

PARTIAL SYNTHESIS OF TCHIBANGENSINE AND DERIVATIVES

Catherine Mirand-Richard, Louissette Le Men-Olivier, Jean Lévy and Jean Le Men[†]

Faculté de Pharmacie, E.R.A. au C.N.R.S. n° 319, 51, rue Cognacq-Jay

51096 REIMS CEDEX, FRANCE

Abstract - The alkaloid tchibangensine 1 and two of its derivatives 6a and 6b were synthesised. Catalytic hydrogenation of 6a,b and acetylation of 1 were described.

Recently the structure 1 for tchibangensine has been established by a combination of spectral evidences and chemical correlations with usambarensine and ochrolifuanines-C and -D¹.

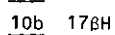
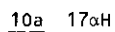
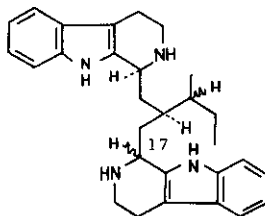
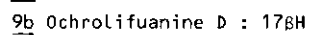
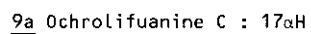
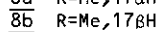
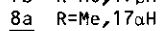
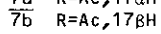
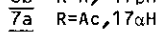
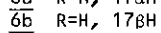
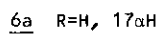
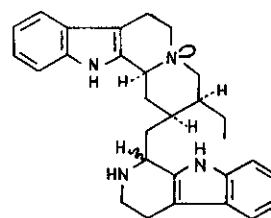
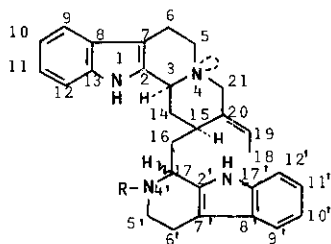
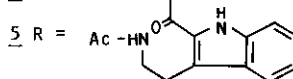
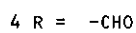
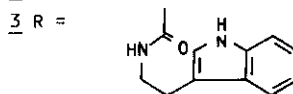
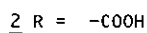
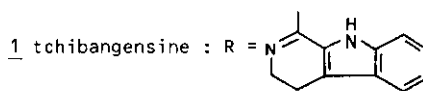
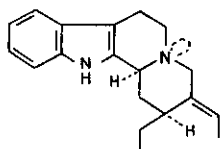
Preparation of optically active tchibangensine was now achieved along the lines of the synthesis of (±)-3',4'-dihydrousambarensine as described by Yamada and colleague². Thus tryptamide 3, obtained by condensation of tryptamine with geissoschizoic acid 2 (DCC, DME/DMF, 20°C, 6 days, quantitative yield), was refluxed in CHCl₃, with POCl₃ for 4 h. to give a compound identical in every respect with tchibangensine 1 (30 % yield).

On reduction with potassium borohydride, tchibangensine 1 yielded two derivatives epimeric at C(17) which were separated by column chromatography on alumina : 6a - the less polar - (α)_D - 11.3° (EtOH)-(46 % yield), 6b - the more polar - (α)_D + 41° (EtOH)-(34 % yield). Both derivatives were acetylated (Ac₂O : 6a,b → 7a,b) or methylated (CH₂O, AcOH, NaBH₃CN : 6a,b → 8a,b) in good yields. Pictet-Spengler reaction between tryptamine and geissoschizal 4 (phosphate buffer ; pH 4-5 ; 20°C) led to two derivatives (1 : 1 mixture ; 23 % yield) identical with the aforementioned reduction products.

As expected, catalytic hydrogenation (PtO₂/MeOH) transformed 6a into ochrolifuanine -C 9a (23 %) and 6b into ochrolifuanine-D 9b (33 %). This reaction was accompanied by inversion of the nitrogen lone pair as already observed in the hydrogenation of tchibangensine¹.

Along with 9a and 9b, two Emde fragmentation products were obtained : 10a - (α)_D - 66° (EtOH) - UV_{EtOH}^{λmax} (log ε) 227 (4.75) 283 (4.12) 291 (4.04) - MS : M⁺·440, characteristic peaks at m/e 440, 438, 423, 410, 396, 383 (M⁺·-C₄H₉), 366, 354, 310, 281, 267, 253, 237, 225, 223, 221, 197, 184, 171 (100 %), 156, 144, 130 - NMR_{CDCl₃}^δ 0.84 (d, 3H, J₆), 1.24 (t, 3H, J₈) - (14 % yield) and 10b (α)_D + 5° (EtOH) - U.V. and mass spectra identical with those of 10a - NMR_{CDCl₃}^δ 0.84 (d, 3H, J₆), 1.24 (t, 3H, J₈) - (30 % yield).

When treated with acetic anhydride in pyridine, tchibangensine 1 afforded the secoderivative 5 in



70 % yield : $[\alpha]_D^{+20}$ (EtOH) - $UV_{EtOH}^{\lambda_{max}}$ (log ϵ) 226 (4.65) 286 (4.05) 293 (4.10) 315 (4.22) -
 I.R. ν_{CHCl_3} 3460, 3330, 1660 - MS : M^{+} 494, characteristic peaks at m/e 494, 476 ($M^{+} - H_2O$), 465,
 422 ($M^{+} - Ac-NH=CH_2$), 408, 265, 250, 249, 247, 235, 232, 221, 219, 185, 172, 158, 156, 154, 144,
 143, 130 - NMR δ_{CDCl_3} 5.88 (t, 1H, J6), 5.5 (q, 1H, J6.5), 4.4 (m, 1H), 1.52 (d, 3H, J6.5). Such a
 ring cleavage is preceded in the harmaline series³.

References

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