LEGENDS

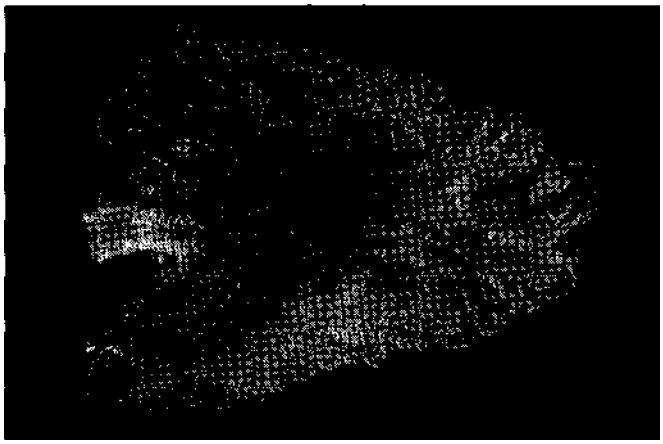

Figure 1 Plastinated specimen of stomach showing stress ulcer.

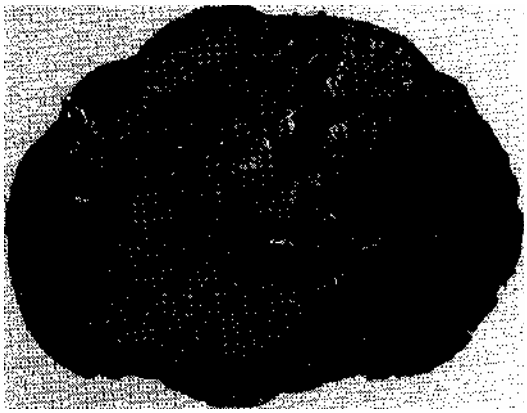

Figure 2 Plastinated specimen of liver showing cholangiocarcinoma mass.

THE USE OF NATRON IN HUMAN MUMMIFICATION: A MODERN EXPERIMENT

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Ever since Herodotus first described the Egyptian use of natron in human mummification, questions have been raised about the exact method of use. To our knowledge, no researcher in modern times has attempted to answer these questions by replicating an Egyptian mummification using natron and a human cadaver. On May 21, 1994 we began such a procedure and concluded it 35 days later on June 25, 1994. We were hoping to gain knowledge in three areas relevant to mummification: (1) Tools used by ancient Egyptian embalmers. Replicas of copper, bronze, and obsidian tools were fabricated and used in the procedure. In addition, copies of ancient storage jars, canopic jars, mummification board, etc., were made and used throughout the experiment. Details of these findings will be discussed in a subsequent paper. (2) Removal of the brain and internal organs. The brain was removed via the nose and internal organs through an incision in the left abdomen. Details of this procedure will be presented in a separate paper. (3) The use of natron in human tissue preservation. This paper will deal with this aspect.

INTRODUCTION

Natron is a naturally occurring compound of sodium carbonate and sodium bicarbonate that exists in several regions of the world.3,4,5 As it occurs in Egypt, it always contains salt (sodium chloride) and sodium sulphate as impurities. Because the salt content is often high, there has been some confusion, even in ancient times between salt and natron. The ancient Egyptian name for the Wadi Natron, one of the two primary sources of natron for Egyptian embalmers, indicates this confusion. In the ancient Egyptian literary work "The Eloquent Peasant" dating from approximately 2000 B.C., the chief character is described as, "A peasant from the Wadi Natron." The term for Wadi Natron literally means "salt fields", so at least in the toponym, salt and natron are associated. This salt/natron confusion is compounded by the fact that several researchers at the beginning of this century concluded that the ancient embalmers used salt and not natron for mummification. Sir Armand Ruffer suggested that the main desiccant in mummification was salte and in their landmark work, Egyptian Mummies. Smith and Dawson state that, "—at most periods common salt (mixed with certain natural impurities) was the essential preservation agent employed by the Egyptians for embalming."? The conclusion that it was salt and not natron that was used for embalming was based on early chemical analysis of mummies on which traces of salt were found. Lucas has conclusively demonstrated that the amount of salt is not sufficient to establish that pure salt was used in embalming, and that the traces could have derived from salt impurities in natron. He concluded, "There is no evidence that salt, either solid or in solution was used in embalming until early Christian times...."8

In support of the position that it was natron and not salt that was used by the embalmers, it should be noted that embalmers' refuse inevitably contains natron and not salt. Unfortunately one of the discoveres of two such caches, H.E. Winlock, uses the words "salt" and "natron" interchangeably, both when referring to his finds",10 and to those of Theodore Davis. 11 Other excavators such as Quibell are more precise and made clear that it is natron that they have discovered. 12

The ancient Egyptians certainly distinguished between salt and natron. In "The Eloquent Peasant", when the goods the peasant is taking to sell are enumerated we have hm3t (salt) and hsmn (natron). Thus, they were distinct commodities to the Egyptians.

Also in favor of the theory that it was natron and not salt that was used in embalming is the-fact that natron had a religious and ritualistic use of natron, but not salt. This is indicated by another of its written forms: hsmn. Here the pouch shows how the natron was kept and the banner, indicating a god's emblem, its divine nature. This aspect is clearest in natron's simplest written form, from which derives the Greek and the English nitre. Similarly, from Arabic comes our "natron". In all these uses and occurrences, the word

denotes something other than salt.

The purely religious use of natron is well attested, both from texts and excavations. In Tutankhamen's tomb, natron was placed at locations where it had no mundane purpose. For example, in two dishes resting on alabaster stands in front of the king's canopic chest.13

Aside from its religious function, natron probably had medical uses as well. The Edwin Smith Surgical Papyrus suggests that ntryt be bound to an abscess of the breast14, and this may well be natron. Ntryt is also mentioned in Papyrus Ebers where it is listed as part of the physicians' pharmacopeia. (48,16; 48,18; 79,1) Among its better established uses is its role in the manufacture of glassis but by far its most discussed use is in mummification.

The earliest mention of natron in connection with mummification is Herodotus' famous description of Egyptian embalmingie. Here he discusses the three types of mummification and mentions natron twice. In one place he says, making it clear that it is natron that removes the flesh. In the other place where "natron" appears, Herodotus uses it to modify the verb which means to preserve like fish. Here he says, "with natron", both Egyptian and Greeks of the period salted their fish so Herodotus had to make clear that it was not salt that was used. The use of the verb has caused considerable confusion and discussion as to how the natron was used. It has been translated as "soaked, bathed, and steeped" all of which seem imprecise in that they require a solution and this is not necessarily how fish was preserved. Unfortunately, in one of the seminal works on mummies, Thomas Pettigrew quotes Laurnet's translation of Herodotus, where "steep" and "lay in brine" are used.17 Thus throughout his work, Pettigrew assumes a bath of natron was used. A century later Dawson continued this error and stated that the procedure was to wash the body "....and then to immerse the corpse in the salt-bath."15

There are several compelling arguments against natron having been used in solution. First, if the purpose is to dehydrate the body, as surely the egyptians realized, then it is both counter-intuitive and counterproductive to immerse it in a bath. Second, Herodotus states that the body cavity was packed with crushed spices and then placed in natron. The spices would have washed out since the incisions were generally not sewn closed. Third, to submerge the mummies of Egypt in a solution of natron would have taken hundreds if not thousands of large vats. If this were the case, surely some, or at least fragments of some with traces of natron would have been found. We must note that Dawson gives as evidence a pottery figure of a person in a jarw and says that it is a mummy in natron solution. We do not find this convincing.

Given all of the above, we find it reasonable to conclude that ancient Egyptian embalmers used natron not salt and that they used it in its natural form rather than in solution. With this premise, we proceeded with our experiment.

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