of an α -ketol⁹⁾ (V), derived from securinine, or application of the octant rule¹⁰⁾ predicts that an absolute configuration of norsecurinine at C_{9a} should be S-configuration.

Norsecurinine is, therefore, represented by either Ia or Ib and dihydronorsecurinine by either IIa or IIb. The stereochemistry at C_{9a} will be discussed in a subsequent paper.

Osaka research Laboratory,
Tanabe Seiyaku Co., Ltd.,
Kajima-cho Higashiyodogawa-ku,
Osaka

Faculty of Pharmaceutical Sciences,
Osaka University,
Toneyama, Toyonaka,
Osaka-fu

Seiichi Saito	(斎藤清一)
Tadasu Tanaka	(田中 雅)
Keishi Kotera	(小寺啓司)
Hideo Nakai	(仲井英雄)
Norio Sugimoto	(杉本典夫)
Zen-ichi Horii	(堀井善一)
Masazumi Ikeda	(池田正澄)
Yasumitsu Tamura	(田村恭光)

Received September 14, 1964

- 9) Z. Horii, M. Ikeda, Y. Yamawaki, Y. Tamura, S. Saito, K. Kotera : Tetrahedron, **19**, 2101 (1963).
10) W. Klyne : *Ibid.*, **13**, 29 (1961).

[Chem. Pharm. Bull.]
12(12)1523-1525(1964)

UDC 547.92.02

On the Structure of Pergularin

The isolation of sarcostin (I), metaplexigenin (II), benzoylramanone (III), deacylcynan-chogenin (IV), utendin (V), pergularin (VI), and two other aglycones from *Metaplexis japonica* MAKINO has been reported previously.¹⁻⁵⁾ In this communication, the experimental result leading the structure of pergularin (VI) is described. Pergularin (VI), m.p. 220~234°, C₂₁H₃₂O₅·½H₂O (*Anal.* Calcd. : C, 67.55; H, 8.85. Found : C, 67.65; H, 9.32). $[\alpha]_{589}^{19}$ -33° (c=0.1, MeOH, from ORD measurement). IR $\nu_{\max}^{\text{Nujol}}$ cm⁻¹ : 3550, 3450, 1720, 1690. Although VI showed two bands in the carbonyl region of the infrared spectrum,^{*1} it gave only a monooxime (VII) which revealed no carbonyl absorption. Therefore, VI possesses only one carbonyl group. Very similar facts were reported in the case of deacylmetaplexigenin (IIa).^{2,3)} Acetylation of VI with acetic anhydride-pyridine afforded a diacetate (VIII), m.p. 130~137°, C₂₅H₃₆O₇ (*Anal.* Calcd. : C, 66.94; H, 8.09. Found : C, 66.97; H, 8.46). The nuclear magnetic resonance spectrum of pergularin (VI) showed three singlet at 8.96 (18-CH₃), 8.29 (19-CH₃), 7.43 (17-COCH₃) τ in pyridine.^{*3} The optical rotatory dispersion curves of pergularin (VI), and its acetate (VIII), in methanol showed negative Cotton effect.

*1 Pergularin (VI) is practically insoluble to CCl₄ and CHCl₃.

*2 *Pergularia japonica* THUNB. is the synonym of *Metaplexis japonica* MAKINO.

*3 In this paper, 10 p.p.m. value (from tetramethylsilane, used as internal standard) is used as τ .

1) H. Mitsuhashi, T. Nomura, Y. Shimizu, I. Takemori, E. Yamada : This Bulletin, **10**, 811 (1962). In the report, pergularin was expressed as crystal 3, and utendin as crystal 4.

2) H. Mitsuhashi, T. Nomura : *Ibid.*, **11**, 1333 (1963).

3) *Idem* : *Ibid.*, in press.

4) H. Mitsuhashi, T. Nomura, M. Hirano : Presented as a paper at the Annual Meeting of the Pharmacognostical Society of Japan, Sept. 19, 1964, Kanazawa.

5) H. Mitsuhashi, T. Nomura : Steroids, **3**, 271 (1964).

These curves were shifted about 10 m μ to longer wave length in comparison with those of ramanone (IIIa), and its acetate (IIIb),^{2,5,6)} suggesting the presence of a α -ketol system.^{6,7)}

TABLE I.

Compound	Trough [ϕ] ₃₁₁	Peak [ϕ] ₂₆₈	$a \times 10^{-2}$
VI	-3878	+5086	-89.6
VIII	-5037	+4606	-96.4

After VI was treated with 3% methanolic potassium hydroxide for 24 hr. at room temperature, the resulting mixture showed only one spot which was identified as starting material (VI) on paper partition chromatogram (CHCl₃/formamide).⁸⁾ This results indicated that pergularin (VI) could not be isomerized under this condition, which led

Chart 1.

6) H. Mitsuhashi, T. Nomura, M. Fukuoka: Steroids, 4: 4, 483 (1964).

7) C. Djerassi: "Optical Rotatory Dispersion Application to Organic Chemistry," McGraw-Hill Book Co., New York (1960).

8) H. Mitsuhashi, Y. Shimizu, E. Yamada, I. Takemori, T. Nomura: This Bulletin, 10, 808 (1962).

17-H-20-one steroids to complete equilibrium mixture of the side chain in most cases.^{6,11)} The above facts strongly suggest that pergularin (VI) has C/D *cis* ring juncture, and 17 β -OH, 17 α -COCH₃ side chain.⁶⁾ Since sarcostin (I), and four other compounds (II, III, IV, V), which have 3 β ,12 β ,14 β -OH groups, have been isolated from the same plants, biogenetic analogy would favour the structure (VI) for pergularin. This assumption was proved by the following results. Pergularin (VI) was reduced with NaBH₄, and the product examined by paper chromatography (CHCl₃/formamide),⁸⁾ giving two spots. The major spot was identical with that of utendin (V). On partition chromatography over Celite(C₆H₆+BuOH/H₂O), crystals, m.p. 240~250°, were isolated, which was identified with utendin (V) by a mixed fusion. Utendin has been isolated from *Pacycarpus lineolatus*,¹⁰⁾ 5 α -dihydroutendin=tomentogenin (X) from *Marsdenia tomentosa*.¹¹⁾ Recently, the structures of these compounds (V, X) were established by Reichstein's group¹²⁾ and Mitsuhashi's group,¹³⁾ independently.

Thus perugularin is represented by the structure (VI).

Faculty of Pharmaceutical Sciences,
School of Medicine,
Hokkaido University,
Sapporo, Hokkaido

Hiroshi Mitsuhashi (三橋 博)
Taro Nomura (野村太郎)

Received October 7, 1964

- 9) M. B. Rubin : Steroids, 2, 561 (1963).
10) E. Abish, Ch. Tamm, T. Reichstein : Helv. Chim. Acta, 42, 1014 (1959).
11) H. Mitsuhashi, I. Takemori, Y. Shimizu T. Nomura, E. Yamada : This Bulletin, 10, 804 (1962).
12) A. Lardon, W. Klyne, E. Iseli, T. Reichstein : IUPAC Symposium at Kyoto, Japan, On April 18, 1964.
13) H. Mitsuhashi, T. Sato, T. Nomura, I. Takemori : This Bulletin, 12, 981 (1964).

[Chem. Pharm. Bull.]
12(12)1525~1529(1964)

UDC 547.466.2.02

The Absolute Configuration of Optically Active Isovaline

Many of the recent studies on α -alkyl- α -amino acids have revealed that some of them have physiologically very interesting properties,¹⁾ and few were found in natural products.²⁾ The absolute configuration of these amino acids is either still unknown or just only suggestive.^{3~5)}

a) cf. R.S. Cahn, C.K. Ingold, V. Prelog : Experientia, 12, 81 (1956).

- 1) a) L. Gillespie, Jr. : Ann. N.Y. Acad. Sci., 88, 1011 (1960). b) H. Smirk : Brit. Med. J., 1963, 146 and references therein. c) A. Sjoerdsma, S. Udenfriend : Biochem. Pharmacol., 8, 164 (1961).
2) a) E. H. Flynn, J. W. Hinman, E. L. Caron, D. O. Woolf, Jr. : J. Am. Chem. Soc., 75, 5867 (1953). b) Sheng-din Fang, Liang-chuan Li, Ching-i Niu, Kwong-fong Tseng : Scientia Sinica, 10, 845 (1961). c) Tsun-tsi Sun, Shuen-hsing Loh, Shu-wei Chow, Zu-yoong Kyi : Scientia Sinica, 10, 852 (1961). d) G. W. Kenner, R. C. Sheppard : Nature, 181, 48 (1958). e) M. Kandatsu, K. Kikuno : Agr. Biol. Chem. (Japan), 25, 234 (1961).