

## First Identification of Drugs in Egyptian Mummies

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The use of drugs in ancient societies permits insight into the social behavior and medical practices of the past. As part of an ongoing investigation of hallucinogenic substances in ancient societies, this preliminary study reports the identification of cocaine, hashish, and nicotine in Egyptian mummies. We took samples of soft tissue, bone, and hair from nine mummies [1]. Drugs were detected by radioimmunoassay and gas chromatography/mass spectrometry [2–5].

The Egyptian mummy material for this study included seven mummified heads (adults, two females, five males), one complete (adult, female), and one incomplete (adult, male) mummy. The mummies were dated at a period spanning from approximately the Third Intermediate Period (1070 B.C.) to the Ptolemaic/Roman Period (395 A.D.). For the following investigations samples were taken from head hair, skin and muscle from head and abdomen as well as bone tissue from the head. Processing of the hair samples has already been described elsewhere [6].

Specimens of the soft tissue and bones were pulverized using a steel ball at  $-180^{\circ}\text{C}$ . One g was dissolved in 0.9% NaCl solution, homogenized ultrasonically, and centrifuged. 1 ml from the supernatant was extracted (pH 9) with chloroform. These extracts were dried under nitrogen and dissolved in 1 ml phosphate buffer (pH 7.4); the samples were finally measured by radioimmunoassay (Merck GmbH; Biermann GmbH) and gas chromatography/mass spectrometry (Hewlett Packard).

Table 1. Drug concentration (ng/g) in Egyptian mummies

<i>Hair</i>		
Cocaine	(n = 4)	24.0– 200.0
Hashish	(n = 4)	800.0– 4100.0
Nicotine	(n = 3)	300.0– 900.0
<i>Soft tissue</i>		
Cocaine	(n = 7)	69.6– 441.5
Hashish	(n = 7)	59.0– 2686.0
Nicotine	(n = 7)	125.4– 1045.0
<i>Bone tissue</i>		
Cocaine	(n = 1)	30.1
Hashish	(n = 1)	67.9
Nicotine	(n = 1)	45.4

The immunological determination of cocaine and hashish (THC) showed the presence of these drugs in all nine samples. Nicotine was detectable in eight cases (Table 1).

This is the first study which shows the presence of cocaine, hashish, and nicotine in Egyptian mummies, dating back to about 1000 B.C. This means that these three organic substances are capable of surviving in hair, soft tissue, and bones for ca. 3000 years under favorable conditions. However, it cannot be determined at present whether the concentrations measured represent the original amount of these drugs during life or immediately after death, or what kind of decomposition might have taken place in the past 3000 years. Since the three drugs were not only detected in hair and soft tissue but also in bones (the tissue most frequently encountered in archaeological human remains), the results open up an entirely new field of research which unravels aspects of past human life-style far beyond basic biological reconstruction.

Most important clues to ancient social behavior are expected with regard to child care, since our results are in excellent agreement with a recommendation from Papyrus Ebers (No. 782/93,3–5) which should calm crying babies [7]: “Poppy seeds, fly droppings found at the wall shall be mixed, mashed and drank on four days, (the child) stops (crying) immediately” (translation by the authors).

Moreover, since the use and abuse of hallucinogenic drugs contribute to major health and social problems today, the history of drug production and intake in various parts of the world might add helpful information. For comparison, the detection of these drugs in the hair of addicts in modern society produce the following results: cocaine 3–15 000, hashish 2–1000, nicotine 3–20 000 ng/g.

Drugs have seemingly played a regular role in the daily life of human populations for a long time, but drug dependency depends on how the drug is consumed (whether orally, by inhalation, or by injection). Comparison of drug use and its level in the consumer's tissue between populations, where drug intake has been endemic for several thousands of years and in modern Western societies, should be helpful in detecting both the quantity and quality of consumed hallucinogenic drugs.

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1. Parsche, F., Ziegelmayer, G.: Akten 4. Int. Ägypt. Kongr., Band 1, S. 287 (1985)
2. Balabanova, S., Brunner, H., Nowak, R.: Z. Rechtsmed. 98, 229 (1987)
3. Balabanova, S., Homoki, J.: *ibid.* 98, 235 (1987)
4. Balabanova, S., Arnold, P. J., Luckow, V., Brunner, H., Wolf, H. U.: *ibid.* 102, 503 (1989)
5. Balabanova, S., Schneider, E., Bühler, G.: DAZ 40, 2200 (1990)
6. Balabanova, S., Parsche, F., Pirsig, W., Schneider, E.: Proc. First World Congr. on Mummy Studies (in print)
7. Deines, H. von, Grapow, H., Westendorf, W.: Papyrus Ebers. Band IV, S. 1. Berlin: Akademie Verlag 1958