

ALKALOIDS OF *STEPHANIA JAPONICA* VAR. *AUSTRALIS**

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Key Word Index—*Stephania japonica* var. *australis*; Menispermaceae; hasubanonine; protostephanine; metaphanine; oxostephamiersine; thalrugosine; stepabyssine; cyclanoline; magnoflorine.

Stephania japonica (Thunb.) Miers var. *australis* Hatusima, a taxon indigenous to the Ryukyu Islands (Japan) was described in 1956 by Hatusima [1]. According to Lo [2], *S. japonica* var. *australis* is conspecific with the Vietnamese taxon *S. longa* Lour. Unfortunately, it was impossible to obtain specimens of *S. longa* from Vietnam for comparison and therefore, the taxonomic position of *S. japonica* var. *australis* still remains somewhat uncertain. However, *S. japonica* var. *japonica*, which grows in the south of Japan, is morphologically similar to *S. japonica* var. *australis*. The basic constituents of *S. japonica* var. *japonica* have already been well studied [3–6, 13, 15] but the alkaloids of *S. japonica* var. *australis* have not been previously investigated.

Therefore, as a continuation of our chemical studies on plants of the Menispermaceae, we now wish to report the alkaloids found in *S. japonica* var. *australis*.

Seven tertiary bases: hasubanonine (1) [7, 8], protostephanine (2) [6], metaphanine (3) [9, 10], oxostephamiersine (4) [5, 6], thalrugosine (5) [11], stephabyssine (6) [12], an unknown base, tentatively named base-A and two quaternary bases, cyclanoline (7) [13, 14] and magnoflorine (8) [14] were isolated from a methanolic extract of stem and rhizome tissue (see Table 1). Of these alkaloids, 1, 2, 3, 4, 7 and 8 are common constituents of both varieties of *S. japonica*, but 5 and 6 have never been isolated from *S. japonica* var. *japonica*. On the other hand, the bisbenzylisoquinoline alkaloids: epistephanine and hypoeptephanine, which have been identified in the variety *japonica* [3, 4, 6, 15], were not found in var. *australis*. The unknown base-A was obtained as colourless prisms from MeOH, mp 248°, C₂₁H₂₆O₇ NCl (M⁺, *m/e* 439.1392). Its IR spectrum showed

absorption bands of OH group 3550 cm⁻¹) and γ -lactam (1683 cm⁻¹), and the ¹H NMR spectrum revealed signals due to four OMe groups (δ 3.42, 3.47, 3.84, 3.91), one NMe group (δ 3.09) and two aromatic protons (δ 6.72). In the MS spectrum, the most abundant and diagnostic peak appears at *m/e* 257.1068, indicating the pattern characteristic for hasubanan alkaloids [16]. From these findings, it is suggested that this base is a new congener of the hasubanan series, the detailed structure of which will be made clear in future work.

EXPERIMENTAL

General procedure. All mps were uncorr. ¹H NMR spectra were recorded on a 60 MHz spectrometer in CDCl₃ soln with TMS as internal standard. MS were recorded at 70 eV using a direct inlet system. Column chromatography was performed on neutral Al₂O₃ (activity II–III) or Si gel (100 mesh). The alkaloids after TLC were detected by treatment with I₂ vapour and by spraying with Dragendorff's reagent.

Plant material. *Stephania japonica* var. *australis* was collected in February 1976 at Ishikawa city, Okinawa Prefecture (Japan), by Y. Inami.

Extraction and isolation of alkaloids. Air-dried and chipped stem and rhizome (5.5 kg) were extracted with MeOH (50–60°), and the solvent was evapd under red. pres. The alkaloid constituents were isolated and purified as described in a previous paper [6]. Known alkaloids were fully identified by direct comparison (mmp, TLC, IR and ¹H NMR) with authentic samples and all gave correct CHN analyses.

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Table 1. Alkaloids of *Stephania japonica* var. *australis*

Classification	Compound	Mp(°C)	Yield (g)*
Tertiary base			
	Non-phenolic		
	Hasubanonine (1)	116	3.22
	Protostephanine (2)	74	6.52
	Metaphanine (3)	232	0.017
	Oxostephamiersine (4)	290	0.009
	Base-A†	248	0.012
Phenolic	Thalrugosine (5)	218	3.65
	Stephabyssine (6)	180	2.35
Quaternary base	Cyclanoline (7)	184 (dec.)	1.70‡
	Magnoflorine (8)	252 (dec.)	0.067‡

* From 5.5 kg of dried material.

† Unknown base.

‡ Iodide.

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REFERENCES

1. Hatusima, S. (1975) *Flora of the Ryukyus* 285.
 2. Lo, H.-S. (1978) *Acta Phytotaxon. Sinica (Peking)* **16**, 29.
 3. Kondo, H. (1953) *Review of Studies on Alkaloids* (Ochiai, E., ed.) Ogata, A. (representative), Tokyo.
 4. Tomita, M. (1967) *Memorial to Retirement of Professor Masao Tomita* (Uyeo, S., ed.). Hirokawa, Tokyo.
 5. Matsui, M., Watanabe, Y., Ibuka, T. and Tanaka, K. (1973) *Tetrahedron Letters* 4263.
 6. Matsui, M., Watanabe, Y., Ibuka, T. and Tanaka, K. (1975) *Chem. Pharm. Bull. (Tokyo)* **23**, 1323.
 7. Tomita, M., Ibuka, T., Inubushi, Y., Watanabe, Y. and Matsui, M. (1964) *Tetrahedron Letters* 2937.
 8. Tomita, M., Ibuka, T., Inubushi, Y., Watanabe, Y. and Matsui, M. (1965) *Chem. Pharm. Bull. (Tokyo)* **13**, 538.
 9. Tomita, M., Ibuka, T., Inubushi, Y. and Takeda, T. (1964) *Tetrahedron Letters* 3605.
 10. Tomita, M., Ibuka, T., Inubushi, Y. and Takeda, T. (1965) *Chem. Pharm. Bull. (Tokyo)* **13**, 695, 704.
 11. Mitscher, L. A., Wu, W.-N., Doskotch, R. W. and Beal, J. L. (1971) *Chem. Commun.* 589.
 12. Kupchan, S. M., Liepa, A. J. and Fujita, T. (1973) *J. Org. Chem.* **38**, 151.
 13. Tomita, M., Ibuka, T. and Tsuyama, T. (1964) *J. Pharm. Soc. Jpn* **84**, 776.
 14. Matsui, M., Manabe, K., Shima, S. and Satoh, S. (1971) *Annu. Rep. Daiichi Coll. Pharm. Sci.* **1**, 17.
 15. Tomita, M. and Ibuka, T. (1963) *J. Pharm. Soc. Jpn* **83**, 996.
 16. Inubushi, Y. and Ibuka, T. (1977) *The Alkaloids* (Manske, R. H. F., ed.) Vol. XVI, pp. 395–398. Academic Press, New York.
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