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# STRUCTURE OF LEDERINE

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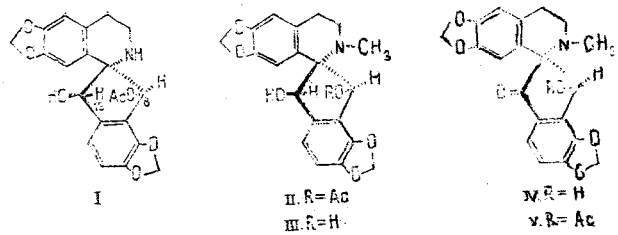
The new spirobenzylisoquinoline base lederine with mp 208-209°C (methanol), $[\alpha]_D$ +13° (c 0.84; chloroform) has been isolated from *Corydalis ledebouriana* Kar et Kir and *Dicentra peregrina* (Rudolphi) Fedde. Its structure has been established on the basis of spectral characteristics and chemical reactions.

Continuing the separation of the total alkaloids from the epigeal part of *Corydalis lederbouriana* Kar et Kir collected at Baraldaisae (KazSSR) 1 , from the nonphenolic-fraction we have isolated a new optically active base with mp 209-209°C, which we have called lederine (I). Lederine has also been isolated from the nonphenolic combined ether-extractable alkaloids of *Dicentra peregrina* (Rudolphi) Fedde collected on the island of Sakhalin.

The IR spectrum of the base contains absorption bands at ($cm^{-1}$) 3600-3150 (active hydrogen), 1760 (ester C=O), 1605 and 1500 (aromatic ring), and 1050 and 940 ($CH_2O_2$). The NMR spectra of (I) contains a three-proton singlet at 1.90 ppm ($COCH_3$), a one-proton singlet at 5.23 ppm, and two pairs of one-proton doublets at 5.86, 5.89, and 6.00, 6.03 ppm (J ∿ 2 Hz), ($2CH_2CO_2$). In the aromatic region of the spectrum there are one-proton singlets at 6.18, 6.51, and 6.66 ppm and a two-proton singlet at 6.78 ppm. The remaining protons are represented by a multiplet in the 2.40-3.65 region.

Methylation by Craig's method [2] yielded N-methyllederine (II). The saponification of (II) gave O-deacetyl-N-methyllederine (III), identical with severcinine (severzinine).

According to the facts given, lederine is a spirobenzylisoquinoline alkaloid [4]. To determine the position of the acetyl group in lederine we obtained O-acetylsibiricine (V) by acetylating sibiricine (IV) [5-7] with acetic anhydride in pyridine. The reduction of (V) with sodium tetrahydroborate led to O-acetyldihydrosibiricine, identical with N-methyllederine. Consequently, the acetyl group in lederine is located at $C_8$.




## EXPERIMENTAL

For chromatography we used type KSK silica gel. For TLC we employed the following solvent system: 1) benzene—ethanol (9:1) and 2) chloroform—ethanol (9:1). IR spectra were recorded on a UR-10 instrument (tablets with KBr) and NMR spectra in $CDCl_3$ on a JNM-4H-100/100 MHz instrument with HMDS as standard (δ scale), and mass spectra on a MKh-1303 instrument.

Lederine, mp 208-209°C (methanol), $[\alpha]_D$ +13° (c 0.84; chloroform).

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N-Methyllederine (II). After 48 mg of lederine had been stirred in 5 ml of Craig's mixture (0.25 ml of 25% $CH_2O$ and 25 ml of $CH_3OH$) for 1 h, 0.45 g of sodium tetrahydroborate was added and stirring was continued for another 1 h and the solution was evaporated to dryness. The residue was dissolved in 20 ml of 5% sulfuric acid and then the solution was made alkaline with 25% $NH_3$ and extracted with ether. The solvent was distilled off and the residue was chromatographed on a column of silica gel. Elution with benzene–ethanol yielded 23 mg of the amorphous substance (II). IR spectrum, $\nu_{max}$ 1740 $cm^{-1}$. Mass spectrum: 411 ($M^+$) 368, 351 (100%), 336, 333, 322, 190.

Saponification of N-Methyllederine. A mixture of 21 mg of (II) and 5 ml of 5% KOH in methanol was boiled for 1 h. Then the solvent was evaporated off, the residue was dissolved in 5% $H_2SO_4$, and the solution was made alkaline with 25% of $NH_3$ and extracted with ether. The residue after the solvent had been distilled off was treated with ethanol. This gave severzinine (III) with mp 90-91°C.

O-Acetylsibiricine. To 40 mg of sibiricine in 0.2 ml of pyridine was added 2 ml of $(CH_3CO)_2O$, and the mixture was left for a day. Evaporation of the solvent and the usual working up gave O-acetylsibiricine (V) with mp 187-188°C (methanol). IR spectrum, $\nu_{max}$, $cm^{-1}$: 1710, 1730. NMR, ppm: 1.68 ($COCH_3$); 2.29 ($N-CH_3$); 5.91, 5.77 (d, J ∿ 2 Hz, $CH_2O_2$); 6.09 (1H), 6.11 (1H), ($CH_2O_2$); 5.97 (1H), 6.47 (1H, 6.57 (1H), 6.95 and 7.45 (2H, d, J = 8 Hz).

Reduction of O-Acetylsibiricine. A mixture of 36 mg of O-acetylsibiricine and 0.15 g of $NaBH_4$ in 5 ml of absolute methanol was stirred for 30 min. The solvent was distilled off, the residue was treated with 5% $H_2SO_4$, and after alkalinization with ammonia the reaction product was extracted with ether. The residue after the distillation of ether was chromatographed on a column of silica gel. Elution with benzene–ethanol gave 21 mg of O-acetyldihydrosibiricine identical with (II) according to TLC.

## SUMMARY

The structure of the new spirobenzylisoquinoline alkaloid lederine has been established on the basis of spectral characteristics and chemical reactions.

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