocarboline derivative, where such an influence has been removed, the curve is very close to that of dihydrolysergic acid. Furthermore, conclusions regarding the structure of lysergic acid which are based on an interpretation of data obtained with "ergotocin" we must regard as unconvincing until more complete data are furnished us regarding the hydrolytic products of this particular substance, for which the formula $C_{21}H_{27}O_3N_3$ has been proposed.[5]

Finally, lysergic acid was discovered and so named by us[6] a little more than two years ago. Since then the investigation of its structure as well as synthetic attempts have been in progress in this laboratory, and such work is being actively continued.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A NEW APPARATUS FOR THE DAYLIGHT PROJECTION OF MICROSCOPIC AND LANTERN SLIDES

THE reflecting box (Fig. 1) which is here described was developed about a year ago in our laboratory after a brief period of experimentation with various types of reflectors and reflecting surfaces. We regard it as the most satisfactory apparatus for daylight projection which we have used.

It has proven to be very useful in demonstrating and describing the detail of histological or zoological slides to small groups of students during laboratory exercises. By means of this apparatus (Fig. 1) any structure on a microscopic slide can be pointed out, emphasized and described. It enables the instructor to be certain that each student actually sees the structures under consideration. It permits of a full discussion and demonstration of any given cell or tissue by manipulating the mechanical stage of the projecting machine so that the cell or tissue under consideration is placed at the end of an arrow which is drawn on the reflecting surface (S, Fig. 1).

Ten or a dozen students can view the image to advantage at one time by standing around the table on which the projecting machine and reflecting box are placed.

This reflecting box can, also, be used to advantage in daylight projection of lantern slides with a delineascope. Photographs or plates from texts can, likewise, be shown in daylight with the delineascope; but they are not as clear as lantern slides.

The great advantage of this apparatus is that it can be used during the daytime in the laboratory, even with lights on and without shading the windows. For best results light should not shine directly into the box and the apparatus should be placed in the darkest portion of the room.

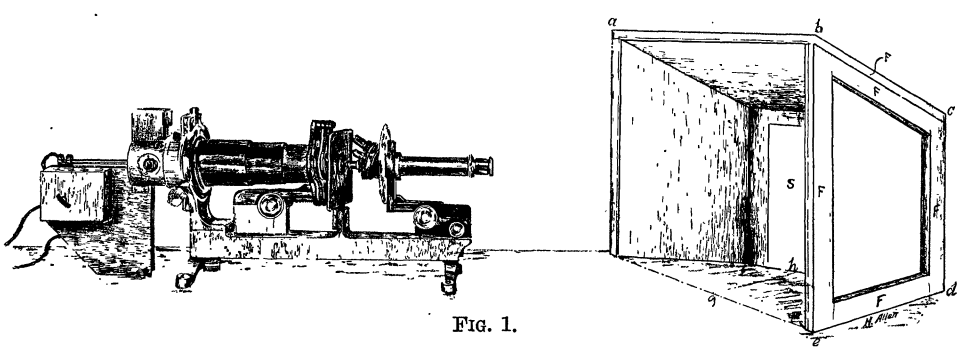

FIG. 1.

The basic idea of this reflecting box apparatus

[5] M. S. Kharasch and R. R. Legault, *Jour. Am. Chem. Soc.*, 57: 1140, 1935.

[6] W. A. Jacobs and L. C. Craig, *Jour. Biol. Chem.*, 104: 547, 1934.