

SYNTHESIS OF TRICHOTOMINE, A BLUE PIGMENT OBTAINED FROM

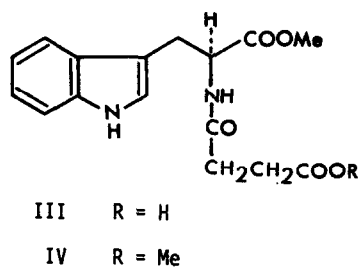
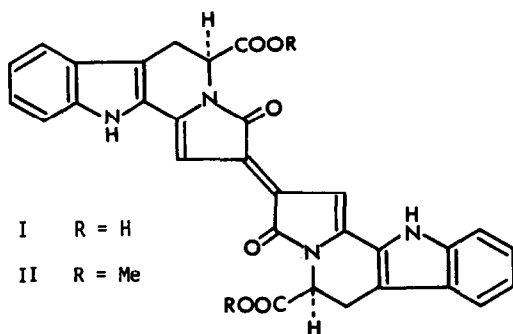
CLERODENDRON TRICHOTOMUM THUNB.

Shuichi Iwadare, Yoshikazu Shizuri, Kiyoyuki Yamada,\* and Yoshimasa Hirata  
Department of Chemistry, Faculty of Science, Nagoya University, Chikusa, Nagoya, Japan

(Received in Japan 5 February 1974; received in UK for publication 19 February 1974)

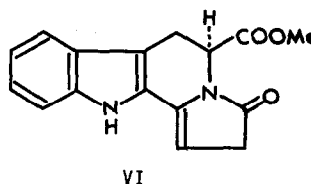
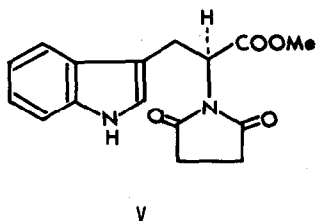
Recently, the structure of trichotomine (I), a blue pigment obtained from Clerodendron trichotomum Thunb. was established in our laboratory.<sup>1</sup> We report here the synthesis of this blue pigment, trichotomine (I) which possesses the unique, new chromophore.

L-Tryptophan methyl ester<sup>2</sup> was reacted with succinic anhydride in anhydrous benzene (reflux, 5 hr), affording the amide (III),<sup>3,4</sup> mp 95 - 97°, (76%). The amide diester (IV),<sup>3,4</sup> mp 151 - 152° obtained on methylation of (III) ( $\text{CH}_2\text{N}_2$  - MeOH) was heated without solvent under reduced pressure (200°, 1 hr) to give the amorphous imide ester (V),<sup>3,5</sup> (90%). The cyclization of (V) was performed by employing phosphorus pentoxide in anhydrous benzene (reflux, 2 hr) to give the lactam ester (VI),<sup>3,6</sup> mp 208 - 211° (20% after recrystallization from EtOAc). The oxidative dimerization of (VI) was achieved by passing air gradually into



\* Author to whom inquires should be addressed.

the n-butanol solution of (VI) (90°, 18 hr), and the resulting mixture was separated by preparative thin layer chromatography [silica gel PF<sub>254</sub>, EtOAc - benzene (1:2)] to afford the deep blue crystals (II),<sup>3</sup> mp 284 - 287° [35% based on reacted (VI)] together with the starting compound (VI) (~20% recovery). The identification of the synthetic compound (II) with natural trichotomine dimethyl ester (II),<sup>1a</sup> mp 285 - 287° was made by spectral (ir, uv, 100 MHz nmr, cd, and mass spectrum) and chromatographic comparison and by the mixture mp (284 - 287°).



The synthetic material (II) was hydrolyzed [1N KOH - MeOH - ether (1:1:1), room temperature, 3 hr] to give the amorphous compound, which was identical with the natural pigment, trichotomine (I) by spectral and chromatographic comparison.

Acknowledgement: The authors are grateful to Professor J. Tanaka (Department of Chemistry, Faculty of Science, Nagoya University) for obtaining the cd spectra.

#### REFERENCES AND FOOTNOTES

1. (a) S. Iwadare, Y. Shizuri, K. Sasaki, and Y. Hirata, Tetrahedron Letters, in the press; (b) K. Sasaki, S. Iwadare, and Y. Hirata, Tetrahedron Letters, in the press.
2. E. Abderhalden and M. Kempe, Hoppe-Seyler's Z. Physiol. Chem., **52**, 207 (1907).
3. Elemental analysis or high resolution mass spectral data for this compound are in accord with theory.
4. This compound has been fully characterized by ir, nmr, and mass spectra confirmatory of the structure presented.
5.  $\nu_{\max}$  (CHCl<sub>3</sub>) 3480, 1784, 1748, 1709 cm<sup>-1</sup>;  $\delta$  (CDCl<sub>3</sub>, 100 MHz) 2.43 (4H, br.s), 3.62 (1H, dd, J = 16.5, 9.5 Hz), 3.61 (1H, dd, J = 16.5, 7.5 Hz), 3.80 (3H, s), 5.05 (1H, dd, J = 9.5, 7.5 Hz), 6.9 - 7.6 (4H, complex pattern, aromatic protons), 8.18 (1H, br.s); m/e 300 (M<sup>+</sup>).
6.  $\nu_{\max}$  (KBr) 1747, 1683, 1654 cm<sup>-1</sup>;  $\lambda_{\max}$  (MeOH) nm ( $\epsilon$ ) 231 (25,200), 308 (21,200), 321 (19,400);  $\delta$  (CDCl<sub>3</sub>, 100 MHz) 3.18 (2H, d, J = 3.2 Hz), 3.27 (1H, dd, J = 16.0, 7.0 Hz), 3.65 (1H, dd, J = 16.0, 2.0 Hz), 3.67 (3H, s), 5.17 (1H, dd, J = 7.0, 2.0 Hz), 5.23 (1H, t, J = 3.2 Hz), 7.0 - 7.7 (4H, complex pattern, aromatic protons), 8.84 (1H, br.s); m/e 282 (M<sup>+</sup>); cd (MeOH)  $[\theta]_{255} +6340$ ,  $[\theta]_{320} +2060$ ,  $[\theta]_{311} -1510$ .