

DRACONTIASIS IN ANTIQUITY

by

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Dracontiasis is an infestation of man by the guineaworm, *Dracunculus medinensis*; a similar infestation also occurs in animals,¹ and a related species, *Dracunculus insignis*, is known to infect racoons, mink, and dogs.² The disease, at the present time, has a wide distribution throughout tropical and subtropical regions of the world. The rate of human infestation varies with the possibility of the definitive host (man) and the alternative host (*Cyclops* sp.) being able to maintain the life cycle of the parasite.³

Because the life cycle of *Dracunculus medinensis* was unknown in antiquity, it must have been difficult to make an early diagnosis of the clinical condition, and also to provide satisfactory treatment for the patients. Nevertheless, physicians in antiquity were acute observers of any abnormality, and have provided us with well-documented reports of many human ailments which were not properly diagnosed by them, including some that may be diagnosed as dracontiasis. Some of these texts are discussed below.

Text 1. "If thou findest a finger or a toe that is ill, fluid [pus?] goes around them, their smell is bad and they have produced small worms [larvae s?], then thou shalt say thereof: it is a disease which I shall treat. Thou shalt prepare for him remedies to kill sp-worms."⁴

Text 2. "Instructions concerning 'wt [larvae?] in any limb of a man. If thou examinest a swelling of 'wt in any limb of a man, then thou shalt apply a bandage to it. If thou findest that it goes and comes, piercing through to the flesh which is under it, then thou shalt say concerning it: 'wt has entered. Thou shalt perform an operation for it, the same being split with a ds-knife and seized with a forceps [hnwh], and then thou shalt remove it with the ds-knife. There is one therein, there is something in it like mndr [brain?] of a mouse; thou shalt remove it with a šš-knife without taking away

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Abbreviations: AMT = R. C. Thompson, *Assyrian medical texts from the originals in the British Museum*, London, 1923 etc.

CT = *Cuneiform texts from Babylonian tablets in the British Museum*.

BAM = F. Köcher, *Die babylonisch-assyrische Medizin in Texten und Untersuchungen*, vols. 1-6, Berlin, 1963-.

¹ C. O. R. Everard, R. Muller, and V. Duckett, 'Experimental infections with guinea worm from a snake', *Trans. R. Soc. Trop. Med. Hyg.*, 1971, 65(4): 433.

² A. C. Chandler and C. P. Read, *Introduction to parasitology*, London, Wiley, 1961, p. 503.

³ A. Hirsch, *Handbook of geographical and historical pathology*, 3 vols., London, New Sydenham Society, 1883-1886, vol. 2, (1885), pp. 339-341, 343.

⁴ B. Ebbell, *The papyrus Ebers*, London, Humphrey Milford, 1937, p. LXXVIII.

these enclosures [fibrous capsule?] which are on the side of it and which adjoin the flesh.”⁵

It is clear that these two Egyptian texts refer to quite different clinical conditions. Text 1 appears to describe myiasis and not the accidental contamination of the digit by non-parasitic larvae. Indeed, treatment is concentrated on removal of these (parasitic) larvae from human tissue. The species of larvae are, however, unidentifiable. In Text 2 there is no mention of s \int or of sp-worms, but some tissue (mndr) is sharply differentiated from myiasis. This mndr is not recognized to be a normal tissue, such as blood vessel or tendon, both of which were known to the ancient Egyptians, but is a foreign substance that has caused a tissue reaction in the human host. The description of this clinical condition strongly suggests the presence of a mature female guineaworm in a limb.⁶

The Ebers papyrus was written c.1550 BC but parts of it may have been derived from much older material. It therefore suggests that dracontiasis was already present in ancient Egypt by the beginning of dynasty XVIII, and perhaps even earlier. Although Text 2 shows how little was actually known about this infestation, treatment was empirically directed towards total removal of the foreign material (mndr), without, however, damaging the surrounding fibrous material that has been produced by the host of the parasite. The medical conditions mentioned in the Ebers papyrus must have been those diseases that were observed to afflict the Egyptian pharaohs and members of their royal court; diseases that affected the lower social classes were hardly considered at all and treatment for their complaints was minimal.

The source of this guineaworm infestation is a matter for speculation. If, as is likely, the patients recorded in the Ebers papyrus came from court circles, they may have become infected by the guineaworm when on a royal hunt in the desert regions adjoining the Nile valley. An alternative explanation would connect the introduction with the trade with Yam, an unidentified state that lay to the south of Egypt, and with Punt, a site on the east coast of Africa, which had been established by 2300 and 2500 BC respectively.⁷ A few Egyptian records do mention the importation of humans and of animals into Egypt from the south, although there is no direct evidence that dracontiasis was imported from the region of Yam and Punt at this early date. Nevertheless, it is suggestive that the disease seemed to have been associated at some time with Negroes from the region of the Sudan.⁸ The inhabitants of Yam fought in the Egyptian army and in several campaigns in Sinai and in Palastine,⁹ but the Ebers papyrus was written before the major expedition by the fleet of Queen Hatshepsut in c.1482 BC, which brought back to Egypt numerous animals and humans by sea from Punt.¹⁰

⁵ Ibid., p. CIX.

⁶ P. Ghalioungui, ‘Acerca de algunas teorías médicas pretéritas originarias del valle del Nilo’, *Pren. Méd. Argent.*, 1966, 53(1): 436–442, see p. 438. *Bull. Inst. Egypte*, 1969, 48: 13–26, see p.14.

⁷ J. H. Breasted, *Ancient records of Egypt*, 5 vols., University of Chicago Press, 1906, vol.1, paras. 311, 324, 333–336.

⁸ Hirsch, *op. cit.*, note 3 above, p. 340.

⁹ Breasted, *op. cit.*, note 7 above, paras. 311–314.

¹⁰ Ibid., vol. 2, para. 265.

Text 3. "If disease comes out of a man's foot and it festers like a *bubu'tu*, he shall prick it [gloss: *šagbānu* is its name, which is full of clear fluid] and he will recover."¹¹

The *bubu'tu* is considered to be a clear vesicle,¹² The *š/sagbānu*-disease is a serious disease, which is associated with joints, and is included in a list of other serious joint diseases.¹³ In Text 3 the disease is clearly coming to the surface from inside the foot and actually produces a vesicle on the surface of the skin of the foot. That it is not a simple infection, and is to be differentiated from such conditions, can be legitimately assumed, because treatment for various other infective conditions are mentioned in the relevant texts concerning diseases of the foot and leg.¹⁴ Nor is it likely that myiasis should be diagnosed, because insect larvae were known and easily recognized by the ancient Mesopotamians; indeed, the use of non-parasitic larvae to clean tissues seems to have been known to the Assyrians in antiquity.¹⁵ Infestation by the jigger flea (*Tunga penetrans*) can definitely be excluded. This species of flea was not found in Africa in antiquity.¹⁶ Moreover, the pregnant female flea tends to invade the soft tissues of the foot, burrowing under the nails or between the toes, whereas the *š/sagbānu* lesion is associated more with joints than with the soft tissues of the digits. Bearing these facts in mind, the most probable diagnosis in Text 3 is guineaworm infestation of the foot, for this part of the body is the most commonly infected. It is to be noted that the disease was given a specific name (*š/sagbānu*), which suggests that it was a disease that was now diagnosable by Assyrian physicians.

This Assyrian text and other texts of diseases of foot and leg come from the library of King Ashurbanipal at Nineveh and are dated to the seventh century BC, although some of them may have been copied from earlier, original texts.

DISCUSSION

Although the aetiology of dracontiasis was unknown in antiquity, the above-quoted texts nevertheless do suggest a diagnosis of this disease. Treatment of the described condition was both varied and empirical; in addition to local surgery, various substances were applied locally to the lesion in the skin, usually with doubtful benefit.¹⁷ According to the texts, the prognosis was reasonably good.

Dracontiasis causes considerable pain and disability to sufferers, but sick people often do not report to doctors for treatment.¹⁸ Thus the disease may be overlooked even when a community is severely infected. It is not surprising, therefore, to find few references to this disease in the ancient texts. Because the mode of transmission (by

¹¹ R. C. Thompson, 'Assyrian prescriptions for diseases of the feet (contd.)', *J. R. Asiat. Soc.*, 1937, 2: 413–432, see p. 421: translation of text AMT 74. rev. III. 13.

¹² P. B. Adamson, '*bubu'tu* and *birdu* in Akkadian texts', *J. R. Asiat. Soc.*, 1969, 1: 10–12.

¹³ CT 18.48.I–II.4. SAG.BA.NÚ:šag-ba-nu, a disease. 5. SA.NIGIN:ra-pa-du, acute rheumatism? 6. SA.AD.NIGIN:si-da-nu, chorea. 7. SA.KĒŠ.SA:ša-áš-ša-tu, arthritis. 8. SA.SĒR:maš-ka-du, arthritis.

¹⁴ BAM 124.II.2–5, 11–18, 35. AMT 15.3 rev. 4–6.

¹⁵ AMT 75.IV.19. mubattira ša eqli: an unidentified species of larvae found in the field.

¹⁶ Chandler and Read, op. cit., note 2 above, p. 658.

¹⁷ AMT 74. rev. III. 13–22. Human faeces, blood from ox kidney, oil, ghee, honey, and vegetable material are all recommended for local application.

¹⁸ S. Johnson and V. Joshi, 'Dracontiasis in western Rajasthan, India', *Trans. R. Soc. Trop. Med. Hyg.*, 1982, 76: 36–40, see p. 40.

drinking-water which has been contaminated by infected *Cyclops*) is often unknown even in some present-day agrarian communities, there is a strong probability that the disease may have increased in prevalence and in a wider distribution over extensive areas that had been occupied by infected farming and pastoral communities in antiquity.¹⁹ The disease is most commonly found in the working age-group of twenty to forty years, although children (but usually not breast-fed infants) may also be at risk; repeated and multiple infections are common.²⁰

It is possible that guineaworm disease had originally infected monkeys and apes in the central part of Africa,²¹ infected animals then being brought by traders to northern Africa. It may be significant that the ancient Egyptians worshipped the god Thoth who was sometimes represented as a cynocephalic ape. These sacred animals were kept in temples by priests, and sometimes they were even domesticated and lived in private houses as pets. They were mummified after death, and buried in their own cemetery near el Amarna.²² Thus, a very close relationship was constantly maintained between ape and human during the period of the New Kingdom (c.1552–c.1069 BC). As guineaworm is known to infect dogs, these animals may have become a reservoir for this disease in Lower Egypt, an area where dogs were numerous and lived in close association with humans. The Egyptian text⁵ suggests that the disease had apparently become established in man by the middle of the second millennium BC. Its presence in humans has been confirmed by histological examination of an Egyptian mummy which is dated to the early part of the first millennium BC.²³ Other evidence is, however, more dubious.

The “fiery serpents” of the Bible that sorely afflicted the ancient Israelites in Sinai have been considered to represent infestation by guineaworm,²⁴ and the emblem erected by Moses to protect them against this affliction has been equated with the Asklepiian wand and snake.²⁵ Unfortunately for this very attractive theory, there is little evidence to connect these “fiery serpents” with dracontiasis. Indeed, there are several opposing factors. The inhabitants of ancient Egypt, among whom should be included the Israelites before the Exodus, were well acquainted with snakes, which they used in

¹⁹ L. D. Edungbola, ‘Babana parasitic diseases project II. Prevalence and impact of dracontiasis in Babana District, Kwara State, Nigeria’, *ibid.*, 1983, 77(3): 310–315, see p. 310. C. N. L. Macpherson, ‘The existence of *Dracunculus medinensis* (Linnaeus, 1758) in Turkana, Kenya’, *ibid.*, 1981, 75: 680–681, see p. 680. Note apparent absence of this disease previously in East Africa (Hirsch, *op. cit.*, note 3 above, vol. 2, p. 341).

²⁰ Edungbola, *op. cit.*, note 19 above, pp. 310, 313. Johnson and Joshi, *op. cit.*, note 18 above, pp. 36, 39. J. O. S. Osisanya, E. I. Elueze and F. I. Okow, ‘Dracontiasis: pattern of morbidity in a north-western village in Sokoto State, Nigeria’, *Trans. R. Soc. Trop. Med. Hyg.*, 1986, 80: 293–294, see p. 293 and Table 1.

²¹ K. M. Bhansali and G. M. Mathur, ‘Dracontiasis — a historical review’, *Ind. J. Hist. Med.*, 1972, 17(1): 8–13, see p. 8, quoting L. M. Isayev (1930).

²² L. Lortet and C. Gaillard, *La faune momifiée de l’ancienne Égypte*, Lyons, Henri Georg, 1905, pp. 209, 211.

²³ A. R. David, ‘Introduction’, in A. R. David and E. Tapp (editors), *Evidence embalmed*, Manchester University Press, 1984, pp. 3–42, see pp. 40, 41. Manchester mummy 1770 of female aged c.14 years had a calcified male guineaworm in the abdominal wall. Evidence of infestation by a female worm might have been found in the legs, but bilateral amputations had been performed *ante mortem*.

²⁴ Num.21.6.

²⁵ Num.21.8–9. H. Menk, ‘Symbol für Heilberufe — Äskulapschlange oder Medinawurm’, *Med. Welt.*, 1974, 25(6): 240–241. F. Henschen and S. Holm, ‘*Dracunculus medinensis* — the brazen serpent of Moses’, *Sydsvenska Medhist. Sällsk. Årsskr.*, 1971, 194–197, see p. 197.

their cult, and the cobra emblem was incorporated in the royal uraeus worn by pharaoh himself. Furthermore, poisonous viperine snakes were known to live in the Sinai peninsula, their bites being both painful and highly toxic. The bite of such a snake aptly describes the use of “fiery” in this context.²⁶ It was most unlikely that dracontiasis could have been responsible for such a high and rapid mortality among the afflicted Israelites, but snake bites would have readily accounted for such a mortality. However, it must be admitted that the actual species of poisonous snake incriminated in this affliction has not been accurately identified.²⁷

It is probable that guineaworm infestation was brought to Mesopotamia during the early part of the seventh century BC. At that time, the Egyptian campaigns of the Assyrian kings Esarhaddon and Ashurbanipal yielded a rich booty of prisoners of both sexes and of varying ages, who were forcibly removed from Egypt and transported back to Assyria by the overland route round the Fertile Crescent.²⁸ It is reasonable to assume that some of them were incubating the pregnant female guineaworm, and that the water supplies of Mesopotamia became infected in consequence.

Once established in an area, dracontiasis tends to persist and may spread locally in a patchy manner. The disease certainly was recognized as occurring in the region of the Red Sea as early as the second century BC, and had become endemic in that region.²⁹ It reached northern India following the military conquests of Alexander the Great during the years 327–325 BC.³⁰ It is specifically mentioned that both Egyptians and Phoenicians were included in the fleet of Alexander,³¹ and these sailors may also have brought the disease with them from the Middle East.

Dracontiasis was probably recognized by the early Christians in the Middle East,³² but this has not been confirmed. Although the physician Galen, who practised medicine in Rome c.AD 170, had never seen any clinical cases himself, he had met many people who had seen sufferers from overt dracontiasis.³³ A near-contemporary of Galen, the physician Rufus of Ephesus (fl. c.AD 110), was certainly acquainted with this disease in Egypt and in neighbouring countries.³⁴ He applied local medicaments

²⁶ Hebrew: *śārāph*, a serpent that produces a burning sensation at the site of the bite (see F. Brown, S. R. Driver, and C. A. Briggs, *A Hebrew and English lexicon of the Old Testament*, Oxford, Clarendon Press, 1976, p. 977).

²⁷ J. Preuss, *Biblich-Talmudische Medizin*, Berlin, Karger, 1911, p. 226 (Eng. trans., *Biblical and Talmudic medicine*, New York, Sanhedrin Press, 1978).

²⁸ A. L. Oppenheim, ‘Babylonian and Assyrian historical texts’, in J. B. Pritchard, (editor), *Ancient near eastern texts*, Princeton University Press, 1969, pp. 265–317, see pp. 293.37–53 rev. 295(ii): second campaign of Ashurbanipal.

²⁹ Plutarch, *Moralia*, 733B, quoting Agatharchidas (fl. c.150 BC).

³⁰ W. W. Tare, ‘Alexander: the conquest of the Far East’, in J.B. Bury, S. A. Cook, and F. E. Adcock (editors), *Cambridge ancient history*, Cambridge University Press, 1969, vol. 6, pp. 387–437, see pp. 403, 407, 410. H. Gärtner, *Rufus von Ephesos: die Fragen des Arztes an den Kranken*, Berlin DDR, Akademie-Verlag, 1962, p. 100. Note the patchy distribution of this disease in India (Hirsch, op. cit., note 3 above, vol. 2, pp. 341–342).

³¹ Arrian, *Indica*, 18.1.

³² Mark 9.46; possibly also Acts 12.23.

³³ Gärtner, op. cit., note 30 above, p. 100 for references in Galen (see C. G. Kühn (editor), *Opera omnia*, Hildesheim, Olms, 1965).

³⁴ Gärtner, op. cit., note 33 above, pp. 44, 46, 100 (Rufus.12.67–68). Also by Leonides who lived about the same time (see Hirsch, op. cit., note 3 above, p. 337 n.2).

Dracontiasis in antiquity

for a cure and even incriminated drinking-water as a source of parasitic infection.³⁵ By the seventh century of the present era, dracontiasis was well established in the Middle East, for Paul of Aegina recognized the symptoms of the disease and was able to write about its aetiology in considerably more detail than had Galen. For example, he noted that it was well established both in Egypt and in India.³⁶ The female guineaworm appears to be hydrotropic, for its presence is often related to parts of the body that are frequently exposed to water.³⁷ In India, however, extradural abscesses with severe neurological symptoms caused by the presence of the female guineaworm have been reported recently. The direct association with water is not always to be noted in these cases.³⁸ Dracontiasis is still relatively common, and persists in many parts of Africa, Asia Minor, and India even today.

³⁵ Gärtner, *op. cit.*, note 33 above, p. 101.

³⁶ F. Adams, *The seven books of Paulus Aegineta*, 3 vols., London, Sydenham Society, 1844, vol. 2, pp. 150–151 (Book 4 sect. 59).

³⁷ The distribution of the parasite is mentioned by Hirsch (*op. cit.*, note 3 above, p. 351), being predominately sited below the knee (Edungbola, *op. cit.*, note 19 above, p. 314).

³⁸ J. R. Donaldson and T. A. Angelo, 'Extradural abscess and quadriplegia from guinea worm in India', *J. Bone Jt. Surg.*, 1961, 43: 197–200. C. R. R. Reddy and V. V. Valli, 'Two cases of extradural abscess due to guineaworm in India', *Amer. J. Trop. Med.*, 1967, 16: 23. A. K. Mitra and D. R. W. Haddock, 'Two cases of extradural abscess and paraplegia due to guinea-worm in India', *Trans. R. Soc. Trop. Med. Hyg.*, 1970, 64(1): 102–106.