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INDOLE ALKALOIDS FROM *RAUVOLFIA MEDIA*

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Key Word Index—*Rauvolfia media*; Apocynaceae; bark; indole alkaloids.

Abstract—Four monomeric indole alkaloids have been isolated from the bark of *Rauvolfia media*. Three of them are the known cabucine, reserpiline and mauiensine; the fourth is a new alkaloid, 12-hydroxymauiensine.

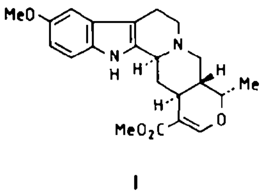
INTRODUCTION

Rauvolfia media Pichon (Apocynaceae) is a tree of 7–12 m height endemic to Madagascar [1]. The bark of the plant is used in the pharmaceutical industry to make preparations for the treatment of arterial hypotension [2].

RESULTS AND DISCUSSION

The total alkaloids obtained by alcoholic extraction of powdered bark of *R. media* were fractionated by CC followed by TLC. Four monomeric indole alkaloids were isolated. Three of them are known, cabucine (**1**), reserpiline (**2**) and mauiensine (**3**) (rare) [5]; the fourth one is new [3–5], 12-hydroxymauiensine (**4**).

12-Hydroxymauiensine (**4**), mp 260°. $[\alpha]_D + 100°$ (*c* 1; MeOH). IR (Nujol) 3400, 1580 cm^{-1}. UV (EtOH) 255 (ε 7630), 295 (ε 2270) nm (indoline chromophore). The mass spectrum showed a $[M]^+$ at *m/z* 324 corresponding to $C_{20}H_{24}N_2O_2$. Other major peaks were at *m/z* 307, 293, 199 and 198. Its structure was determined mainly by a detailed ^{1}H NMR study at 400 MHz. Application of the normal consecutive single and multiline decoupling techniques and comparison with earlier ^{1}H NMR data [6]



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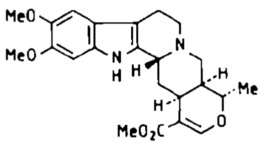

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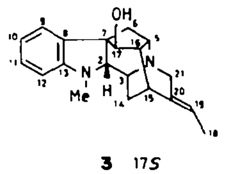

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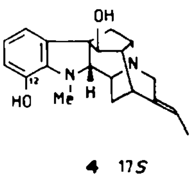

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Table 1. ^{1}H NMR data of mauiensine (**3**) and 12-hydroxymauiensine (**4**)

H	3	4
2	3.07 *s* (*d*)	3.07 *s* (*d*)
3	3.62 *d* (*dd*)	3.63 *d* (*dd*)
5	2.89 *dd* (*d*)	2.94 *dd* (*d*)
6α	2.05 *d* (*d*)	2.00 *d* (*d*)
6β	1.23 *dd*	1.25 *dd*
9	7.10	6.68
10	6.81	6.63
11	7.16	6.68
12	6.66	—
14α	1.78 *dd* (*d*)	1.85 *dd* (*d*)
14β	2.08 *dd* (*d*)	2.20 *dd* (*d*)
15	2.97 *dd* (*d*)	3.03 *dd* (*d*)
16	2.44 *dd* (*d*)	2.50 *dd* (*d*)
17	4.72 *d*	4.68 *d*
18	1.62 *br d*	1.65 *br d*
19	5.22 *br q*	5.25 *br q*
21α	3.34 *d*	3.32 *d*
21β	3.46 *d*	3.48 *d*
NMe	2.78 *s*	3.06 *s*

Coupling constants (Hz): compound 3, $J_{2,3} < 0.5$; $J_{3,14\alpha} = 10$; $J_{3,14\beta} \sim 1$; $J_{5,6\alpha} \sim 1$; $J_{5,6\beta} = 5$; $J_{5,16} = 7$; $J_{6\alpha,6\beta} = 12$; $J_{14\alpha,14\beta} = 14$; $J_{14\alpha,15} \sim 1$; $J_{14\beta,15} \sim 4$; $J_{15,16} \sim 4$; $J_{16,17} = 9$ Hz; $J_{18,19} = 7$; $J_{21\alpha,21\beta} = 15$. Compound 4: $J_{2,3} < 0.5$; $J_{3,14\alpha} = 10$; $J_{3,14\beta} \sim 1$; $J_{5,6\alpha} \sim 1$ Hz; $J_{5,6\beta} = 5$; $J_{5,16} = 7$; $J_{6\alpha,6\beta} = 12$ Hz; $J_{14\alpha,14\beta} = 14$; $J_{14\alpha,15} \sim 1$; $J_{14\beta,15} \sim 4.5$; $J_{15,16} \sim 4.5$; $J_{16,17} = 9$ Hz; $J_{18,19} = 7$; $J_{21\alpha,21\beta} = 15$.

Spectra were run in $CDCl_3$ (compound 3) or in $CDCl_3$–CD_3OD (3:2) (compound 4) at 400 MHz. Values are in δ (ppm) (TMS = 0). Sample temperature was 20°. The coupling constants between aromatic protons are not included. The signals due to hydroxyl groups are omitted.

*Taken from ref. [6].

permitted all of the protons to be assigned. The assigned chemical shifts and coupling constants are presented in Table 1 and are in good agreement with the proposed structure. A supplementary proof for the proposed structure **4** was obtained by an analysis of the ^{13}C NMR spectra (Table 2) of compounds **3** and **4**.

Table 2. ^{13}C NMR data of mauiensine (**3**) and 12-hydroxymauiensine (**4**)

C	**3**	**4**
2	76.62 *d*	77.32 *d*
3	55.85 *d*	55.83 *d*
5	50.19 *d*	49.91 *d*
6	35.96 *t*	36.12 *t*
7	53.62 *s*	53.83 *s*
8	131.98 *s*	134.19 *s*
9	119.82 *d*	116.39 *d*
10	118.86 *d*	120.36 *d*
11	127.34 *d*	111.95 *d*
12	109.37 *d*	140.94 *s*
13	154.16 *s*	144.88 *s*
14	30.17 *t*	30.05 *t*
15	27.42 *d*	27.36 *d*
16	42.39 *d*	42.28 *d*
17	72.25 *d*	72.15 *d*
18	12.51 *q*	12.50 *q*
19	113.79 *d*	113.94 *d*
20	139.88 *s*	139.53 *s*
21	55.22 *t*	55.13 *t*
NMe	34.54 *q*	37.13 *q*

The spectra were recorded in $CDCl_3$ (compound **3**) or in $CDCl_3$–CD_3OD (3:2) (compound **4**). The δ values are in ppm downfield from TMS. The interpretation of the signals is partly based on the recent results given for some ajmalane alkaloids [7, 8].

EXPERIMENTAL

^{13}C NMR spectra were recorded at 50 MHz and ^{1}H NMR spectra at 400 MHz in the Institut d'Electronique Fondamentale d'Orsay [9]. MS were recorded at 70 eV using direct sample insertion into the ion source, whose temp. was maintained at 180–200°.

Plant material was collected in 1968 in the forest of Ankarafantsika, near the village of Beronono (Madagascar). Botanical identification as *R. media* Pichon was made at the Muséum National d'Histoire Naturelle de Paris, by M. P. Boiteau and Mme. L. Allorge (ref. no. 1045).

Alcoholic extraction of air-dried bark powder of *R. media* in the classical manner gave the total alkaloids in 16 g yield; these were fractionated first by CC on silica gel and alumina, and then on TLC plates. Yields (%): **1**, 0.9; **2**, 26.9; **3**, 7.0 and **4**, 5.6.

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