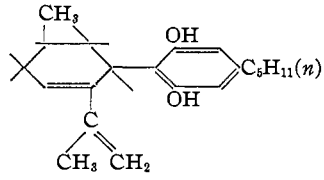
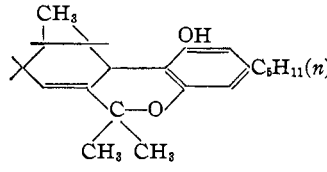


I



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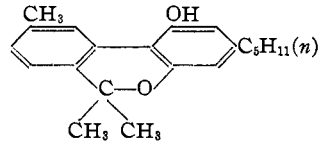
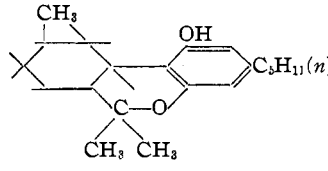


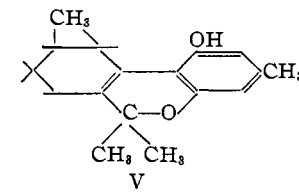
III



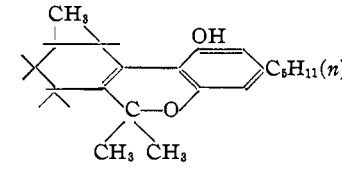
IV

The interesting fact is that the tetrahydrocannabinol (II) product, independent of its rotation, has a potent marihuana activity. Upon reduction the tetrahydrocannabinol, regardless of the rotation it possesses, gives a hexahydrocannabinol (IV) of constant rotation (colorless, viscous oil, b. p. 153–155° (0.10 mm.), $[\alpha]^{27}D$ −70°, found: C, 79.35; H, 10.43); this reduction product is also physiologically active.

A superb method for preparing pyrans of the type III and IV has been devised. It consists in condensing ethyl 5-methylcyclohexanone-2-carboxylate with orcinol and phosphorous oxychloride, followed by treatment with methylmagnesium iodide; compound V (white crystals, m. p. 115.5–116°, found: C, 78.98; H, 8.75) was prepared thus. If, however, olivetol is used in place of orcinol, a tetrahydrocannabinol (VI) will result which upon dehydrogenation should give cannabinol and upon reduction a hexahydrocannabinol (IV), the racemic or a diastereoisomeric form of the same substance obtained from isomerization of cannabidiol and reduction. These synthetic products, at least the reduced one, it is expected will have marihuana activity.



V



VI

NOYES CHEMICAL LABORATORY
UNIVERSITY OF ILLINOIS
IN COLLABORATION WITH THE
TREASURY DEPARTMENT, NARCOTICS
LABORATORY, WASHINGTON, D. C.
AND DR. S. LOEWE AT THE
PHARMACOLOGICAL DEPARTMENT
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RECEIVED JULY 23, 1940

RELATION OF LIGHT INTENSITY TO THE LATERAL GROWTH ON A PHOTOGRAPHIC PLATE

Sir:

While investigating the dependence of the diameters of photographic images of stars (artificial and natural) upon several parameters, we found a certain failure in reciprocity with respect to the relation between diameter, time and intensity which is very much greater than the usual reciprocity failure for photographic density. We find that the greatly predominant factor upon which the width of the photographic image depends is the intensity. To investigate the effect of wave length, we used a Hilger Quartz Spectrograph in addition to "star sources." During certain experiments we were able to vary independently the time of development, temperature of development, time of exposure, intensity of exposure and the plate characteristics.

The following results were obtained:

1. The width of the photographic image appears as a nearly linear function of the logarithm of the intensity.

2. In most cases the widths of the images were not at all or only slightly influenced by increases of exposure time.

3. In cases in which the width of the images of corresponding lines increased with the increase of the logarithm of the exposure time, such increase was in no case more than one-tenth the increase with the logarithm of the intensity.

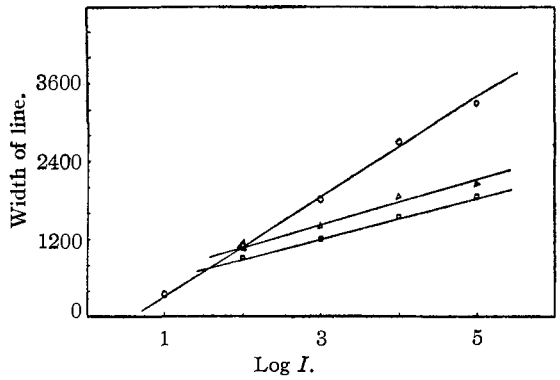

Fig. 1.—Width of 3888 He line *vs.* log I for plates of different grain size: I is intensity; ○ Eastman contrast lantern slide plates; △ Eastman spectroscopic I-F plate; □ Wratten plate.

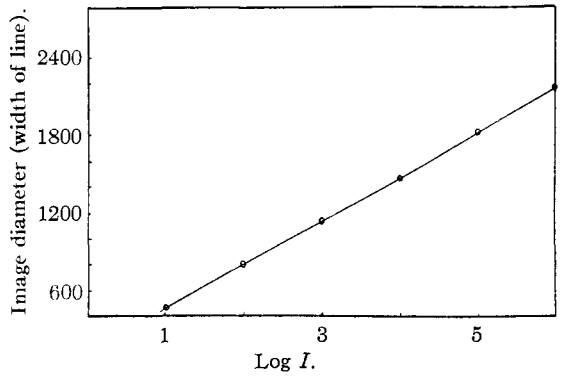

Fig. 2.—Width of segments of 3888 He line from wedge spectrogram *vs.* log of the transparency of the wedge: Eastman spectroscopic I-F plate; developed in D 72; 2350 division = 1 mm.; $\partial\alpha/\partial \log I = 1700/5 = 340$.

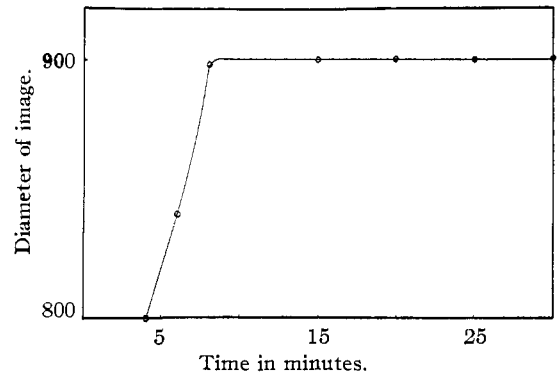

Fig. 3.—Diameter of photographic image of a star *vs.* development time: α Lyra; E = 5 m.; Eastman Super Panchro Press plates; 2350 div. = 1 mm. of diameter; developed in D 72 at 66 °F.; in-focus technique.

4. The width of a spectrum line is independent of development conditions.

5. The width of an image of fixed slit width increases with decreasing grain size. Thus, if the slit width is 0.1 mm., the image of the 3888 Helium line for an I-F plate is 0.9 mm. for a particular intensity while the image on a contrast lantern slide plate under the same conditions is 1.8 mm. Ten different standard emulsions were investigated, namely:

1 & 2, Eastman Spectroscopic plates—Types I-F and V-O;
3, Eastman S. Pan Press;
4, Eastman S. XX 35 mm. film;
5, Eastman panatomic 35 mm. film;
6, Eastman contrast lantern slide plates;
7, Agfa finopan 35 mm. film;
8, Agfa ultra speed 35 mm. film;
9, Agfa nitrate cut film;
10, Wratten M plates

6. Wave length appears to have little or no influence on the width of the image. There seems to be an anomalous effect in this connection; *i. e.*, certain lines exhibit complete reciprocity failure while others between them show the slight variation of width with time mentioned above.

Many useful applications of this information in astronomy and spectroscopy should follow; these include magnitude determinations, line intensity measurements, etc.

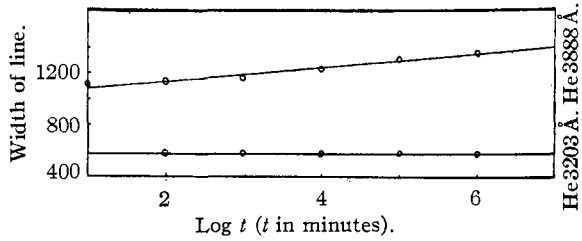

Fig. 4.—Width of line *vs.* log of exposure time: I-F plate; 2350 div. = 1 mm.; developed in D 72 at 65 °F.

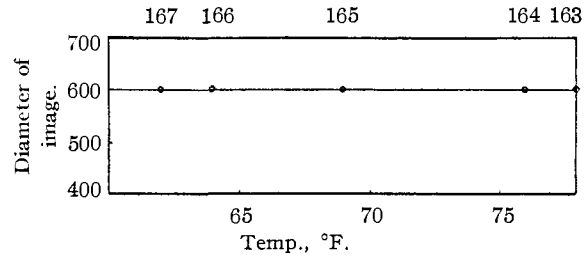

Fig. 5.—Diameter of photographic image of a star *vs.* temperature of the developer: μ Lyra; E = 5 m.; 2350 div. = 1 mm.; Eastman Super Panchro Press plates.

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RECEIVED MAY 14, 1940