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SOME REPLIES TO FORENSIC QUERIES IN CANNABIS IDENTIFICATION

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The positive identification of *cannabis sativa*, L., commonly known in the United States as "marihuana", poses no difficulty to identification experts. More recently microscopic and chemical color tests have been supplemented by paper chromatography and spectrophotometry (1). Yet experience has indicated that some legal minds have to be convinced, and when persuaded by evidence there still exists that daring inclination of lawyers to probe deeper. The present paper reviews some of the legal questions encountered during recent years.

Is marihuana a narcotic? No person is better qualified to answer this than Commissioner of Narcotics H. J. Anslinger of the U. S. Bureau of Narcotics, and he replies: "I think it necessary to explain first that the Federal control of the traffic in marihuana in the United States is based upon a statutory plan resembling, yet somewhat different from, the statutory plan provided for the control of drugs commonly understood as falling under the narcotic drug category. The term 'marihuana' is defined in Sec. 4761 of the Internal Revenue Code of 1954, and the term 'narcotic drugs' is defined in Sec. 4731 of the Internal Revenue Code of 1954, and the latter definition does not include marihuana. On the other hand, a collateral statute (49 USC 781-788) deals with the seizure and forfeiture of vessels, vehicles, and aircraft concerned in certain prohibitive transactions in contraband narcotic drugs and, for purposes of this statute, the term 'narcotic drugs' is defined to include not only the drugs usually understood as falling within this category (such as opium, morphine, cocaine, etc.), but also marihuana.

"It must also be borne in mind that some of the State narcotic laws define the term 'narcotic drugs' to include marihuana. It would seem, therefore, that, while marihuana may not ordinarily be understood as falling within the category of a 'narcotic drug', due regard must be given to the intended coverage of that term, as used in a particular

statute" (2). The U. S. Court of Military Appeals has stated: "Marihuana is now generally considered to be a narcotic drug. It produces a deleterious effect upon human conduct and behavior, as do heroin, opium, morphine, and other so-called 'habit-forming' drugs" (3).

Is marihuana habit-forming? The forensic literature favors an affirmative reply. One well-known text reports marihuana to be habit-forming if used repeatedly over a period of time (4). In 1929 Congress recognized it as a deleterious "habit-forming substance" by including cannabis and its derivatives and preparations under the Harrison Narcotic Act. Cannabis causes habituation *but not true addiction*, as does morphine (5).

Can marihuana be identified after it has undergone laundering and dry-cleaning? Tests performed at this laboratory established that cannabis can be identified despite the fact that it has been processed in clothing after laundering or dry-cleaning. The soap or organic solvents used failed to interfere with identification of the active resin principle, tetrahydrocannabinol. Nor were the botanical characteristics altered in any manner that would interfere with microscopic identification. This question has been posed from time to time in those cases in which marihuana residue was discovered in the clothing of subjects.

Can marihuana be positively identified? The trained and experienced observer can positively identify *cannabis sativa* L. (marihuana) with the aid of microscopic, chemical, chromatography, and instrumental techniques. There do exist substances which resemble marihuana visually, but with experience the genuine can be discerned from the false specimen. For example, a green substance in "asthma cigarettes" sold in western Germany has sometimes confused individuals. Hops, the dried pistillate cones of *humulus lupulus*, also bears some botanical resemblance to cannabis.

Are there other substances which give the same

chemical color reactions as marihuana? In some instances tobacco has given a color similar to that of the marihuana resin with the Duquenois reagent. However, the color produced by tobacco is not extracted from aqueous solution by chloroform (6) whereas the color produced by marihuana is readily extracted from aqueous solution by chloroform. Ghamrawy's reagent¹ gives colorations similar to that of the marihuana resin with some resins of essences (7) (Phenolic, terpenic), but these are not absolutely identical with the successive colorations that appear in the case of cannabis.

Weight considerations. Obviously, a substance suspected to be marihuana or other drug however small in quantity must first be weighed on a microbalance or other analytical balance. The quantity of substance received and the amount consumed in analysis must be reported.

Is it possible to identify a specimen of marihuana as originating from a certain geographical area? The experienced botanist or toxicologist should be consulted in such matters. Some experts have ventured into this area and opined that specimens they have examined did not come from their country (8). If from physiological activity and/or total resin content, the native source can be ascertained further progress will have been made.

Does the passage of time affect the particular specimen? For identification purposes time does not affect identification. The author has obtained positive chemical reactions with the Duquenois and Ghamrawy reagents with specimens that were 10 years old. Research conducted by Girard and Reynier of the Bordeaux Faculty of Medicine and Pharmacy have reported they obtained positive chemical reactions (using the Beam, Duquenois, and Ghamrawy reagents) with specimens collected in 1865 and 1926 (9). In an excellent article Dr. I. C. Chopra and Col. Sir. R. N. Chopra have aptly treated the potency view and report "there is no doubt that the narcotic principle of cannabis drugs deteriorates with age. The popular belief is that cannabis drugs retain their potency for a period of at least two years without appreciable loss. The experience of the excise authorities in the plains of India is that "ganja" retains most of its activity for one year, and during the second year it gradually begins to lose its potency until it becomes quite useless and unsaleable at the end of two years"

¹This should more properly be called Wasicky's Reagent for Ghamrawy (JOUR. EGYPT. MED. ASSN., 20: 193 (1937)) merely applied the technique developed by Wasicky and reported 22 years earlier (Z. ANAL. CHEMIE, 54: 393 (1915)).

(10). Eli Lilly Laboratories carried out bioassays on dry samples of cannabis and found that the activity loss was 1% per month over a period of five years. The use of sealed containers did not seem to prolong its activity much longer.

Is there any relation between the chemical and physiological phenomena of cannabis? Pittenger compared the resin content of the cannabis plant of the Indian, African, and North American varieties and demonstrated that there was no relation between the chemical and physiological phenomena. Dr. Roberval Cordeiro de Farias commenting on this wrote: "Thus, samples with a high resin content revealed a low physiological activity, while others with a low percentage of resin were quite active. These results led Pittenger to conclude that there was a notable variation in the activity of different samples of the same variety" (11). The actual physiological potency of the drug can best be demonstrated through biological methods.

Do both male and female (cannabis sativa L.) plants produce resin? In a personal communication Commissioner Anslinger stated: "The Bureau does believe that both male and female cannabis plants contain the resinous principle. Government laboratory tests made at or about the time the Federal Marihuana Tax Act of 1937 was under consideration resulted in this finding, and the definition of 'marihuana' then adopted, which definition avoided any distinction between male and female plants, remains unchanged. It is further noted from an article on cannabis by Dr. R. J. Bouquet of Tunisia, printed in the October 1950 *U. N. Bulletin on Narcotics*, that he discusses the cultivation of cannabis in Tunisia. In describing the male plants as turning yellow after distributing the pollen, Dr. Bouquet states that in the Tunis plantations they (the male plants) are then pulled up and destroyed, as their resin content is too weak. On the basis of the evidence that we have, I certainly would not subscribe to a viewpoint which would withhold application of appropriate control measures to the male cannabis plant." (2).

What methods exist to estimate the resin content? There are several methods but they are not all equivalent. Certain methods give the total resin content, like the gravimetric methods of extraction. Other methods enable us to determine certain constituents only and to state whether a sample is physiologically active or not. The colorimetric method of Duquenois-Negm employs vanillin-acetaldehyde and permits a determination of $\frac{1}{2}$

milligram of resin. The physiological method published by Duquenois in 1939 utilizes small fish and permits an estimation of $\frac{1}{3}$ milligram of resin. But the results are not necessarily comparable with the other methods, and that method should be utilized which suits the particular problem to be resolved (12).

Do potency tests exist? Reliable tests to assay the cannabis drug for potency still await discovery largely due to lack of an adequate standard (1).

How much marihuana is to be considered dangerous? Wood reports that one-eighth ($\frac{1}{8}$) of a grain of one extract of cannabis will produce definite intoxication, while many grains of another extract which is chemically and physically indistinguishable from the first can be taken without any intoxication (11).

What is the danger of using cannabis? According to Pablo O. Wolff, marihuana has physical and mental effects which definitely lead to mental and moral degeneration (13).

SUMMARY

Marihuana identification presents no problem to the trained and experienced worker. Instrumental techniques and chromatography have supplemented microscopic and chemical color tests. The U. S. Commissioner of Narcotics advises that while marihuana may not ordinarily be understood as falling within the category of a "narcotic drug", due regard must be given to the intended coverage of that term, as used in a particular statute. The only problem encountered by the author has been with questions relating to potency of individual specimens when small quantities of cannabis were submitted for examination. Reliable tests to assay the cannabis drug for potency await discovery.

Some of the legal questions encountered during the writer's experience are discussed.

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