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Morphological Changes in Human Schistosomiasis and Certain Analogies in Ancient Egyptian Sculpture

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Abstract **

Egyptian sculpture has created statues and reliefs with deformations similar to morphological changes such as found in human schistosomiasis; characteristics of splenomegaly have been depicted in naturalistic reliefs and also symbolically in order to indicate assumed qualities of deities. Such statues show usually to some degree a transformation from male to morphological female features as is observed in humans in certain cases of advanced schistosomiasis.

One has, however, to keep in mind that there are also statues and reliefs which show the various mentioned characteristics without any association with schistosomiasis. Examples are the sculptures representing Pharao Akhenaten.

I. Introduction

Egyptian art has produced in a number of statues and reliefs signs of non-parasitic diseases and pathologic conditions, for example tuberculosis of the spine, umbilical hernia, atrophy of leg muscles, achondroplasia, blindness (many illustrations in GHALIOUNGUI & DAWAKHLY, 1965). Representations of parasitic infections, on the other hand, are very rare.

Pathologic changes associated with schistosomiasis are shown in different ways.

a) They may give a naturalistic depiction of splenomegaly (which of course also may be due to malaria) in country people cultivating rice, who by their profession are frequently working in water.

b) They have been used symbolically in order to indicate certain supposed qualities. Large breasts in hermaphroditic deities such as the 'Niles' show their assumed nutritive nature. – In addition there are sculptures with deformations resembling those which are found in schistosomiasis but which have a different etiology. An example of this kind concerning Akhenaten will be discussed for comparison.

II. Medical notes

Human schistosomiasis caused by different closely related schistosomes is of great importance for the population in East Asia *(S. japonicum),* in Africa, especially in Egypt *(S. haematobium* and *S. mansoni)*

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** Since this publication went to press, we deeply regret having to announce the death of our dear colleague Hoeppli, who spent his latter years at the Swiss Tropical Institute. The memory of this great scientist will always remain with us. He will be sorely missed by his numerous friends and colleagues throughout the world. Prof. R. Geigy

and also in Central America *(S. mansoni)* where in all probability the infection had been introduced by African negroes at the time of the slave trade[1].

Haematuria, the characteristic symptom of *S. haematobium* infection is mentioned in a number of papyri and the existence of the infection in ancient Egypt has been proved by RUFFER, who in 1910 found in two mummies of the twentieth Dynasty (1200–1090 B.C.) calcified eggs of *S. haematobium* situated for the most part among the straight tubules of the kidneys.

S. haematobium lives chiefly in the veins of the pelvic organs, especially the bladder causing haematuria. The normal localisations of *S. mansoni* and *S. japonicum* are the veins of the intestine and mesentery. Their infection produces symptoms which are somewhat similar to those of dysentery.

Schistosomiasis due to *S. mansoni* always involves the liver and in heavy infection of long duration cirrhosis of the liver frequently develops.

Haematuria was apparently well known to the country people in Egypt for a very long time. It usually started with their boys at the time of puberty and in consequence was regarded as male menstruation indicating sexual maturity.

PROSPERO ALPINI, 1553–1616, observed and mentioned haematuria from Egypt in 1591.

Covers of the penis – Condom

They are mentioned here, as they are shown on statues and reliefs and were evidently often used as a supposed protection against haematuria[2].

NAVILLE, 1900, illustrates a small statue of basalt or porphyry about 6,000 years old with a karnata and gives pictures of people with karnata, dating from the nineteenth Dynasty. QUIBELL, 1900, illustrates an ivory statuette of a prisoner with a cover of the penis. MASPERO, 1899, shows on a column in the temple of Denderah a representation of the God Bes with a cover of the penis (PFISTER, 1913).

Until *S. haematobium* and *S. mansoni* had been recognized as different species with different pathological manifestations, haematuria

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[1] *Schistosoma intercalatum* which infects the intestinal tract, has so far only been reported from central Africa; it is not included in our discussion.

[2] According to J. CAPART, 1904, in Egyptian inscriptions the name 'Karnata' is applied to peniscovers. In the 'Wörterbuch der ägyptischen Sprache', vol. V, pp. 60–61, 1931, Karnata which in transcription is read Krnt is a designation for the phallus of alien populations, apparently referring to circumcision.

and morphological changes in schistosomiasis in Egypt were attributed merely to *S. haematobium* and haematuria parasitaria, as it was called by JONCKHEERE, 1944, and others was even regarded as āaā of the papyri. The bloodstained evacuations mentioned in the papyri are in JONCKHEERE's opinion urinary, according to SCHEUTHAUER, 1881, they are intestinal.

GHALIOUNGUI, 1962, on the other hand is inclined to regard āaā as the result of the combined infection by different helminths.

In recent years special attention has been paid to endocrine disturbances associated with cirrhosis of the liver in schistosomiasis.

In heavy infection of long duration starting from childhood the spleen gradually greatly increases in size and the liver after enlargement becomes cirrhotic (hepatosplenomegaly). The clinical picture was formerly described as "Egyptian splenomegaly" and in Japan as "Katayama disease" respectively.

Advanced cirrhosis of the liver in schistosomiasis is not unfrequently accompanied by gynaecomastia, an enlargement of the male breast in a feminine way. SILVESTRINI, 1926, first reported gynaecomastia in cirrhosis of the liver and CORDA in 1925 first described testicular atrophy in liver cirrhosis.

Splenomegaly due to *S. japonicum* causes frequently a retardation of growth and an underdevelopment of the sexual organs, if the infection started in early childhood. Similar changes, although less often, are also observed in *S. mansoni* infection. At an age of ca. 15–28 years the infected persons show still an infantile habitus. They are small, have a feminine facial appearance, their penis is small and the testicles are infantile; in the pubic region and the axilla there is very little or no hair. X-ray examination shows fine slender bones, a small sella turcica and a delayed union of the epiphyses indicating hypopituitarism. The cause is most probably an insufficient and disturbed function of the hypophysis which in turn is due to splenomegaly. Exstirpation of the spleen has a stimulating effect on the somatic and sexual development (VOGEL, 1965, p. 727). The disturbed function of the cirrhotic liver and in addition malnutrition play an important role (HUANG MING-HSIN et al., 1957; KUO & CHIANG, 1958; CHENG CHAO-LING et al., 1959; EL DEEB & BASSALY, 1961).

A number of investigators came to the conclusion that the cirrhotic liver fails to inactivate estrogens, and GLASS, EDMONDSON & SOLL, 1940, have suggested that the free estrogens are etiologically related to the production of gynaecomastia in advanced cirrhosis of the liver.

MEIRA, 1951, and FERREIRA, 1957, studied endocrine disturbances due to *S. mansoni* in Brazil. Essentially the developmental and morphological changes in schistosomiasis caused by *S. mansoni* are similar in Brazil and in Egypt. Gynaecomastia, however, is apparently less fre-

quent in Brazil than in Egypt. It may be added that gynaecomastia so far has not been reported from Asia in infections with *S. japonicum*.

III. Analogies between certain ancient Egyptian statues and reliefs and morphological changes due to schistosomiasis

A. Reliefs of people at work in presumably infected water

It is of interest that GHALIOUNGUI, 1962, reproduced and discussed from the tomb of Mehu, a notable of the VIth Dynasty in Saqqara, reliefs of people like fishermen, bargemen, potters with deformities such as swelling of the abdomen, possibly due to cirrhosis of the liver, protrusion of the umbilicus (umbilical herniae and scrotal swellings). These changes could have been caused by schistosomiasis. Although there is no definite proof, the present author agrees with GHALIOUNGUI that the morphological changes and the kind of work of the represented people indicate the probability of this etiology.

B. Statues and reliefs of deities

Already in 1902 VON OEFELE discussed changes in the body of male persons with haematuria parasitaria (schistosomiasis) and pointed out their somewhat feminine appearance shown also in certain sculptures. The brown-red colour of the Nile during its yearly rise might have been interpreted as a menstruation of a male deity with feminine qualities.

Statues and reliefs representing the Nile deities are numerous. For instance they were sometimes depicted on the sides of the throne of Pharao joining the lotus of Upper Egypt to the papyrus of Lower Egypt. They are usually shown as bearded men with large feminine breasts. The sexual organs are generally covered by three or four strips of cloth.

In discussing VON OEFELE's description of the representations of the "Niles", JONCKHEERE, 1944, stated that in haematuria parasitaria due to *S. haematobium* (in his opinion corresponding to āaā) there was no atrophy of the testicles or the penis and there was no reason to hide the genitals in sculpture as VON OEFELE had apparently suspected. In the tomb of Sahu-Re at Abusir for example the Southern Nile is provided with a large penis kept in a sheath (condom) while the Northern Nile wears a belt with four strips of cloth (BORCHARDT, 1910).

JONCKHEERE, 1944, in his discussion does not state the different effects of *S. haematobium* and *S. mansoni* on the infected person. *S. mansoni* in young people may cause an underdevelopment of the outer

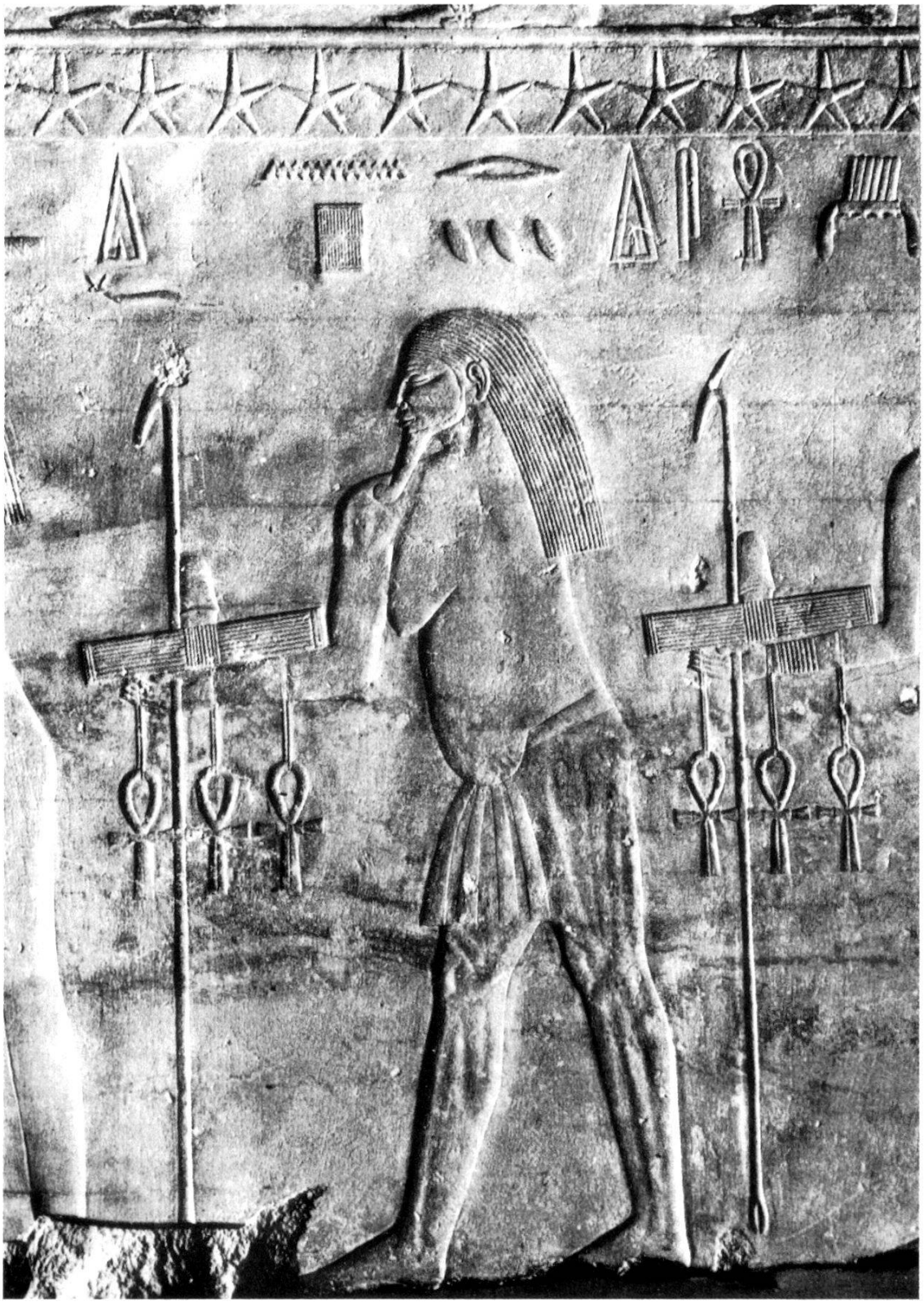

Fig. 1. Relief showing Npri god of wheat, with the oval grains above his picture. In a procession of deities bearing offerings. Cairo Museum, from the temple of Sahu-Rē, Abusir.

sexual organs which is generally not observed in *S. haematobium* infection.

Enlargement of the male breast in a feminine way is found not only in sculptures of the "Niles" but also in statues and reliefs of certain other deities for example of the grain and the ocean (Fig. 1). This enlargement of the breast in bearded statues is usually regarded as indicating their nutritive nature. The breast in statues and reliefs of hermaphroditic deities is in general much more enlarged than in gynaecomastia due to schistosomiasis associated with advanced cirrhosis of liver.

One will also remember the statues of various antique cultures with enlargement and even an increased number of breasts[3]. It is likely that in these cases the nutritive qualities are emphasized.

From the foregoing it can be seen that some pathological changes known to be caused by schistosome infection in association with liver cirrhosis and endocrine disturbances were naturalistically reproduced on reliefs by showing men working in water with signs of the disease.

They were also represented in stylized statues of deities such as the Nile. In this case a transformation of male into female features is found, corresponding to some extent to the changes in man infected with *Schistosoma mansoni.*

IV. Comparison

Sculptures representing Pharao Akhenaten

General remarks. Amenophis IV who changed his name in Akhenaten belonged to the eighteenth Dynasty, and reigned from ca. 1364 to 1347 B.C. (HORNUNG, 1971). He was in several respects very unusual and remarkable. He broke with the old traditions and tried to replace the Egyptian religion with its multitude of gods by a new monotheistic cult in which "Aten", an aspect of the sun, was regarded as the only one god. He built a new residence-city Akhetaten (modern Tell el-'Amarna) and caused the construction of large temples for the sun in Thebes and Amarna.

In art he introduced disturbing reforms. At the beginning of his reign Akhenaten had himself represented in the old traditional style, but soon more and more radical changes took place.

During excavations at Thebes several colossal statues of the pharao were found which are extraordinary as expression of an extreme mannerism. Very different from the custom of previous Egyptian rulers

[3] The Artemis of Ephesus is a wellknown example.

Fig. 2. Pharao Akhenaten – torso of a painted colossal sandstone statue from the destroyed Aten temple at Karnak, excavated by the Egyptian Antiquities Service, 1926–1932. (Reproduced from Aldred 'Akhenaten' with permission by the publishers Thames and Hudson, London.)

Akhenaten showed in reliefs intimate scenes of his family life and had the pathological changes and distortions of his body reproduced and possibly exaggerated, having himself portrayed with a deformed skull showing a large egg-shaped occiput. The reason of his attitude was perhaps the wish to set the pharao and his family apart from his subjects. His social and religious ideas which were not universally popular involved the need for self-assertion.

Politically he was a failure, being largely responsible for the temporary decline of Egyptian power.

Soon after Akhenaten's death the cult of the sun was abolished and the old Egyptian gods were reinstated. Akhenaten was then regarded as a heretic. His temples were destroyed and his memory was as much as possible obliterated. His successor was Tut-ankh-'amun who had an undistinguished reign of only nine years but became well known in modern times after Howard Carter in 1922 had discovered his practically intact tomb filled with magnificent treasures.

The pathology of Akhenaten judged from his representation in sculpture

The body of Akhenaten has a distinctly female character with adiposity. His hips are wider than his shoulders; the breast region is womanly, the abdomen is protuberant with a transverse umbilicus, buttocks and thighs are prominent.

On a colossal statue, excavated with several others at Karnak, he is shown naked without any visible genitals (Fig. 2).

The face is elongated and emaciated, has full large lips, a coarse nose and large ears (Fig. 3). The reliefs confirm a prominent chin, an elongated and deformed skull and the feminine habitus of the body.

As they have no direct bearing on the present study, we do not discuss here the various theories which have been published in order to explain Akhenaten's peculiar habitus. Fugitive acromegalic changes and the adiposo-genital dystrophy of Bartels have been especially considered. ALDRED & SANDISON, 1962, who have made extensive and detailed studies on the pathology of Akhenaten came to the conclusion "that the monuments strongly suggest that Akhenaten suffered from an endocrinopathy with hypogonadism and adiposity". These two authors regard the facial changes as a result of a pituitary lesion, a conclusion with which the present author agrees.

GHALIOUNGUI, 1962, 1963, expressed the opinion that Akhenaten's morphological changes could all be explained by liver cirrhosis in connection with *Bilharzia* infection. For obvious reasons he questions the pharao's opportunity to acquire the infection.

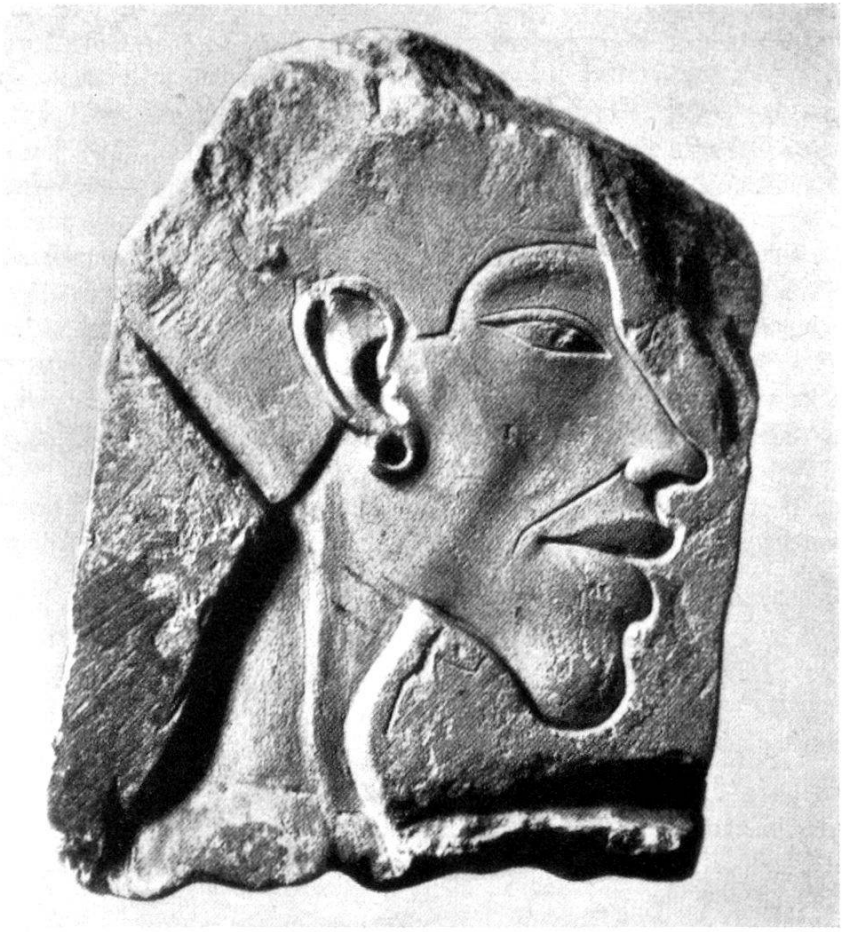

Fig. 3. Pharao Akhenaten, head. Fragment of a relief. Berlin, Staatliche Museen.

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Zusammenfassung

Ägptische Bildhauerkunst schuf Standbilder und Reliefs mit Entstellungen, die gestaltlichen Veränderungen, wie sie bei menschlicher Schistosomiasis gefunden werden, ähnlich sind. Charakteristische Eigenarten wurden dargestellt in naturalistischen Reliefs und auch symbolisch, um angenommene Eigenheiten von Gottheiten anzudeuten.

Derartige Standbilder zeigen gewöhnlich bis zu einem gewissen Grad eine Verwandlung von männlichen in weibliche Merkmale, wie es beim Menschen in gewissen Fällen von fortgeschrittener Schistosomiasis beobachtet wird.

Man hat jedoch zu bedenken, daß auch Standbilder und Reliefs vorkommen, die die verschiedenen erwähnten Merkmale aufweisen, ohne irgendeine Verbindung mit Schistosomiasis. Beispiele sind Bildwerke, die den Pharao Echnaton darstellen.

Résumé

Les sculpteurs égyptiens ont créé des statues et des bas-reliefs dont les personnages présentent des déformations similaires à celles que l'on peut observer dans la schistosomiase humaine. Les caractéristiques d'une splénomégalie ont été représentées sur des personnages naturels ou symboliques dans le but d'indiquer les qualités présumées des dieux. De telles statues montrent généralement des hommes présentant quelques caractères féminins comme cela peut s'observer dans certains cas avancés de schistosomiase.

On ne doit cependant pas oublier qu'il y a aussi des statues et des bas-reliefs où les différentes déformations mentionnées ne sont pas associées à une schistosomiase. C'est le cas par exemple des sculptures représentant le Pharaon Akhetaton.