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A SIMPLE AND RAPID METHOD FOR DISTINGUISHING OPIUM OF MEXICAN ORIGIN FROM OTHER TYPES OF OPIUM

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Several different methods for the determination of the geographical origin of seized opium have been recently developed. Most of them were worked out within the United Nations joint program of opium research (1). Particularly useful discrimination of various types of opium was possible on the basis of the differences in the content of some alkaloids. However, a systematic quantitative analysis of various organic constituents of opium, especially of minor alkaloids, requires a great deal of time, professional skill, and a considerable amount of sample.

The direct spectrophotometric technique, developed in the Institute for the Control of Drugs,

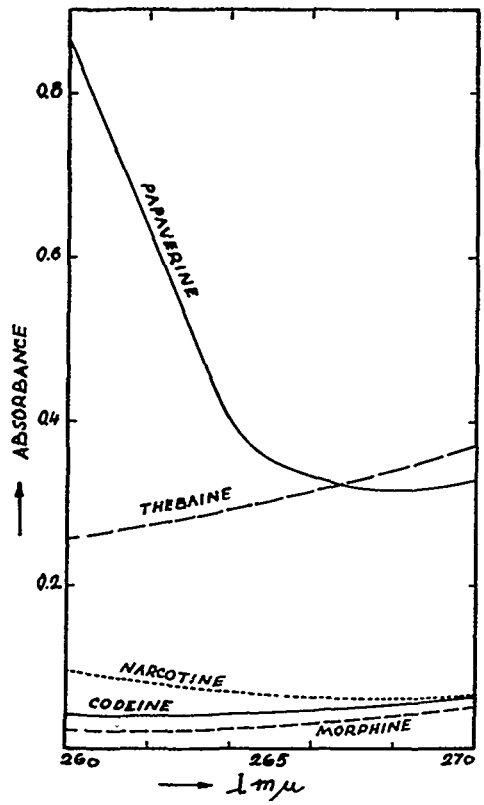

Figure 1

Absorption curves of 5 main alkaloids of opium over the wavelength range 260–270 mμ (0.002 % solution, pH 3.9).

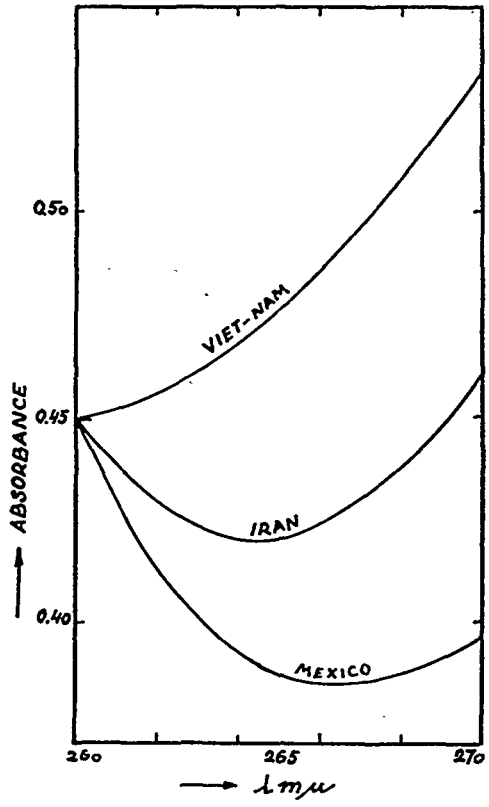

Figure 2

Absorption curves of a typical sample of Mexican opium, compared with opium from Viet-Nam and Iran; readings are reduced to the value 0.45 for A_{260}.

Zagreb (2), makes it possible to determine rapidly approximate ratios between the content of certain alkaloids. Due to its simplicity and reproducibility, as well as to the small amount of sample required, direct absorption spectrophotometry was tested and applied on a large scale for the determination of the origin of opium (3).

In this paper, the possibilities of a rapid identification of Mexican opium, on the basis of peculiar absorption characteristics of its diluted extracts, are described.

Procedure

25 mg of opium are triturated in a mortar for 1 minute with a few drops of sodium acetate-HCl buffer by Walpole, pH 3.9. Thereafter, 5 ml of the same buffer are added, the trituration being continued for the following 3 minutes, and the mixture is filtered. The filtrate is diluted with the same buffer, until at 260 mμ the absorbance between 0.3 and 0.6 is reached (using buffer as a blank and 1 cm cells). The absorbance of the diluted extract is accurately measured at 260 and 270 mμ, and the ratio A_{260}/A_{270} is calculated. A ratio higher than 1.07 indicates the Mexican origin of the opium under examination.

Results and Discussion

Altogether 573 opium samples originating from 16 different countries have been analysed by means of the procedure described. Most of these samples have been authenticated by the Governments concerned.* The results obtained for 12 available samples of Mexican opium have been compared with the results for samples from the remaining countries. In Mexican opium, A_{260}/A_{270} values were particularly high, ranging from 1.073 to 1.165. On the other hand, only 3 samples from other countries (i.e. some 0.5% of the total number of samples analyzed) exhibited values over the same range, two originating from the Indian state Himachal Pradesh, and one from Afghanistan. In our experience, such a high value for A_{260}/A_{270} ratio is exceptional for both Himachal Pradesh and Afghanian opium, whereas it seems to occur as a rule in the Mexican type of the drug. In opium from other countries, A_{260}/A_{270} ratio is definitely lower, the lowest values being found in opium from Southeast Asia (below 0.9).

* The author acknowledges the kind assistance of the Division of Narcotic Drugs of the United Nations for having supplied a great number of opium samples under examination.

The results obtained for Mexican opium can be explained in accordance with the principles applied in direct spectrophotometry of crude vegetable drugs (4). Specific absorption properties of Mexican opium are obviously due to an exceptionally high content of papaverine, and at the same time to a low content of thebaine. Both properties have been found for Mexican opium by chemical analysis (5), and this explanation can be confirmed by examining the absorption spectra of 5 main opium alkaloids over the range of 260-270 mμ (figure 1). As it is seen, the absorption curve of papaverine exhibits a steep decrease, whereas thebaine shows a marked increase over the same range of spectrum. In general, the absorptivity of both the alkaloids is much higher than that of the remaining ones. Consequently, the value A_{260}/A_{270} is mostly affected by the content of papaverine and thebaine in opium, the former influencing the increase, while the latter influencing the decrease of the A_{260}/A_{270} ratio. Therefore, Mexican opium being both very rich in papaverine and poor in thebaine, shows the highest A_{260}/A_{270} values among all opium types.

As it is seen in figure 2, the shape of the absorption curve of Mexican opium over the same range of the spectrum is quite different from Southeast-Asian opium (Viet-Nam) which is very rich in thebaine, whereas Iranian opium exhibits an intermediate curve.

Conclusion

The proposed method for distinguishing Mexican opium from Asian and European types of the drug offers many advantages and is suitable for use in police investigations. With it one can identify Mexican opium with a great probability, and it requires not more than 15 minutes. The procedure is simple, easily reproducible, and requires only minute samples. On account of extremely strong absorptivity of ultraviolet radiation shown by opium extracts, even smallest traces of opium can be successfully examined, by using aliquots of buffer solution. Due to the application of absorbance ratio (instead of absolute readings), the presence of most common adulterants as well as the presence of water in opium do not influence the results. For this reason, drying, accurate weighing of sample, and quantitative dilution of the extract are unnecessary. As equipment, an ultraviolet spectrophotometer is required.

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