over sodium sulfate and evaporated. On treatment with ether, 0.03 g of 1-acetylexcelsine (IV) with mp 108-110°C was isolated.

Mass spectrum of (IV): m/z (%): M^+ 449(15.6), 434(10), 432(0.7), 418(8), 406(2.6), 390 (100), 374(2), 372(2), 358(2).

PMR spectrum of (IV) (100 MHz, $CDCl_3$, ppm): 1.02 (3H, t, $N{-}C_2H_5$), 1.98 (3H, s, $OCOCH_3$), 3.03 and 2.12 (each 3H, s, OCH_3), 5.02 (1H, q), 3.55 (1H, br.s).

LITERATURE CITED

1. T. E. Monakhova, T. F. Platonova, A. D. Kuzovkov, and A. I. Shreter, Khm. Prir. Soedin., 113 (1965).
2. V. A. Tel'nov, M. S. Yunusov, and S. Yu. Yunusov, Khim. Prir. Soedin., 129 (1973).
3. S. M. Nasirov, V. G. Andrianov, Yu. T. Struchkov, V. A. Tel'nov, M. S. Yunusof, and S. Yu. Yunusov, Khim. Prir. Soedin., 812 (1974); 206 (1976).
4. É. F. Ametova, M. S. Yunusov, V. E. Bannikova, N. Dzh. Abdullaev, and V. A. Tel'nov, Khim. Prir. Soedin., 466 (1981).
5. M. S. Yunusov, Ya. V. Rashkes, and S. Yu. Yunusov, Khim. Prir. Soedin., 85 (1972).
6. M. S. Yunusov, Ya. V. Rashkes, and S. Yu. Yunusov, Khim. Prir. Soedin., 626 (1971).
7. M. N. Sultankhodzhaev, M. S. Yunusov, and S. Yu. Yunusov, 481 (1975).

SYNTHESIS OF THE RACEMIC ALKALOID DIPTOCARPILIDINE

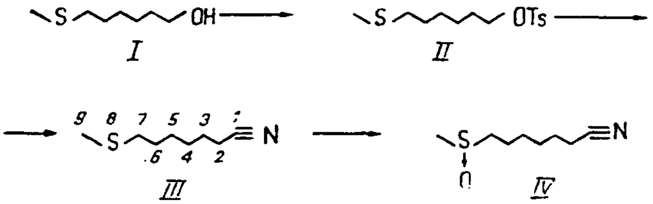
A. G. Tolstikov, L. A. Biktimirova,
O. V. Tolstikova, V. S. Shmakov,
S. F. Aripova, V. N. Odinokov,
and G. A. Tolstikov

UDC 547.495.2

A convenient approach to the synthesis of the racemic alkaloid diptocarpilidine from the readily available 1-hydroxy-7-thiaoctane has been developed.

The isolation from the plant Dipthychocarpus strictus of the optically active alkaloid diptocarpilidine, which exhibits a high antihypoxic activity, has been reported previously [1].

We have developed a convenient approach to the synthesis of the racemic diptocarpilidine (IV) from 1-hydroxy-7-thiaoctane (I) [2]. The conversion of the ω-hydroxy sulfide (I) at the hydroxy group into the tosylate (II) and then into 8-thianonanonitrile (III) and the oxidation of the latter wtih hydrogen peroxide led to the desired alkaloid (IV) with an overall yield in the three stages of 63%. The transformation of the sulfide (III) into the sulfoxide (IV) was characterized by a considerable paramagnetic shift of the signals of the carbon atoms adjacent to the sulfur atom. While in the ^{13}C NMR spectrum of the sulfide (III) the signals of the C9 and C7 atoms were observed at 15.76 and 34.31 ppm, in the case of the sulfoxide (IV) these signals were shifted into the 38.58 and 54.29 ppm regions, respectively. The presence of a SO group in the molecule of the alkaloid synthesized was also confirmed by the appearance in the IR spectrum of an intense absorption band at 1032 cm^{-1}.



Institute of Chemistry, Bashkir Scientific Center, Urals Branch Academy of Sciences of the USSR, Ufa. Institute of Chemistry of Plant Substances, Academy of Sciences of the Ubzek SSR, Tashkent. Translated from Khimiya Prirodnykh Soedinenii, No. 2, pp. 261-263, March-April, 1991. Original article submitted October 12, 1990.

EXPERIMENTAL

IR spectra were obtained on a UR-20 instrument. PMR spectra were recorded on a Tesla 567 B instrument with a working frequency of 100 MHz. ^{13}C NMR spectra were taken on a Bruker AM-300 instrument with a working freuqency of 75 MHz using $CDCl_3$ as the solvent and TMS as the standard. The products of synthesis were purified by column chromatogrphay on silica gel 40/100 (Czechoslovakia).

7-Thia-1-tosyloxyoctane (II). A mixture of 2.86 g ($2 \cdot 10^{-2}$ mole) of the alcohol (I), 4.49 g ($2.4 \cdot 10^{-2}$ mole) of tosyl chloride, and 5 ml of anhydrous pyridine was stirred at room temperature for 4 h. Then it was diluted with 10 ml of ethyl acetate and washed with water (2 × 10 ml). The organic layer was dried with Na_2SO_4 and evaporated, and the residue was chromatographed (hexane—ethyl acetate (9:1)). This gave 4 g (68%) of the tosylate (II) in the form of a light yellow oil, R_f 0.44 (hexane—ethyl acetate (7:3)), n_D^{22} 1.5155. PMR spectrum (ppm): 1.25-1.75 (8H, m, CH_2-2—CH_2-5), 2.08 (3H, s, CH_3-8), 2.42 (2H, t, J = 6.8 Hz CH_2-6), 2.50 (3H, s, CH_3Ar), 4.02 (2H, t, J = 7 Hz, CH_2-1), 7.25-7.95 (4H, m, H-Ar).

8-Thianonanonitrile (III). A mixture of 2.46 g ($8.1 \cdot 10^{-3}$ mole) of the tosylate (II), 0.8 g ($1.63 \cdot 10^{-2}$ mole) of NaCN and 5 ml of anhydrous dimethyl sulfoxide was heated at 70°C for 2 h. Then it was cooled to room temperature, diluted with 25 ml of ether, and washed with water (3 × 10 ml) and with saturated NaCl solution (20 ml). The organic layer was dried with $MgSO_4$ and evaporated, and the residue was chromatographed (hexane—ethyl acetate (7:3)). This yielded 1.25 g (98%) of the nitrile (III) in the form of a light yellow oil with R_f 0.44 (hexane—ethyl acetate (7:3)), n_D^{22} 1.4760. IR spectrum (cm^{-1}): 2257 ($C \equiv N$). PMR spectrum (ppm): 1.39-1.75 (8H, m, CH_2-3—CH_2-6), 2.09 (3H, s, CH_3-9), 2.37 (2H, t, J = 6.9 Hz, CH_2-2), 2.51 (2H, t, J = 7 Hz, CH_2-7). ^{13}C NMR spectrum (ppm): 15.76 (C-9), 17.32 (C-2), 25.52, 28.09, 28.50, 28.99 (C-3—C-6), 34.31 (C-7), 119.92 (C-1).

8-Oxo-8-thianonanonitrile (IV) [(±)-Diptocarpilidine]. A stirred solution of 0.86 g ($5.4 \cdot 10^{-3}$ mole) of the nitrile (III) in 5 ml of acetone was treated with 2 ml of glacial acetic acid and 0.62 g ($5.4 \cdot 10^{-3}$ mole) of 30% hydrogen peroxide. After 2 h, the solvent was evaporated off from the reaction mixture, the resiude was dissolved in 10 ml of chloroform, and the solution was neutralized with saturated $NaHCO_3$ solution. The organic layer was dried with Na_2SO_4 and evaporated, and the residue was chromatographed (chloroform—methanol (10:1)). This gave 1 g (94%) of the alkaloid (Iv) in the form of a clear oil. Its IR and PMR spectra were identical with those given in [1]. ^{13}C NMR spectrum (ppm): 17.01 (C-2), 22.30, 25.04, 289.07, 28.14 (C-3—C-6), 38.57 (C-9), 54.29 (C-7), 119.55 (C-1).

LITERATURE CITED

1. S. F. Aripova, O. Abdilalimov, É. S. Bagdasarova, M. I. Yunusov, and A. G. Kurmukov, Khim. Prir. Soedin., 84 (L984).
2. O. V. Tolstikova, A. G. Tolstikov, V. S. Shmakov, E. G. Galkin, E. M. Vyrypaev, S. F. Aripova, and I. B. Abdrakhmanov, Khim. Prir. Soedin., 232 (1989).
3. V. I. Khvostenko, V. A. Mazunov, V. S. Fal'ko, O. G. Khvostenko, and V. Sh. Chanbarisov, Khim. Fiz., 715 (1982).