377. *Studies on Argentine Plants. Part I. Hypaphorine from* Erythrina cristagalli.

By V. Deulofeu, E. Hug, and P. Mazzocco.

Hypaphorine (tryptophan betaine) has been isolated from the seeds of *Erythrina cristagalli*. The *flavianate*, m. p. 235°, can be used for its identification.

In a study of the curarizing principle of *Erythrina cristagalli* (Cicardo and Hug, *Compt. rend. Soc. Biol.*, 1937, **126**, 154) crystals were isolated independently and almost simultaneously by Hug (Rosario) and Mazzocco (Buenos Aires). They were characterised as tryptophan betaine hydrochloride (hypaphorine hydrochloride) by analysis, physical constants, and formation of the insoluble nitrate described by Romburgh and Barger (J., 1911, **99**, 2068). A *flavianate* also was prepared; it is a very easily crystallisable compound and can be used for the identification of hypaphorine.

Tryptophan betaine has been found in the *Erythrina* species so far examined and was first isolated by Greshoff from *E. hypaphorus* (*Med. Lands Plant*, 1890, **7**, 29; cf. Henry, "Alkaloids," p. 447, London, 1939); its chemical constitution was demonstrated by Romburgh and Barger (*loc. cit.*). Marañon and dos Santos isolated it from *E. variegata* (*Philippine J. Sci.*, 1932, **48**, 563), Rao, Rao, and Seshadri from *E. indica* (*Proc. Indian Acad. Sci.*, 1938, **7**, *A*, 179), and Folkers and Koniuszy from *E. sandwiscensis* and *E. Subumbrans* (*J. Amer. Chem. Soc.*, 1939, **61**, 1232).

The yield of hypaphorine hydrochloride obtained from *E. cristagalli* was 1·86%, similar to that recorded for other species.

Experimental.

Seeds of *E. cristagalli* (100 g.) were ground, mixed with 10 g. of calcium hydroxide, dried, and extracted (Soxhlet) with alcohol. The semi-solid precipitate obtained on cooling was removed, and the filtrate evaporated on a water-bath. After addition of N-hydrochloric acid to the syrupy residue, crystals soon formed; these were collected after some days and washed with a little alcohol. Another crop was produced by slow evaporation of the mother-liquor. The total yield of hydrochloride was 1·86 g. The crystals, m. p. 227—229° (243—245° when rapidly heated), were repeatedly crystallised from water and obtained in long prisms, m. p. 234—235° after darkening from 222°, $[\alpha]_D^{20°}$ + 89·2° (*c*, 0·69 in water) (Found: C, 59·5; H, 6·7; N, 10·0; Cl, 12·6. Calc. for $C_{14}H_{18}O_2N_2$,HCl: C, 59·4; H, 6·7; N, 9·9; Cl, 12·6%). The nitrate, prepared by Romburgh and Barger's method, had m. p. 220—222°.

Hypaphorine Flavianate.—0·15 G. of hypaphorine hydrochloride was dissolved in 25 c.c. of water, and a solution of 0·4 g. of flavianic acid added. Almost immediately, fine orange-yellow needles were deposited, m. p. 235° (decomp.) after recrystallisation from water. Red rhombic prisms were sometimes obtained, but m. p. and analysis were the same (Found: N, 9·7. $C_{14}H_{18}O_2N_2,C_{10}H_6O_9N_2S$, requires N, 10·0%).

INSTITUTO DE FISIOLOGÍA, FACULTAD DE MEDICINA,
BUENOS AIRES, ARGENTINE.

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