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Schistosomiasis in Ancient Egypt: The 'AAA' Debate

by

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Abstract

In 1910, Sir Marc Armand Ruffer (1859-1917), considered to be one of the founders of paleopathology, discovered the calcified eggs of *Schistosoma haematobium* in the kidneys of two mummies from Egypt's 20th dynasty (1250-1000 BC). Since Ruffer's discovery, debate has ensued over whether the medical papyri offer conclusive evidence that schistosomiasis, or bilharziasis, was known to the ancient Egyptians.

In the medical papyri, the word transliterated as 'aaa' was recorded almost fifty times, along with numerous remedies, including preparations made from antimony and honey. Today, antimony compounds are known to be effective, albeit debilitating, anti-schistososomal drugs. In addition, associated with the word 'aaa' in the medical papyri is the determinative of a discharging phallus. This association, plus art created by the ancient Egyptians depicting men with physical characteristics known today to be sequelae of schistososomal infection, has been used by several researchers to support the theory that the 'aaa' condition mentioned in the ancient Egyptian medical papyri was the disease known today as schistosomiasis.

Immunocytochemical analysis of preserved tissues from mummies discovered in ancient Egypt and nearby Nubia indicates that schistosomiasis was indeed a widespread disease in ancient times. Thus, it is likely that the symptoms attributed to schistosomiasis today were experienced by the ancient Egyptians. Recently, however, several researchers have argued that the evidence linking the affliction 'aaa,' as mentioned in the medical papyri, to schistosomiasis is tenuous, and these researchers support a more spiritual interpretation. Specifically, these researchers consider it more likely that the word 'aaa' referred to an evil spirit in the form of an incubus, which was a common theme in ancient Egyptian mythology, or to a negative influence generated by magic, which was a common theme in the medical papyri.

Introduction

Schistosomiasis is a disease caused by trematode worms from the genus *Schistosoma* (Gryseels *et al.*, 2006). Five species are known to primarily infect humans: *S. haematobium*, *S. intercalatum*, *S. japonicum*, *S. mansoni*, and *S. mekongi* (WHO, 2006). These species have a complex life cycle, requiring both human and snail hosts to complete their development. Three of these species, *S. mansoni*, *S. japonicum* and *S. haematobium*, have wide geographical distributions. *S. mansoni* is found in Africa, South America and in the Arabian peninsula, *S. japonicum* is found in China, Indonesia and the Philippines and *S. haematobium* is found in Africa and the Arabian peninsula (Gryseels *et al.*, 2006).

According to the World Health Organization (2006), 600 million people are at risk of infection, and nearly 200 million are infected with schistosomiasis, either constantly or sporadically. Of these five species, only *S. haematobium* causes primarily urogenital disease; the remaining four species typically cause intestinal schistosomiasis (Tanagho and McAninch, 2008). *S. haematobium* is also responsible for the greatest number of human infections worldwide (WHO, 2006).

Given the widespread distribution of the five major species and the staggering number of people that are currently infected, or at risk of infection, with schistosomiasis, it is clear that the disease is a concern of modern medicine. The purpose of this paper is to explore whether schistosomiasis was also a concern in ancient medicine through discussion of one of the many fascinating debates in Egyptology: The *aaa* debate.

Schistosomiasis in Ancient Egypt:

In 1910, Sir Marc Armand Ruffer (1859-1917) discovered calcified *S. haematobium* eggs in the kidneys of two Egyptian mummies from the 20th dynasty (1250-1000 BC) (Ruffer, 1967). This discovery provided direct evidence that schistosomiasis existed in ancient Egypt, and spurred the search of Egyptian medical papyri for mention of the disease. Since Ruffer's discovery, considerable debate regarding whether the ancient Egyptians were able to diagnose schistosomiasis has ensued (Contis and David, 1996).

A substantial number of medical papyri have been discovered, and Nunn and Tapp (2000) have tabulated what they consider to be the twelve most important. Their table has been recreated as Table 1.

Unfortunately, several of these papyri, such as the *Hearst Papyrus* and the *Berlin Papyrus*, do not have English translations. Furthermore, some of the English translations are viewed to be of poor quality (Nunn, 1996). In fact, Nunn (1996, p. 252) states: "The longest and most important papyrus is the Ebers, and this was translated into English in an over-imaginative and unreliable form by Ebbell in 1937." Unfortunately, Bendix Ebbell's 1937 translation is, at present, the only available English translation of the *Ebers Papyrus*.

Much of the dissent among experts is due to difficulties with the vocabulary in the medical papyri. Specifically, many of the words in the medical papyri are found only within the medical papyri. As a result, these words cannot be translated with the aid of non-medical documents from ancient Egypt. Thus, the meaning of many words in the medical papyri must be inferred from their medical context. An example of such dissension is the main topic of this manuscript, the word *aaa*.

Medical Papyri	Approximate Date	Contents
Edwin Smith	1550 BC	Surgical, mainly trauma
Ebers	1500 BC	General, mainly medical
Kahun	1820 BC	Gynaecological
Hearst*	1450 BC	General Medical
Chester Beatty VI*	1200 BC	Rectal diseases
Berlin*	1200 BC	General medical

London*	1300 BC	Mainly magical
Carlsberg VIII	1300 BC	Gynaecological
Ramesseum III, IV, V*	1700 BC	Gynaecological, ophthalmic and pediatric
London and Leiden	AD 250	General medical and magical
Crocodilopolis	AD 150	General
Brooklyn Snake*	300 BC	Snake bite

Table 1: The most important Egyptian medical papyri. Adapted from Nunn and Tapp (2000, p. 148). *No English translation available.

Was the morbid condition the ancient Egyptians called *aaa* schistosomiasis? Answering this question first requires the exploration of two other questions. First, was there a word in the ancient Egyptian language for haematuria (bloody urine)? Second, did the ancient Egyptians associate haematuria, which is one of the most dramatic sequelae of infection with *S. haematobium*, with disease? The second question is closely related to the first and they can actually be addressed together.

The ancient Egyptian words for “urine” and “blood” are *mewyt* and *senef*, respectively (Ebbell, 1937; Nunn and Tapp, 2000). According to Nunn and Tapp (2000), a convincing argument against the existence of an ancient Egyptian word for haematuria is the fact that *senef* and *mewyt* have not been found in combination in any of the known Egyptian medical papyri, including those listed in Table 1.

The ancient Egyptian word *wesesh* has been interpreted to mean the general “evacuation or voiding of waste products” and possesses a discharging phallus as its determinative. A determinative, in the ancient Egyptian language, is a symbol that was added to the end of a word, or group of words, to make their meaning unambiguous (Davies, 1990). The determinative of a discharging phallus and its association with the word *wesesh* has been used to support the more specific interpretation of *wesesh* as urination (Nunn and Tapp, 2000). According to Nunn and Tapp (2000), however, such a specific interpretation of *wesesh* cannot be supported as the word, with its determinative of a discharging phallus, has also been found in the medical papyri within descriptions of intestinal disorders. Unfortunately, Nunn and Tapp (2000) do not provide an example from the medical papyri to support their statement.

The only passage that refers to what might be haematuria is from passage XVI in the Ebers Papyrus (Ebbell, 1937, p. 34):

Another [remedy] to expel evacuation of the blood that is (too) frequent:
fresh porridge 4 ro, pulverized manna 5 ro, oil 4 ro, honey 4 ro, are
strained and taken for 4 days.

However, as Nunn and Tapp (2000) point out this passage does not talk of the voiding of urine, just the voiding of blood; therefore, the above passage could just as easily refer to haematochezia (bloody stool), or perhaps even haematemesis (bloody vomit).

The AAA Controversy

The controversy surrounding the word *aaa* among experts stems from the fact that it is a word unknown outside of the medical papyri (Nunn and Tapp, 2000). The word *aaa* also

possesses the determinative of a discharging phallus, which some argue supports the conclusion that *aaa* refers to haematuria (Ebbell, 1937). However, there is no mention of what substance the phallus is discharging. Therefore, the discharge shown in the hieroglyphics could just as easily represent semen. Ebbell (1937) further concluded that *aaa* must represent the haematuria caused by schistosomiasis, meaning the disease depicted by *aaa* was, in fact, the disease known today as schistosomiasis (Nunn and Tapp, 2000). The critical section that Ebbell relies on for his conclusion is found in passage XIX of the Ebers papyrus (Ebbell, 1937, p. 35):

Another excellent remedy amongst those prepared for the belly: *išw* |
,š3mś |, are ground fine, boiled with honey and eaten by a man in
whose belly there are *hrrw*-worms; it is haematuria that produces them
and (they) are not killed by any remedy.

Building on his claim, Ebbell wrote in a footnote that *hrrw*-worms must be adult *S. haematobium* (Ebbell, 1937, p. 35):

By this Bilharzia haematobia [= *S. haematobia*] must no doubt be
meant, a trematode worm, which is found in the veins of the abdominal
organs in the haematuria which is endemic in Egypt.

Unfortunately, Ebbell does not provide any further supporting evidence for his conclusion.

According to Nunn and Tapp (2000), the word *aaa* has never been found in association with the word *senef* (blood). In addition, if the above passage is read carefully, it states that the haematuria produced the worms, and not the other way around; this is an important distinction with respect to causation. At this time, the identity of the *hrrw*-worms is unknown (Nunn and Tapp, 2000).

Despite Ebbell's unsupported leap in logic, several influential individuals in Egyptology, including Frans Jonckheere (1944), a Belgian physician, and Gustave Lefebvre (1956), a noted Egyptologist, lent their support to Ebbell's interpretation. As a result, the interpretation of the affliction *aaa* as schistosomiasis appeared to be solid and incontrovertible (ibidem, 2000).

Did the Ancient Egyptians Associate Haematuria with Disease?

Given the analysis by Nunn and Tapp (2000), it appears unlikely that the ancient Egyptians considered bloody urine worth mentioning in their extensive medical texts. However, as a caveat, it is possible that the ancient Egyptians referred to the symptom of bloody urine using an entirely different word; one that did not combine the words for blood and urine. The ancient Egyptians' conceptualization of the symptom may have been completely different from how it is conceptualized today. For example, Halioua and Ziskind (2005) comment that one group of passages in the Ebers Papyrus, as translated

by

Thierry Bardinet (1995), describes a condition called *henau*; when translated this word is believed to mean 'accumulation' or 'concentration'. Bardinet (1995), as cited in Halioua and Ziskind (2005), has proposed that *henau* may signify blood. In addition, the word

henau is found in several passages describing treatments for urinary conditions (Halioua and Ziskind, 2005, p. 118):

Another [remedy] to make normal again the urine of the man who has excessive [blood]: tiger nut: I; *peret-cheny*-fruit: I; root of *beheh*-plant: I; crush [this to make] one thing, leave it to rest with sweet beer, then drink it when the dregs have been deposited.

However, what if infection with schistosomiasis was so prevalent in ancient Egypt that haematuria was considered to be “natural” and, therefore, not associated with a disease process? This is a suggestion provided by several authors, including Nunn and Tapp (2000) and Halioua and Ziskind (2005). In support of their statement, Halioua and Ziskind (2005) state that the condition *henau* was only mentioned a few times; therefore, it may not always have been viewed as pathological.

The exact count of the number of times the *aaa* disease is mentioned in the papyri varies from source to source. For instance, according to Hanafy *et al.* (1974), the disease *aaa* is mentioned once in the *London Papyrus*, nine times in Hearst’s, twelve times in the *Berlin*, and twenty-eight times in the *Ebers Papyrus*. In contrast, Nunn and Tapp (2000) state that the *aaa* disease is mentioned only twenty-two times in the various medical papyri. Clearly, there is even dissent over the translation of the word *aaa*. Despite this discrepancy, it is still apparent that the *aaa* disease was a common affliction in ancient Egypt. So, if not schistosomiasis, what was the affliction *aaa*?

In 1853, the German Egyptologist Heinrich Brugsch (1827-1894) translated *aaa* as the “deadly divine disease” (Halioua and Ziskind, 2005, p. 118). Indeed, several passages in the Ebers Papyrus refer to *aaa* in association with a god or a dead person, and discuss “the driving out of the *aaa*” (Nunn and Tapp, 2000, p. 150). For example, the following remedy is presented in passage XXIV (Ebbell, 1937, p. 38):

Another to clear out purulency and expel [aaa] (caused) by a dead man or woman, in the belly of a man or woman: juice of acacia 5 ro, its *hrw* 5 rho, its *k33* 5 ro, juice of pistachia 5 ro [...] and eaten for four days.

Since Ebbell’s interpretation of *aaa* as haematuria is contested, this author has replaced “haematuria” with *aaa* (within the square brackets). Other researchers, such as Warren Dawson, have interpreted *aaa* to mean “influence” and consider *aaa* to represent the “point of contact between medicine and magic” (Dawson, 1935, p. 39). In support of his conclusion, Dawson draws on the fact that the word *aaa* is commonly associated with the ancient Egyptian hieroglyphics for “poison” and “magic”, and was “envisaged as some evil secretion injected into the body of the patient by a god or a demon (Dawson 1935, p. 39).” For example, passage XXXIV in the Ebers Papyrus describes a remedy to drive out magic and *aaa* (Ebbell, 1937:45); again, the word “haematuria” has been replaced with *aaa* (square brackets):

Another to expel “magic” and [aaa] (caused) by a god or dead man in the belly of a man: *nhp* of rush-nut 4 ro, *š3š3* 4 ro, fruit of *thwj* ½ ro, *ibw* 4 ro, are made in powder, put in beer and drunk before going to bed.

Dawson’s (1935) interpretation describes an evil entity that is commonly referred to as an incubus, or succubus, depending on the gender of the evil spirit (Isbell, 1978; Nunn and Tapp, 2000). In addition, it is interesting to note that the Egyptian word for

poison also possesses the determinative of a discharging penis. Further evidence against the interpretation of the word *aaa* as schistosomiasis comes not from the medical papyri, but from parasitology. *S. haematobium* is a small parasite. The male measures a mere 10 mm x 1 mm in size, the female is 20 mm x 0.25 mm and the eggs even smaller: 0.16 mm x 0.06 mm. Therefore, it is unlikely that the *hrrw*-worms mentioned in passage XIX of the Ebers Papyrus refer to the adult stage of *S. haematobium* as the parasite would likely have been difficult to see with the naked eye, even during preparation of the dead for embalming. Furthermore, since the worms were not expelled through feces, they would not have been found by examining the stool (Stewart, 1951). *S. haematobium* eggs are expelled in the urine, but given their extremely small size, it is unlikely that the ancient Egyptian physician would have seen the eggs in that medium, either. It is unlikely, therefore, that the ancient Egyptian physicians were even aware of the worms' existence in the human body.

In the early 20th century, antimony compounds were used as a treatment for schistosomiasis (Duffin and René, 1991). According to Hanafy *et al.* (1974), antimony, mixed with honey, is described in the *Hearst Papyrus* as a treatment for *hrrw*-worms. Given Ebbell's (1937) interpretation of *hrrw*-worms as the adult form of *S. haematobium*, this interesting parallel between ancient and modern medicine has been used to support the theory that the *aaa* disease is schistosomiasis. However, Nunn and Tapp (2000) indicate that the *Hearst Papyrus* discusses the use of *mesdjemet*, or lead sulphide, as a treatment for *aaa* disease, not antimony specifically. It is possible that antimony existed as an impurity in the *mesdjemet* prescribed as a treatment for *aaa* disease. However, Nunn and Tapp (2000) consider it improbable that, if the antimony impurity was present, the ancient Egyptians knew that the impurity was there. Therefore, antimony, in the form of *mesdjemet* could not have been purposely prescribed by ancient Egyptian physicians for the treatment of schistosomiasis. Since it is unlikely that the *aaa* disease is schistosomiasis, and since the ancient Egyptians were most likely unaware of the possible antimony in their lead sulphide, the interesting parallel between ancient and modern medical treatment of schistosomiasis ceases to exist.

Conclusion

In concluding, given Ruffer's discovery of calcified *S. haematobium* eggs in the kidneys of mummies from the XXth dynasty, schistosomiasis clearly existed in ancient Egypt. Since Ruffer's discovery, debate has ensued over whether the ancient Egyptians were aware of the parasite's existence. When the small size of the parasite and its life cycle is taken into account, it seems unlikely that the ancient Egyptians would have been aware of its presence, either within the human body or within the bloody urine experienced by many ancient Egyptians. Even so, several researchers claim that the disease *aaa*, a morbid condition that was commonly discussed in the medical papyri, refers to schistosomiasis. When the evidence used to support this claim is examined more closely, it appears that this conclusion was the result of over-interpretation by early translators. In contrast, the evidence available to date more securely supports the interpretation of *aaa* as an evil "influence", one that was believed by the ancient Egyptians to have been caused either by a god, or a dead person.

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