Thin-layer chromatography of the peyote alkaloids*

The peyote cactus, *Lophophora williamsii* (Lem. ex SD.) Coult. (T.) (syn. *Anhalonium lewinii* Hennings), contains, besides the narcotic mescaline, a number of other bases, which are derivatives of phenylethylamine or tetrahydroisoquinoline[1,2]. The use of peyote ("mescal buttons") by the natives of Mexico as a hallucinogenic drug has lately also spread to other countries. Until the recent paper by McLAUGHLIN AND PAUL[3] apparently no thin-layer or paper chromatographic procedures for the rapid identification of *Lophophora* bases had been published.

In this note several thin-layer chromatographic systems suitable for the separation and identification of the peyote alkaloids are described.

Methods and materials

Thin-layer chromatography was carried out as described earlier[4] on silica gel coated glass plates (20 × 20 cm, 0.25 mm layer) except that the coated plates were dried overnight at room temperature. For details regarding solvent systems, see Table I.

The base fraction from a peyote cactus (fresh wt. *ca.* 100 g–0.4 g alkaloids) was

TABLE I

R_F VALUES × 100 OF PEYOTE ALKALOIDS

Silica Gel G chromatoplates with the following solvent mixtures:
(A) chloroform–ethanol–diethylamine (85:5:10 by vol.)
(B) chloroform–ethanol–diethylamine (85:10:5)
(C) chloroform–ethanol–conc. NH_3 (85:15:0.4)
(D) chloroform–*n*-butanol–conc. NH_3 (50:50:2.5)
(E) pyridine–conc. NH_3 (90:10)

Alkaloid	*Solvent system*					*Colour*[a]
	A	*B*	*C*	*D*	*E*	
Phenolic						
Anhalamine	11	20	—	—	40	purple
N-Methyltyramine	31	31	—	—	32	yellow
Tyramine	34	33	—	—	42	yellow
Anhalonidine	39	51	—	—	51	purple
Hordenine	51	56	—	—	60	yellow
Anhalidine	55	65	—	—	72	purple
Pellotine	63	70	—	—	69	purple
Non-phenolic						
N-Methylmescaline	—	—	22	20	25	yellow
Mescaline	—	—	24	31	36	brown
Anhalinine	—	—	30	41	48	yellow
O-Methylanhalonidine	—	—	33	45	50	yellow
Anhalonine	—	—	45	58	56	yellow
Lophophorine	—	—	68	80	72	blue gray
N-Acetylmescaline	—	—	82	95	68	pale brown

[a] Colour with *o*-dianisidine reagent.

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isolated by chloroform extraction[5]. The evaporated chloroform extract was dissolved in 100 ml chloroform and passed through a 2 × 15 cm column of acid Celite (15 g Celite 545 and 4 ml 0.5 *M* H_3PO_4). The column was washed with 200 ml chloroform to remove non-basic compounds. The alkaloids were eluted with chloroform saturated with ammonia[6]. A solution of the alkaloids in methanol was applied to a column (1 × 20 cm) of Amberlite IRA 400 (OH) ion-exchange resin. The column was washed with 100 ml of 30 % aqueous methanol to yield the non-phenolic alkaloids. The phenolic alkaloid fraction was obtained by elution with 200 ml of a solution of 120 ml methanol, 60 ml water and 20 ml glacial acetic acid.

Alkaloids were located by the use of an *o*-dianisidine reagent (equal volumes of 0.5 % *o*-dianisidine in dilute HCl and 10 % $NaNO_2$ in water) or iodoplatinate reagent[7].

Reference alkaloids were kindly supplied by Drs. A. BROSSI, Hoffman-La Roche Inc., and G. KAPADIA, Howard University, or isolated or synthesized according to known procedures (*cf.* ref. 1).

Results and discussion

The thin-layer chromatographic behaviour of the peyote alkaloids in several solvent systems and their colour reactions with the dianisidine reagent are recorded in Table I. This reagent produces a red colour with phenolic tetrahydroisoquinolines and a yellow or brown, fading colour with non-phenolic alkaloids.

Solvent system A was found to be must suitable for the separation of phenolic alkaloids and system D for non-phenolic alkaloids. With the exception of solvent system E, no system was found to resolve satisfactorily both phenolic and non-phenolic alkaloids.

Details of thin-layer and gas chromatographic separation of peyote alkaloids will be published at a later date.

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