TECHNICAL NOTE

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Microcrystalline Identification of Drugs of Abuse: Stimulant Street Drugs

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ABSTRACT: The microcrystallographic properties of the dilituric (5-nitrobarbituric acid) derivatives of certain stimulant drugs found in illicit street preparations have been determined. These microcrystallographic data can be used as a means of drug identification.

KEYWORDS: toxicology, crystallography, drug identification, abused drugs, stimulant drugs, dilituric acid, apparent properties, crystal morphology, photomicrographs

Recently, the microcrystalline properties of the drugs found in the illicit street preparation "The White Cross Suite" have been presented [*1*]. These microcrystalline tests serve a valuable role in the identification of abused drugs by providing a rapid, visible method for the analysis of these species. The present communication reports similar microcrystalline data for the following "stimulant drugs:[3] diethylpropion (Tenuate® and Tepanil®), methylphenidate (Ritalin®), phendimetrazine (Plegine®), phenmetrazine (Preludin®), fenfluramine (Pondimin®), and the alkaloids, brucine and strychnine [*2*].

Stimulant drugs continue to be the most prevalent drug species to be abused in the illicit drug marketplace [*3*]. The stimulant drugs studied in this report are those used as substitutes for drugs of the amphetamine group and also represent some of the drugs used for cocaine adulteration [*4*]. Fenfluramine has had great popular use in Western Europe and several severe and toxic reactions have been reported for this drug [*5*]. Of special interest is the substitution of the highly toxic alkaloids [*6*], strychnine and brucine, for the amphetamines and for the alkaloid, cocaine.

Experimental Procedure

The methods and materials employed, the instrumentation and photomicrography used, and the preparation and analysis of the crystalline derivatives were the same as those re-

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[3]The authors acknowledge supplies of the following drug chemicals: diethylpropion (Tenuate, Merrell-National), methylphenidate (Ritalin, Ciba-Geigy), phendimetrazine (Plegine, Ayerst), phenmetrazine (Preludin, Boehringer-Ingelheim), and fenfluramine (Pondimin, A. H. Robins) and express their appreciation and thanks to the manufacturers who supplied the amine salts used in this study.

ported in the previous work [*1*]. The microcrystalline properties of the dilituratc salts are listed in Table 1. Descriptions of the crystals are shown in Table 2. Individual crystal morphologies for each drug are represented by the drawings (Fig. 1) and by the photomicrographs (Figs. 2-10). These data serve to characterize the crystalline derivatives.

Results and Discussion

Significant Properties

The most significant chemical microscopical properties appear in Table 1, Fig. 1, and the photomicrographs (Figs. 2 to 10). The crystals of the dilituratcs of these drugs are so flattened that when suspended in a liquid on a microscope slide, nearly all crystals assume the same or nearly the same orientation. Optical properties (Table 1) noted are the crystal morphology

TABLE 1—*Apparent (most frequently observed orientation) properties.*

Drug Dilituratc	Crystal Habit	Extinction Angle	Refractive Indices (Front Face)		Elongation
Brucine	hexagonal platelet	parallel = 0°	1.496	1.716	slow
Diethylpropion—Form I (Tenuate, Tepanil)	lath-shaped	parallel = 0°	variable	1.655	slow
Diethylpropion—Form II	prism	parallel = 0°	1.462	variable	fast
Methylpenidate (Ritalin)	prism	parallel = 0°	variable	1.608	slow
Phendimetrazine (Plegine)	platelet	parallel = 0°	1.532	1.635	fast
Phenmetrazine (Preludin)	lath-shaped	parallel = 0°	1.542	1.633	fast
Fenfluramine (Pondimin)	acicluar—lath-shaped	parallel = 0°	1.600	variable	fast
Strychnine—Form I (yellow prism)	prism	parallel = 0°	1.508	1.728	slow
Strychnine—Form II (white needle)	acicluar—lath-shaped	parallel = 0°	1.553	variable	fast

TABLE 2—*Dilituratc microchemical descriptions—stimulant drugs.*

Substance	Description
	PLATELETS
Phendimetrazine	thin, square platelets to square prismatic forms
Brucine	thin, hexagonal, white platelets
	PRISMATIC FORMS
Diethylpropion—Form II	very small prisms appearing before crystallization of diethylpropion Form I
Strychnine—Form I	clusters of very small yellow prisms
	ACICULAR FORMS
Diethylpropion—Form I	thin, elongated lath forms to long rods
Fenfluramine	short stellate rods and lath forms to acicular needles
Methylphenidate	clusters of narrow rods to elongated prisms
Phenmetrazine	elongated lath-like crystals in stellate arrangement
Strychnine—Form II	elongated, white needles appearing in rosettes after crystallization of strychnine Form I

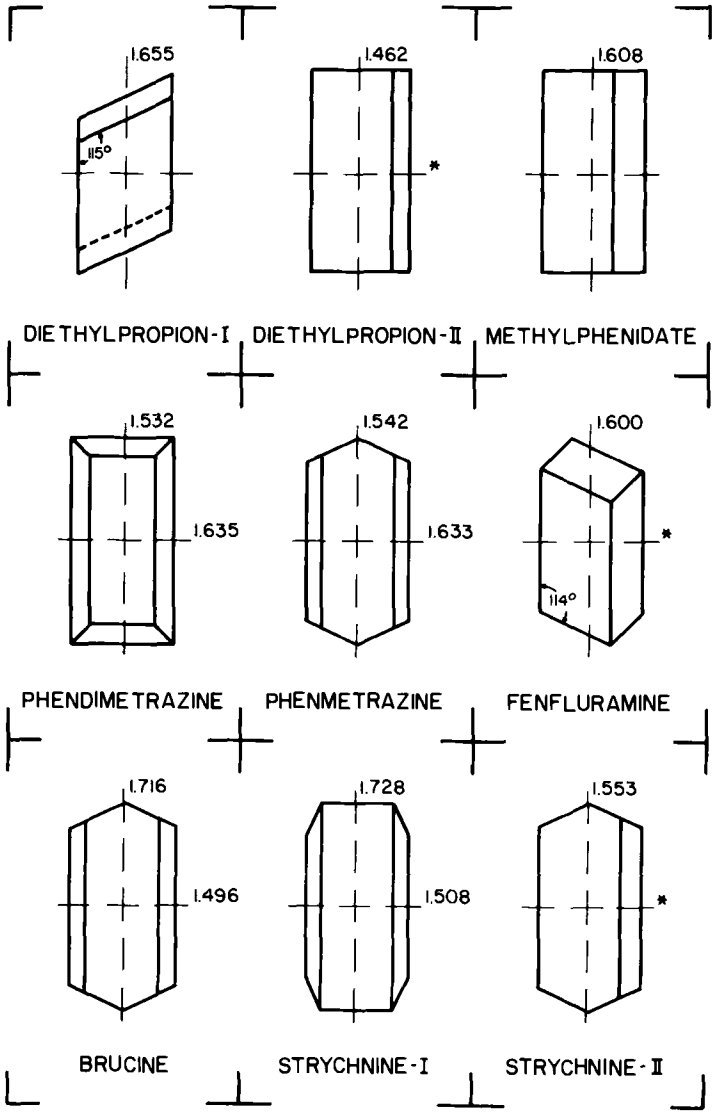

FIG. 1—*Amine dilituratos (stimulant drug suite).*

(Figs. 1 through 10), the extinction angle, and the refractive indices on the front face of the crystal. These data serve to identify the drug chemical under investigation.

Descriptions of Crystal Derivatives

Additional descriptions of some of the dilituratos will facilitate identification of them. The reagent, dilituric acid, rarely crystallizes out of solution at the concentration used; however, small, square to rectangular tablets are characteristic of this chemical. Other descriptions have been summarized in Table 2.

Other frequently appearing drugs found in stimulant street preparations include pemoline

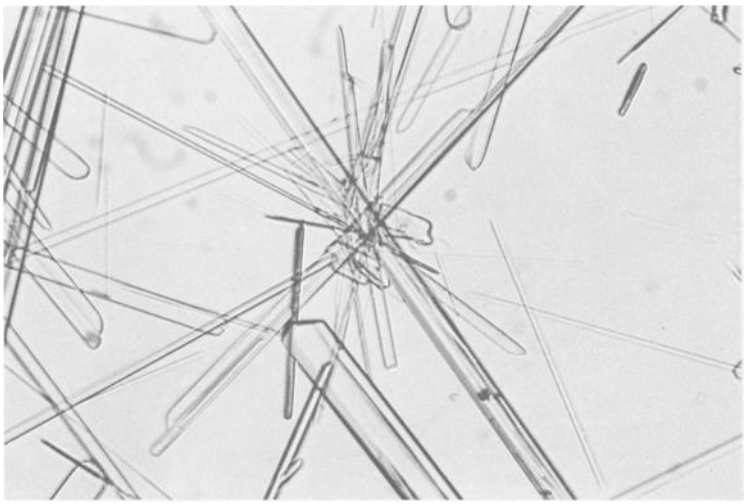

FIG. 2—*Photomicrograph of diethylpropion—Form I.*

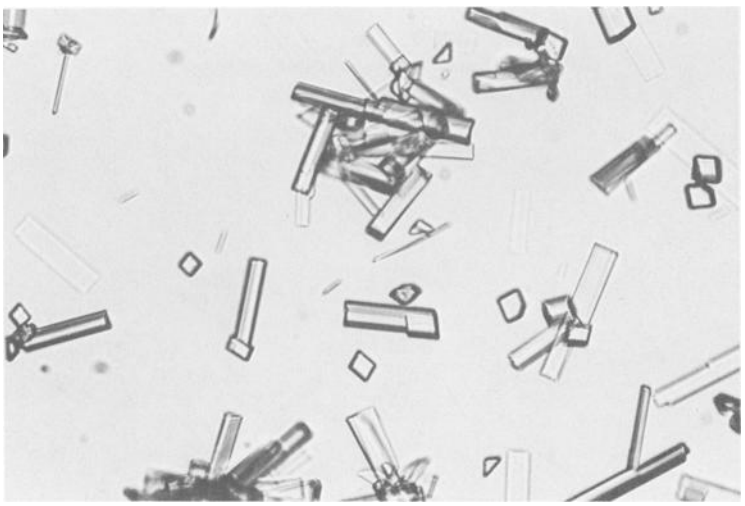

FIG. 3—*Photomicrograph of diethylpropion—Form II.*

(Cylert®) and cocaine. Neither drug forms a crystalline derivative with the reagent chemical, dilituric acid, used in this study. Cocaine has been studied for its crystalline properties by using the platinic chloride reagent of Fulton [7].

Conclusions and Summary

The chemical microscopy of the dilituric derivatives of the stimulant drugs brucine, diethylpropion, methylphenidate, phendimetrazine, phenmetrazine, fenfluramine, and strychnine have been determined and discussed. The data presented serve to identify these drugs.

FIG. 4—*Photomicrograph of methylphenidate.*

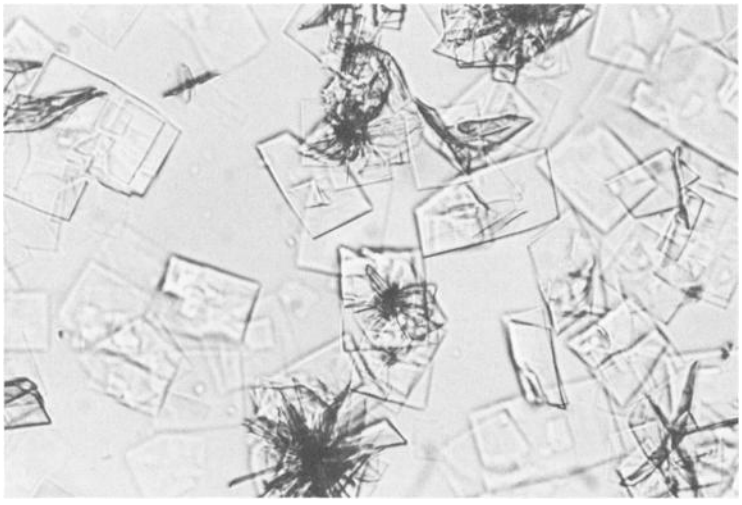

FIG. 5—*Photomicrograph of phendimetrazine.*

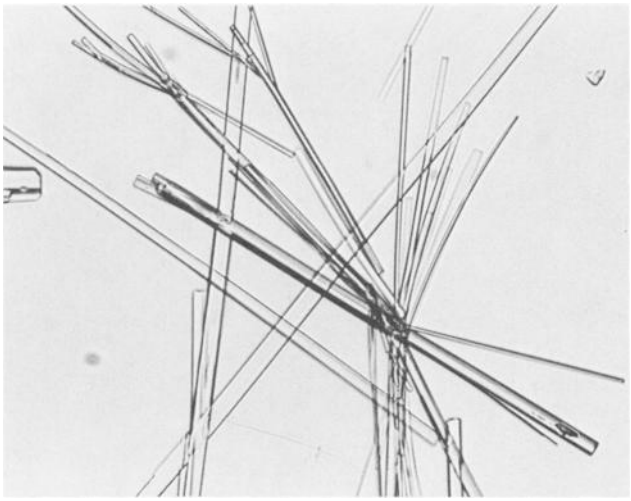

FIG. 6—*Photomicrograph of phenmetrazine.*

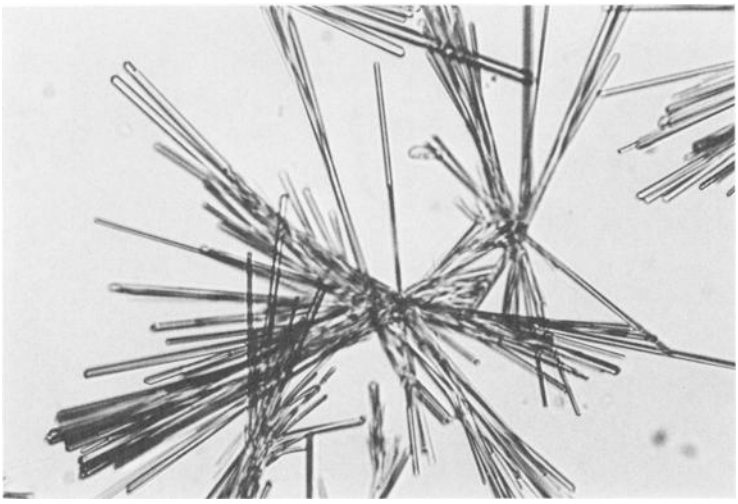

FIG. 7—*Photomicrograph of fenfluramine.*

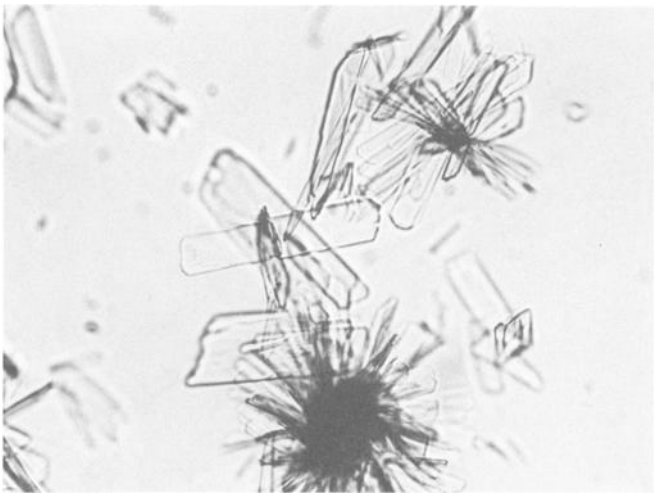

FIG. 8—*Photomicrograph of brucine.*

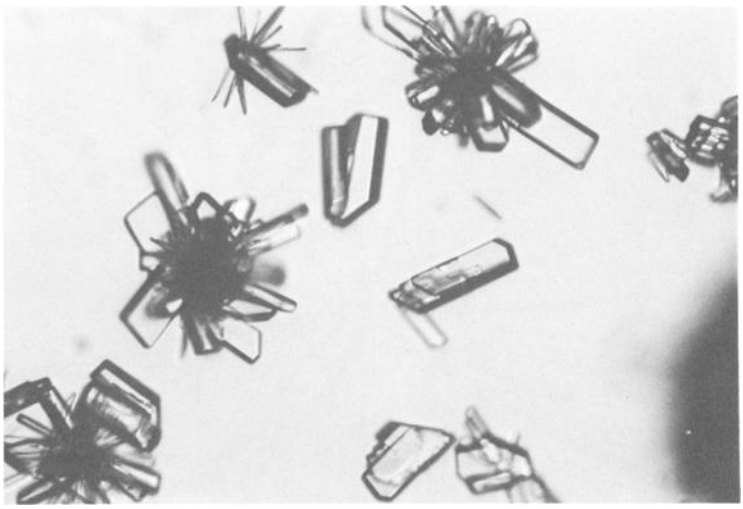

FIG. 9—*Photomicrograph of strychnine—Form I.*

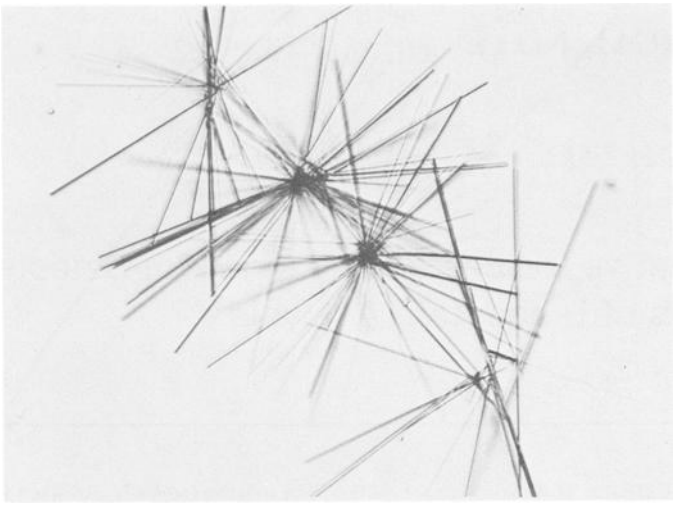

FIG. 10—*Photomicrograph of strychnine—Form II.*

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