HIPPAMINE, A MINOR ALKALOID FROM *STERNBERGIA LUTEA*

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Sternbergia lutea Ker-Gawl (Amaryllidaceae) is known to contain the alkaloids lycorine, galanthine, hippeastrine, tazettine, galanthamine, and haemantidine (1). We now report the occurrence of the rare compound, hippamine (2) as a minor component of the alkaloid mixture. Previously, it had been only isolated in very low yield (0.0021%) from an unidentified *Hippeastrum* species (3).

As shown by hplc analysis of acid extracts of the bulbs carried out using the chromatographic conditions reported for the assay of lycorine (4), a very low level of hippamine (0.0015%) is present in the plant.

According to the present understanding of lycorine biosynthesis (5), hippamine represents the product of a shunt reaction. As regards biological activity, when tested at a standard concentration of 20 μM, hippamine proved to be a slightly less effective inhibitor (58%) of ascorbic acid biosynthesis in potato tubers than is lycorine (80%) (6).

EXPERIMENTAL

PLANT MATERIAL.—Bulbs of *S. lutea* were collected during the withering period in the wild near Bari and identified by Prof. O. Arrigoni of the Istituto di Botanica, Università di Bari, Italy (where a voucher specimen has been deposited).

ALKALOID EXTRACTION.—Dried and ground bulbs (1.0 kg) were extracted with aqueous 1% H_2SO_4. The extracted alkaloids were precipitated with NaOH as the free bases (7). The crude precipitate was crystallized from EtOH to yield pure lycorine (11.22 g, 1.12%) (8).

ISOLATION OF HIPPAMINE (2-O-METHYL-LYCORINE).—Evaporation of the EtOH after crystallization of lycorine left an oily residue. This was purified first by chromatography on a SiO_2 column ($CHCl_3$-EtOAc-MeOH, 2:2:1) and then on preparative tlc ($CHCl_3$-MeOH, 9:1). The pure residue of hippamine, crystallized from Et_2O (11 mg, 0.0011%), gave the following physical data: mp 160-162°; $[\alpha]^{28}D$ −72.8° (c=1.02, EtOH); uv λ max nm (log ε) 292 (3.65), 236 (3.59); [lit. (9): mp 162-163°, $[\alpha]^{28}D$ −72.7°, uv λ max nm (log ε) 292 (3.67)]; ir ν max 3660, 3595 and 1130 cm^{-1}; ^{1}H-nmr ($CDCl_3$) δ, 2.39 (brq, H-5), 2.62 (m, 2H-4), 2.70 (dd, J=11, 1.4, H-11b), 2.75 (d, J=11, H-11c), 3.32 (ddd, H-5), 3.50 (s, OMe), 3.52 (d, J=14, H-7), 3.81 (m, H-2), 4.11 (d, J=14, H-7), 4.59 (dd, J=1.4, 1.4, H-1), 5.92 and 5.93 (1H each, d, J=1.5, 2H-12), 6.58 (s, H-8) and 6.85 (s, H-11); ^{13}C-nmr (CD_3OD) δ, 30.0 (C-4), 42.8 (C-11b), 58.3 (C-5), 58.6 (OMe), 63.0 (C-11c), 68.9 (C-1), 83.5 (C-2), 103.0 (C-12), 106.7 (C-11), 108.9 (C-8), 117.9 (C-3), 130.3 (C-11a), 130.9 (C-7a), 145.0 (C-3a), 146.8 (C-10), and 148.8 (C-9); ms *m/z* (rel. int.) 301 (M^+, 26), 268 (18), 252 (20), 250 (22), 227 (100), and 226 (98).

Hippamine was identical by direct comparison (uv, ir, mp, $[\alpha]D$, ^{1}H-nmr, and Rf in three different solvents) with a reference sample prepared by synthesis from lycorine chlorohydrin (9). Acetylation of the alkaloid performed under the usual conditions afforded 1-O-acetyl-hippamine (3.5 mg, 65%) $[\alpha]^{25}D$ −68.3° (c=0.24 $CHCl_3$); uv λ max nm (log ε) 290 (3.28), 250 (3.40); ir ν max 1730 and 1130 cm^{-1}; ^{1}H-nmr ($CDCl_3$) δ, 1.94 (s, 3H, MeCO) and 5.76 (dd, J=1.7, 1.1, H-1).

Full details of the isolation and identification of the compounds are available on request to the senior author.

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ALKALOIDS FROM *NEOLITSEA ACICULATA*

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As part of our continuing search for alkaloids of Lauraceous plants (1,2), we report here the isolation and identification of two alkaloids, laurotetanine and (+)-reticuline, from *Neolitsea aciculata* (Blume) Koidz.

Compound	Identified by	Reference
Laurotetanine	mp, ir, ^{1}H-nmr, [α]D, uv, by preparing *N*-methyl derivative (mmp, ir, ^{1}H-nmr, (α]D)	(5)
(+)-Reticuline (perchlorate)	mmp, ir, [α]D, uv, co-tlc	(2)

EXPERIMENTAL

PLANT MATERIAL.—Plants were collected in Kyoto and Nara, Japan. The plants were identified by the late Dr. M. Futoh of this university and voucher specimens are deposited there in the herbarium.

EXTRACTION AND ISOLATION.—Air-dried, cut root material was extracted with boiling MeOH, and the extract was subjected to an isolation procedure based on the Stas-Otto method (3,4). The resulting phenolic alkaloid mixture was treated with picrolonic acid, and laurotetanine picrolonate was obtained. (+)-Reticuline was isolated as its perchlorate from the mother liquor of the picrolonate. The same procedure was applied to the stems, and similar results were obtained.

Full details of the isolation and identification of the compounds are available on request to the senior author.

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