Polyamide layer chromatography of opium alkaloids

Recent advances in polyamide layer chromatography techniques have resulted in the easier handling and better separation of some compounds[1]. The separation of opium alkaloids by silica gel thin layers has been reported[2] but there is no similar report for polyamide layers. In this note, the separation of seven opium alkaloids by polyamide layers will be described.

Experimental

Materials. The polyamide resin was Amilan CM 1007s (poly-ε-caprolactam) of Toyo Rayon Co., Tokyo, Japan. All alkaloids except diacetylmorphine were supplied by the Narcotic Control Administration, Ministry of Internal Affairs, Republic of China. Diacetylmorphine was synthesized[3] by acetylation of morphine. The solvents were the reagent grade of Wako Pure Chemical Industries, Ltd., Osaka, Japan.

Preparation of polyamide layers and chromatographic techniques. The method described by WANG[1] was used.

Visualization. Two color reagents[4] were used: (1) Dragendorff's and (2) iodoplatinate reagent.

TABLE I

CHROMATOGRAPHIC DATA

No.	*Substance*	R_F *value*[a]		*Color of spot*	
		I[b]	*II*[c]	*Dragendorff*	*Iodoplatinate*
1	Morphine	0.05	0.63	orange	yellow
2	Papaverine	0.32	0.06	pink	violet
3	Codeine	0.38	0.58	orange	violet-blue
4	Ethylmorphine	0.47	0.48	orange	violet-blue
5	Noscapine	0.61	0.00	pink	violet-red
6	Dihydrocodeine	0.70	0.00	orange	yellow
7	Diacetylmorphine	0.70	0.61	orange	violet-blue

[a] The R_F values are the mean of five chromatograms.

[b] Solvent I: cyclohexane–ethyl acetate–*n*-propanol–dimethylamine (30:2.5:0.9:0.1), distance 10 cm, time required, 2 h.

[c] Solvent II: water–absolute ethanol–dimethylamine (88:12:0.1), distance 10 cm, time required, 1.5 h.

Results and discussion

Table I shows the R_F values in two solvent systems, and Fig. 1 shows the chromatogram of solvent I. It is very interesting that the R_F values in the two solvent systems are reversed. In solvent I, the result is the same as in thin-layer chromatography on silica gel; *viz.* the R_F value was increased as the hydroxyl group was substituted.

Both iodoplatinate and Dragendorff's reagent were used for visualization of the spots but iodoplatinate reagent is much preferred because of its higher sensitivity. Ten μg of alkaloids were easily detected by the iodoplatinate reagent. The violet spots changed to pale yellow after standing for a while.

The separation of morphine alkaloids by polyamide layers is most interesting

from the toxicological point of view, so that further applications to this field are in progress.

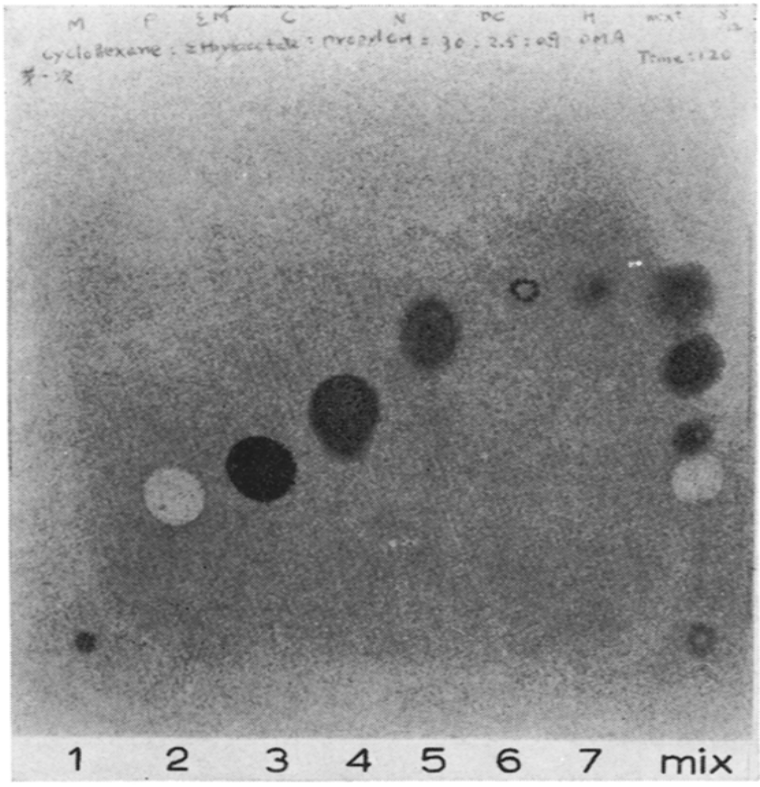

Fig. 1. One-dimensional chromatogram. Solvent: I, 2 h, 10 cm. Layer: poly-ε-caprolactam resin CM 1007s (26°). Loading: 10 μg in 0.01 ml methanol. Numbers: *cf.* Table I.

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Department of Pharmacy, Taipei Medical College JEN-TZAW HUANG
Taipei, Taiwan (Republic of China) HSING-CHIEN HSIU

Department of Chemistry, National Taiwan University KUNG-TSUNG WANG
Taipei, Taiwan (Republic of China)

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