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Theorising disAbility in Egyptian bioarchaeology

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Abstract: *What is disability, and how do we identify it in a bioarchaeological context? Within palaeopathology and bioarchaeology, disability has often been viewed from a modern medicalised model standpoint, with focus placed on skeletal changes and impairments, but the field of bioarchaeology is intrinsically social in nature. People experience physical impairments but are not necessarily disabled by those impairments. In ancient Egyptian contexts, the medical papyri provide a view of the emic understanding and treatment of bodily difference in the Egyptian past, but this concept of difference does not map directly onto modern etic understandings of physical bodily difference, and may not map to skeletal impairment identifiable from bioarchaeological study. All potential impairments should be understood in contextual terms as putative disorders that are contingent on the local situation in which the affected individual lived and in which the surrounding community operated. For example, dyslexia is only a difference within literate societies. Even when considering disability as enabling a focus to be placed on the ability to undertake actions (disAbility), there is still a fluid boundary between disabled and able-bodied, with shading and gradations along the continuum of disAbility depending on the actions and activities of the individuals involved. The temporal aspects and duration of impairment must also be considered as disAbility is not static, but rather changes along the life course. DisAbility in past populations must be viewed using an emic lens.*

Key words: disability; dwarfism; life course; representation

What is disAbility?

Palaeopathology is commonly misunderstood by the general public to be the identification and recognition of disability in the past. Palaeopathology is a descriptive, explorative and analytical science of the biological processes of disease and disorder in past populations. Disability, by contrast, is a broader term, and is considered by the World Health Organization as comprising impairment, limitation on activity, and restriction on participation (WHO n.d.). The WHO *Policy on Disability* (2021:10) defines disability as "the outcome of the interaction between individuals with a health condition ... and personal and environmental factors." Recognising and identifying

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disability in the past, therefore, involves moving beyond palaeopathology, to understand the impact of disease and trauma processes on both the individual concerned and the community around them.

Disability itself is also constructed differently depending on the community. It is constructed in terms of medical reductionism within the medical community and for many health professionals, but is viewed as a social phenomenon by social scientists (Thomas 2007). Bioarchaeology, with its determinedly biosocial framework that bridges the biological and social divide, should fall toward the social camp. Using this social framework, as outlined by Oliver (1983), disability is then not caused by the skeletal impairment, but by the social restrictions placed upon individuals with that skeletal impairment. Following such an approach, the embodied difference is the so-called impairment, with the external to it being what is considered 'disability' (Tremain 2002).

The term 'disability' places unfortunate stress upon the inability to undertake activities or to participate in normal social life. In this sense, disability may be viewed as a state of social liminality, where the individual is at least partially excluded from ordinary life and is neither a full person nor not-a-person, and thus is denied the full expression of being human (Murphy 1990). By rephrasing and reviewing the term as 'disAbility', the focus moves towards ability and places the individual at the dynamic core rather than being a passive observer to others defining their inabilities. This means that being 'disabled' should be viewed as simply a point upon a continuum of ability, rather being viewed as a binary opposition to someone who is defined as able-bodied (or not-disabled).

Using this approach, it is clear that disAbility will change in its expression, severity and impact throughout the life course. During a normal or standard life course, individuals will experience episodes during which they may be unable to fully participate. For example, diseases that produce high fever during pregnancy not only impinge on the pregnant woman's ability to undertake work, but also have been associated with major skeletal malformations in the developing offspring (Titelbaum et al. 2023). Furthermore, a woman produces more red blood cells during pregnancy, and thus is more susceptible to anaemia and its effects (Brickley & Morgan 2023). Similarly, older individuals may experience physical and/or cognitive impairments that restrict their ability to undertake certain activities, due to biological causes such as arthritis, ischaemic heart disease, stroke etc. For an older person, using a walking stick or staff might enable greater participation in activities, thereby reducing some of the disabling effects of age-related skeletal degeneration. As a result, disability is clearly an age-related and universal phenomenon. Some of these aspects were clearly noted by the ancient Egyptians as the hieroglyphic ideogram or determinative for the elderly was a realistic depiction of an older person using a stick as a walking aid

(Gardiner's A20 sign, **Figure 1**). Loebl and Nunn (1997:452) have described this hieroglyph as being a remarkably realistic depiction with the elderly man portrayed "shown with osteoarthritic nodular joint enlargements in their typical distribution: acromioclavicular, metacarpophalangeals of the right hand, and a bunion of the first metatarsophalangeal joint of his front foot."

Identity has been a common focus of study by bioarchaeologists (e.g. papers in Gowland & Knüsel 2006; Knudson & Stojanowski 2009; Stojanowski & Knudson 2020). Furthermore, following on from pioneering archaeological work by Meskell (2001), these multiple strands of identity have started to be synthesised by bioarchaeologists to form cohesive entities incorporating personhood (e.g. Boutin 2011, 2016; DeWitte & Yaussy 2020; Hosek & Robb 2019). Understanding and conceptualising disAbility has been one such strand of identity, but, with a few notable exceptions (e.g. Battles & Gilmour 2022; papers in Byrnes & Muller 2017; Schrenk & Tremblay 2022) has rarely been synthesised with other aspects of identity in bioarchaeological analysis. Identity is fluid and dynamic: disAbility is clearly personal, situational, and reflexive. DisAbility may be overlooked in studies as it is perceived as a minority identity, as in one that is not experienced by everyone. The body, as the central location for the forging and entangling of identities, and the "physiological embodiment of social processes and integration with social theory" (Gowland & Thompson 2013:3) is the location for the interplay between disAbility and other aspects of identity, and thus bioarchaeology has the potential to add nuance to archaeological understanding and interpretation of disAbility in the past.

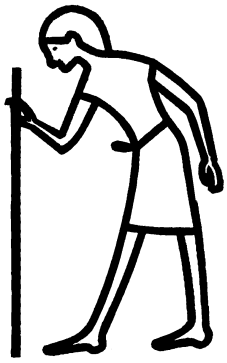

Figure 1. Gardiner's A19 sign. Described as a "bent man leaning on a stick" and more "senile" than the person depicted in sign A20 (Gardiner 1957:444). Redrawn by Sonia Ruth Zakrzewski.

DisAbility in Egypt: The traditional view

Despite the strict canon of proportions used in ancient Egyptian art, some differences are reasonably well represented (Nyord 2020), for example, with representations of many different 'ethnic' groups (e.g. Buzon 2006; Jeffreys & Tait 2000; Matić 2020; Nibbi 1986; Robinson 2017) and differences between young and old (e.g. Sweeney 2004; Matić 2020; Robinson 2017). Similarly, certain impressions of health and/or disease are relatively easily recognised (Dasen 1993; Gordon & Schwabe 2004; Iversen 1975; Jeffreys & Tait 2000). Although the elite were (almost) always portrayed as young and able-bodied and conforming to contemporary ideals of beauty (Szpakowska 2012), commoners were frequently depicted realistically, together with their physical imperfections, including ageing (Kozieradzka-Ogunmakin 2013; Robinson 2017).

Achondroplastic dwarfism appears relatively commonly in tomb scene artwork and in statues. Obviously, by the Late period (c. 525–332 BCE), the apotropaic deity Bes was commonly portrayed with characteristics of achondroplastic dwarfism. But depictions of dwarfism start relatively early in the Dynastic period, so that by the Old Kingdom, at least two dwarves appear to have received sufficient status to have been accorded their own individual tombs.

A 4th Dynasty (c. 2614–2494 BCE) basalt statue of the dwarf Perniankhu (JE 98944), from an Old Kingdom tomb at Giza, has him sitting on a low chair. Perniankhu is depicted with regalia normally reserved for officials of high authority, including a short, curled, shoulder-length black wig, a short white kilt fastened with a black belt, and holding a *sekhem*-sceptre in his right hand and placed on his lap, and a long staff, diagonally across his chest, held in his left hand. The sceptre and staff are unambiguous symbols of authority in the 4th Dynasty (Hawass 2010; Wilkinson 2007). Perniankhu is also depicted with a strong upper body, but with short, bowed legs, thick ankles and flat feet. His knees also differ, which Wilkinson (2007) suggests might be either due to congenital deformity or traumatic injury. His name and titles are also given on the statue: "One who delights his lord every day, the king's dwarf, Perniankhu, of the Great Palace" (Hawass 2010:26), and may highlight an entertainment role.

The dwarf Seneb, whose name means 'healthy' (Wilson 1993:43), was likely the son of Perniankhu (Hawass 2010:88), and probably served the 4th Dynasty Pharaohs Khufu and Djedefre, with his tomb believed to date from the latter's reign (c. 2566–2558 BCE). Seneb was buried in a mastaba tomb in the West Field of the Giza necropolis. In one famous representation of Seneb (**Figure 2**), he is depicted seated with his arms crossed in the position of a scribe, with his wife Senetites seated next to him (JE 51280). He wears a short white kilt. The representation of his limbs have been suggested to show remarkable similarity to achondroplasia whilst his facial features

have been described as being suggestive of hypochondroplasia (Kozma 2006). Below Seneb and Senetites, in the lower register of the statue, where Seneb's legs would normally have appeared in Egyptian statuary, are representations of what are believed to be two of their three children, a boy and a girl. With Seneb's stature difference proudly shown and using the visual coded language known in the Egyptian world, this statue demonstrates his status and his achievements in life, to have married and had children.

Visual representations of dwarfism continue throughout Egyptian history, but one of the most famous is that of Djeho, depicted on the lid of his sarcophagus (Cairo CG 29307), found in the burial tomb of his patron Tjaiharpta, near the sacred animal necropolis at Saqqara (Baines 1992), dating from the Late period (c. 525–332 BCE, with the sarcophagus of Tjaiharpta dated by inscription to 346–345 BCE (Baines

Figure 2. Group statue of Seneb with his family. Modified by Sonia Ruth Zakrzewski from Djehouty, CC BY-SA 4.0, via Wikimedia Commons.

1992:241). The carving is detailed, with prominent modelling of the limbs and musculature, depicting him with features suggestive of achondroplasia with some kyphosis (Kozma 2006).

Representations of physical difference are not limited to depictions of achondroplasia, but also include depictions of individuals with other forms of visible difference. Classic examples include the 18th Dynasty (c. 1400–1360 BCE) funerary stela of Roma (Carlsberg Glyptotek Museum, Copenhagen ?IN 134), the 12th Dynasty (c. 1930 BCE) stela of Intef (British Museum EA 562), and the depiction of the gardener from the Ramessid (c. 1300-1100 BCE) tomb of Ipuy (TT217 at Deir el-Medina; de Garis Davies facsimile, Metropolitan Museum 30.4.115). Roma, a New Kingdom doorkeeper, is depicted on his funerary stela with a severely wasted and shortened front (right) leg, associated with an equinus deformity or skeletal changes associated with poliomyelitis, with a long staff across his chest and in his left arm as a walking aid (Galassi et al. 2017a; Loebl & Nunn 1997; Nunn 1996). Similarly, on the stela of Intef, the tomb owner is depicted with a potentially wasted front leg and using a stick for support (Loebl & Nunn 1997). In the garden scene from the tomb of Ipuy, the gardener is depicted with kyphotic deformity of his back. This has been suggested as likely to be Pott's disease from spinal tuberculosis (Nunn 1996; Robinson 2017).

Other representations of difference include those forms that may be less physically visible, but are socially conspicuous, such as blindness. Examples include the model of a blind harpist on a riverboat from the Middle Kingdom (c. 1980–1975 BCE) tomb of Meketre (TT280; Metropolitan Museum of Art 20.3.1) and the 18th Dynasty blind harpist depicted on the vestibule hall of the tomb of Nakht (TT52) dating to c. 1400 BCE. Raia, the Ramessid chief of singers (c. 1300 BCE) from the temple of Ptah at Memphis (Wilkinson 2007) was depicted blind when playing music for his patron deities, but sighted or at least with his eyes open in other representations (Dasen 1993). The depiction as blind has been argued as denoting his piety (Dasen 1993), potentially celebrating a heightened sense of hearing, perhaps compensated by the gods, although it is possible that he simply has his eyes closed.

Texts also demonstrate the ancient Egyptian awareness of difference, with the medical papyri including multiple treatments, such as the Edwin Smith papyrus providing multiple treatments for gaping head wounds, nasal fractures and various tumours (Nunn 1996; Strouhal et al. 2014). Other texts, however, such as the instruction of Amenemope, demonstrate both understanding and communication of that social recognition and understanding of difference. However, a statue of Nebenteru, a high priest of the 21st Dynasty (c. 1077–943 BCE), has an epitaph saying "I passed my life in joy, without either worry or illness..." (Halioua & Ziskind 2005:95), demonstrating the importance placed on health. The importance of preventive mea-

sures should also not be forgotten; amulets, magic and formularies were integral to ancient Egyptian life (Sarischouli 2021). Amulets were worn by people of all social classes to protect their health and ensure their well-being both during their life and in afterlife, and magic was used therapeutically with incantations or utterances of magical medicine requiring recitation (Halioua & Ziskind 2005).

The ancient Egyptians certainly had an idealised concept of bodily perfection (Nyord 2020), at least for the afterlife, as prosthetics and other bodily embellishments are found in some mummies. The best known prosthetic is probably the cartonnage toe likely to date from the New Kingdom (British Museum EA29996), produced before 600 BCE. The gum resin coating on the surface of the prosthetic toe is thin and shows evidence of wear, indicating that this was a working prosthesis and not simply a cosmetic restoration undertaken during the mummification process (Falder et al. 2003). A similar prosthetic big toe was found in the mummy of a 50–55 year old female named Tabaketenmut from Sheik-Abd-el-Gurna (TT95) dating to c. 750–610 BCE (Nerlich et al. 2000). The toe amputation occurred during life, argued by Nerlich and colleagues to be potentially the result of ischaemic gangrene, and the associated prosthetic had clear marks of usewear on the sole of the toe. In experimental archaeology research, modern people missing a hallux (big toe) found replicas of these toe prostheses to be helpful and improved their gait and hence such prostheses potentially had both functional and cosmetic benefits (Finch 2018). Similarly, there is plenty of evidence to show that embalmers attempted to reinstate or reform the complete physical body by using packing materials such as linen, through moulding with plaster, or stuffing material such as sawdust between the skin and muscle to reform the contours (Finch 2011). Indeed onion skins were sometimes placed over the eyes of mummies from the 13th Dynasty (c. 1800–1650 BCE), with artificial eyes used developed from the Ramessid period (c. 1300 BCE) onwards (Andersen 1997).

Despite the wealth of literary material from Egypt, there appears to be little evidence for an awareness of mental impairment in ancient Egypt, although the last section of the Ramessid period text (c. 1300 BCE) known as the 'Instruction of Amenemope' has been suggested to refer to mental illness (Jeffreys & Tait 2000). Medical texts seem to have concentrated primarily on the brain in terms of potential neurological complications to trauma rather than other mental health conditions (Nunn 1996), but did recognise that medical treatment needed to be "as effective as possible by 'acting upon the mind"' (Halioua & Ziskind 2005:26). They thus recognised the importance of mental states in linking to treatment of physical disorders (and impairments), but not to mental disorders themselves.

DisAbility in Egypt: The biological view

Skeletal manifestations of potentially impairing disease or trauma are well-known, with some of the first reported by Ruffer in his pioneering works (1910, 1911, 1913, 1919a, 1919b). Much analytical focus was initially placed primarily on the royal mummies, followed by traditional studies of 'classic' palaeopathological case studies or examples. More recently, archaeological analysis has included studies of potentially disabled individuals, but placed them into context of their community or other group. It is important to remember that, due to modern medical treatment and drugs, conditions that might have been considered as disabling in the past, might not be viewed as such today (Roberts 2000). Similarly, conditions that can be disabling in the modern world might not have been recognised as such in the past. For example, dyslexia only becomes potentially problematic in a society where all are expected to be literate, or the well-known example of hereditary congenital deafness not being disabling in the sign-language-using community of Martha's Vineyard, USA (Groce 1985).

Potentially most well-known of the classic examples of putative disability in ancient Egypt are the dwarfs. The earliest skeletal case described dates from the Badarian (c. 5000–4000 BCE), although the skeletal morphology does not follow a typical presentation of achondroplasia (Hughes-Jones 1932) and the skeleton, although originally curated at the Royal College of Surgeons in London (Hughes-Jones 1932) now appears lost (Kozma 2019). Two clear Predynastic cases (c. 3650–3300 BCE) of achondroplasia have been found in putative males from cemetery HK6 at Hierakonpolis (Friedman 2011; Pieri 2011; Pieri & Antoine 2012). Achondroplasia has been suggested for an individual found in the 4th Dynasty tomb (c. 3080 BCE) of Mersekha (skeleton AF.11.4/427 curated the Natural History Museum, London) (Ortner & Putschar 1981:331). Ortner and Putschar (1981:331) also note the existence of an 18th Dynasty (c. 1550–1290 BCE) skull that might be achondroplastic, but which was initially considered to be potentially the result of either achondroplasia or 'cretinism.' Possible mucopolysaccharidoses are suggested for the isolated humeri of the likely young adult NHM AF.11.3/75. Ortner & Putschar (1981:337) state that "the general appearance undoubtedly indicative of a chondrodysplasia, although the extreme abnormality of the humeral heads is not typical of achondroplasia." Pituitary dwarfing has been suggested in the literature for individuals from both Abydos and Beni Hasan (Dasen 1993), but the location(s) of the skeletal remains are now unknown. There is, however, a clear case of a female with a stature at least two (more probably three) standard deviations below the cemetery mean, i.e. with proportionate dwarfism, from Ain Tirghi in Dakhleh Oasis, dating from the Third Intermediate Period (c. 800 BCE), and so is likely an example of hypopituitarism (Molto & Kirkpatrick 2018). The inverse, gigantism and acromegaly have also been recognised, such as in a 5th Dynasty (c. 2494–2345 BCE) young male from Giza (Mulhern 2005),

although eunuchism was also suggested for this individual. Additionally, the skeletal remains attributed to the 3rd Dynasty king Sa-Nakht (c. 2700 BCE), found in mastaba tomb K2 near Beit Khallaf, have been proposed to be a case of gigantism (Galassi et al. 2017b). Macrocephaly, potentially associated with hydrocephalus, has also been suggested for a mature adult individual found in a Roman-period cemetery near Helwan (Derry 1913; York & Steinberg 2009).

Examples of scoliosis have been noted, such as the Ptolemaic-Roman mild case found Quesna (B11) (Rowland 2008). Fritsch et al. (2015) note a high frequency of scoliosis in their computed tomography study of 52 ancient Egyptian mummies, ranging in date from the Middle Kingdom to the Greco-Roman period (c. 1980–30 BCE). They noted scoliosis in six individuals, and spinal osteoarthritis in at least 24 (24 recorded in their table, 25 noted in the text). Severe scoliosis may result in visible bodily differences and may be disabling as it may be difficult for the lungs to function properly (see also discussion in Waldron 2000).

Mummies have also provided classic examples of putative disfigurement. Filarial worms were found in the 20th Dynasty (c. 1000 BCE) mummy Natsef-Amun, and these may block lymphatic channels leading to swelling and potential elephantiasis (David 2005; Sandison & Tapp 1998). A male Guinea worm was found in the abdominal wall of the uncertainly dated (c. 1000 BCE; Hodge & Newton 1979) mummy 1770 from Manchester Museum (Isherwood et al. 1979; Tapp 1979). This individual had their right leg amputated above the knee and the left leg amputated below the knee, and both their lower limbs replaced with prostheses in their mummies (Isherwood et al. 1979). Female Guinea worms may cause necrosis and ulceration which led to the amputation in this individual (Sandison & Tapp 1998). Cerebral palsy has been diagnosed in an older aged Middle Kingdom female named Geheset from Dra Abu-el-Nagar (Lösch et al. 2012). Other classic cases of disability in mummies include the Pharaohs Siphtah and Tutankhamun. Siphtah's deformed foot has been diagnosed as resulting from clubfoot (*talipes equinovarus*; Elliot-Smith 1912) or poliomyelitis (Habicht et al. 2022; Harris & Weeks 1973).

As noted earlier, the usewear on studied toe prostheses demonstrates their use in life. Other amputations exist, such as of the hand, but the reason for the curative treatment can rarely be identified (Strouhal et al. 2014). Furthermore, quadriplegic paralysis has even been hypothesised for an elderly Ptolemaic period man who sustained severe damage (incarcerations) of the fourth and fifth cervical vertebrae, and thus would have likely required constant care (Strouhal & Horáčková 2007; Strouhal et al. 2014).

Although not necessarily causing visible bodily difference, haematuria (blood in the urine) was probably common, primarily as a result of schistosomiasis (bilharzia) (Sandison & Tapp 1998). The ova of *Schistosoma haematobium* have been recovered

from the mummy ROM I (Sandison & Tapp 1998), but schistosomes circulating anodic antigens, indicative of active schistosomiasis, have been found in the skin tissue of the predynastic adolescent BM EA 32753 from Gebelein (Miller et al. 1993). Enzyme-linked immunoassay (ELISA) has similarly diagnosed schistosomiasis in a range of mummy tissues (Rutherford 2016), thus showing the high likely frequency of the disease in ancient Egyptians.

Importance of the Nile

The River Nile was the framing axis around which ancient Egypt was organised. The Egyptians had no actual name for the river, but simply called it Hapy or Itrow, both of which simply mean 'river' (Abdel-Ghaffar et al. 2019). Time was organised around the cycles of river flow. The calendar was intrinsically linked to the flow cycle, with each season being named and lasting about four months. The seasons were called Akhet (flood season), Peret (growth season) and Shemu (harvest season), thereby demonstrating their agricultural and hence economic and social importance.

As an agricultural 'hydraulic' civilisation (Butzer 1976), completely reliant on the seasonal inundation for cultivation, being unable to take part in the required activities at the planting or harvesting times might have rendered someone occupationally useless. In this sense, even a relatively minor fracture requiring some level of immobilisation, would have therefore restricted someone's ability to participate in normal farming activities, and thus would have rendered them temporarily 'disabled.'

The Nile was also a transmission agent for diseases that might have rendered someone disabled. Waterborne diseases result from faecal waste entering and contaminating the water with infectious microorganisms, leading to diseases that are mainly diarrhoeal in nature, including ascariasis, gastroenteritis, cholera, typhoid fever, and poliomyelitis. Water-based diseases are primarily parasitic in nature, when the skin is penetrated when contaminated water is used or entered, such as for watering plants or washing. Parasitic diseases include guinea worm and schistosomiasis. Water-washed diseases result from poor hygiene when infected water comes into contact with the skin or an eye, and results in diseases such as conjunctivitis, leprosy, and trachoma. Examples of all of these kinds of water-transmitted diseases have been found in ancient Egypt.

As noted earlier, the depiction of Roma with his withered right leg has been considered to show poliomyelitis (Galassi et al. 2017a), although this has been said to be questionable (Sabbahy 2017). Probably more disabling for the ancient Egyptians were the parasitic diseases. Schistosomiasis eggs were recovered from the kidneys of 20th Dynasty mummy during the pioneering research by Ruffer early in the 20th century (Abdel-Ghaffar et al. 2019; Ruffer 1910, 1911, 1913, 1919a, 1919b). Since

then, Schistosoma antigens have been found in mummy tissue (Miller et al. 1993) and aDNA analysis of Middle Kingdom mummies has confirmed the presence of *S. haematobium* in the liver tissues of Nekht-Ankh and *S. mansoni* and in the intestinal tissues of Khnum-Nakht (Mathieson et al. 2014). Additionally, bloody urine was noted in the Ebers papyrus (Contis & David 1996). Similarly, the Ebers papyrus also contains a section that includes the diagnosis of and description of the process of extracting a Guinea worm from the foot of an infected individual (Nunn 1996). A calcified Guinea worm has been found in the abdominal wall of mummy 1770 (from the Manchester Museum collection). This individual had an amputation above the knee of the right leg and below the knee of the left leg, implying that there was a failed attempt to extract the female worms that then led to serious infection and complication (Abdel-Ghaffar et al. 2019; Tapp 1979). Filarial worms were found in the scrotum skin of the mummy of Natsef Amun (curated in Leeds) (Tapp & Wildsmith 1992) and there have been many suggestions that the Queen of Punt may have also suffered from filariasis (Abdel-Ghaffar et al. 2019; Otsuji 2011). Blindness (trachoma) may result from infection with *Chlamydia trachomatis*. The medical papyri refer to Nehat, which is believed to be trachoma, and implies that the disease was endemic (Nunn 1996).

DisAbility and the life course

Western laws, such as those in the United Kingdom, require the impact of the impairment to last twelve months for the individual to be considered legally disabled (UK Equality Act 2010). In a society with relatively strictly defined periods of great social, economic, or religious importance, the timeframe required to 'make' someone disabled might be expected to be shorter or temporarily prescribed. This might mean that someone who was temporarily unavailable to take part in their required activities might be socially defined as either 'disabled' or as 'different' if their inability to participate overlapped with one of these important temporal periods. It is also possible, however, that some understanding was given to the inability to undertake required activities, and that participation in other activities was preferred or required instead. The perception and definition of disAbility is thus culturally and socially contingent, and that understanding of it in the past should not rely wholly on modern Western norms.

For the majority of the Egyptian population, living in rural settings, daily life was organised around the agricultural cycle as crop cultivation would have been the inhabitants' main activity (Ikram 2010). After the season of flooding, Akhet, planting of cereals such as wheat and barley was undertaken during Peret (i.e. the growing season). The fields would have been prepared for planting using hoes and mattocks,

and with ploughs pulled either by people or animals. Following this preparation, the fields would have been planted with seeds trampled into the ground or planted by hand. Following this growing season, harvesting was the imperative during Shemu, the drought or dryness season. The grain was harvested by hand using sickles, and then tied up and loaded for transportation to the threshing area. Threshing was either done by people or by driving animals over the grain to separate the cereals from the chaff. The chaff was removed by winnowing and then the grain taken to granaries for storage. From the New Kingdom onwards, water was drawn for irrigation using a shaduf, with animal-powered irrigation systems not developed until later. By the Roman period, two harvests of some crops was common (Ikram 2010), and so the cycle was accelerated.

Both the period of planting and the period of harvesting were highly labour-intensive. Some tasks, such as weeding or watering the plants, or scaring away birds and pests, might have been delegated to children or individuals with mobility impairments. Other tasks, however, were physically demanding and tiring activities, thereby requiring not only physical strength and agility, but also stamina. An individual who was unable to take part in such activities may have thus been economically, or at least agriculturally, inactive. Even something that might be considered relatively innocuous, such as a long bone fracture, could have rendered the individual disabled through their inability to participate as a normal member of the agricultural society in either the processes associated with planting or with harvesting and winnowing. In this sense, a short-term impairment might have had a profound effect, socially disabling the individual affected. Some of the agricultural tasks, such as threshing and winnowing, despite being physically demanding, were undertaken by both men and women and so this workload could have been shared around. It is possible, however, that some of the important tasks were delegated to specific individuals, and hence even temporarily physically impaired individuals might have been considered disabled by the community if they were unable to undertake these tasks. The social and economic impact of the physical impairment resulting from a long bone fracture on a working adult might be thus better cushioned in larger communities than in small family groups. Obviously, individuals and their surrounding community can mitigate the economic effects of some physical impairments by selecting other activities to undertake. Livestock, such as sheep, goats, pigs and donkeys, might have been pastured immediately outside and around the villages. It is possible, therefore, that animal husbandry could have been undertaken by mobility impaired individuals.

Women's life courses, however, also had other periods when full participation might have been impaired. Pregnancy obviously places physiological stress on the body as the increased tissue mass results in increased energetic costs for bodily maintenance, commonly associated with increased basal metabolic rate (Butte & King 2005),

and hence there is reduced energy available for work. Although contemporary pregnant women's energy intakes commonly appear to remain relatively stable throughout pregnancy, resting energy expenditure may rise by up to nearly 30% by the late stage of pregnancy (Savard et al. 2021). Despite this, in contemporary non-Western societies, many women are expected to continue with partial or full duties throughout most of pregnancy and may have to continue to undertake strenuous activities right up to birth (Butte & King 2005), and it is likely that the same was the case in ancient Egypt. Changes in bodily physical form and shape, however, make undertaking certain forms of physical labour difficult or impossible for a pregnant woman (Cheng et al. 2006; Nicholls & Grieve 1992). Common side-effects of pregnancy, such as symphysis pubis dysfunction or pelvic girdle pain (Leadbetter et al. 2004), might also make common activities, such as walking or carrying, difficult. After childbirth, limitations continue as lactation exerts energetic costs on the mother (Butte & King 2005) and requires carrying of the infant. Active participation in activities might also be impeded during periods of a woman's menstrual cycle. Indeed, women who have unusually heavy menses may, if cycling repeatedly, become anaemic (Strassmann 1996) and thus less able to undertake certain forms of work.

It is obviously difficult to hypothesise the varying impacts of menstruation, pregnancy, and lactation on women's activities in ancient Egypt, but it is likely that each woman would have experienced periods during which their ability to fully participate was impaired. The impact and cost of pregnancy and lactation should not be ignored as social anthropological study has demonstrated that, in the absence of contraception, menstruation may be a rare event. For example, during a two-year period of study, Dogon women aged 20–34 spent most of the time pregnant or in amenorrhea with a median of only two menses over the study period (Strassmann 1996). Assuming a similar pattern in ancient Egypt would imply that most women of reproductive age, and hence of prime working age, were either pregnant or lactating for the majority of the time. Given that this was the norm, it is likely that pregnancy and the period of breastfeeding would not be considered disabling or inhibiting by the community, but complications with pregnancy or neonatal problems might prove disabling.

Developing a holistic view of disAbility in ancient Egypt

Disability should be viewed as a continuum, with individuals moving forwards and backwards along that continuum at different points in their lifetimes. Individual differences in physical or mental ability may have been recognised, but might have been considered as qualitative rather than quantitative (Knüsel 1999). An individual's ability to undertake specific activities will vary as a result of the changing impact of their impairment, with the impact depending upon societal demands and compen-

satory mechanisms. All societies, whether past or present, make demands on their populations, but these demands vary in response to the specific circumstances of the time. This means that the expectation for participation will differ as an individual goes through their own individual life course. Furthermore, in situations where there is strong seasonal patterning to activity, seasonal changes will interweave in the demands made on an individual. Thus, in ancient Egypt, with its work patterning delineated by the temporal structuring of Nile flooding, short-term limitations on participation may have led to individuals being considered temporarily disabled, or at least temporarily less able.

Given the imperative for most in a society to participate economically, such as in crop-planting or threshing, it is likely that the ancient Egyptians placed an emphasis on an individual's ability to participate. This might mean undertaking alternative roles or adjusting the mechanisms through which the individual was acting. In this sense, the impact of relatively common restrictions upon participation places the focus on the ability to participate in alternative ways and on the mechanisms employed to mitigate reduced abilities. Ancient Egyptian society was therefore likely to adapt and be responsive to such individual and temporary fluctuations in ability.

Marked seasonality, and the complex social organisation surrounding it, have profound effects on work patterning. Across the agriculturally-based subsistence populations of the ancient Near East, seasonality impacts on labour requirements. Consequently, any short-term inability to work, or reduced ability to fully participate therein, needs to be recognised and appreciated by modern archaeologists in terms of its perception by the contemporary unaffected population, and any ensuing social modifications recognised. Ancient Egyptian society was heavily socially stratified, with a few individuals being part of the social elite and the majority being part of the lower social classes, including serfs, field labourers, domestic servants, cooks etc. (Grajetzki 2010; Kemp 2006). This highlights a clear issue with understanding ancient Egyptian disAbility as artistic and textual representations primarily exemplify the higher social ranks but bioarchaeological analysis normally encompasses those towards the bottom of the hierarchy. Such a contradiction is problematic but unsurprising given the requirement for large sample sizes in order for skeletal "difference" to be recognizable. Furthermore, the interaction of disability with social status in other groups has been previously noted (Knüsel 1999) and merits further research. It is imperative, therefore, to remember that not all within a community would be engaged in any specific activity, such as threshing, but rather that such physically demanding work requirements might be spread across the wider community in association with social hierarchy.

Disability in the ancient world must therefore be viewed using an emic, rather than etic, lens. As the perceptions of disability or disAbility will differ over time.

DisAbility is "culturally dependent... Peoples differ in their interpretation of disability and in their response to it" (Knüsel 1999:32). The timescales for the restriction or limitation are crucial in understanding the societal impact and in recognising the mitigating approaches used to compensate. The ancient Egyptians would have recognised the differences in bodies and how these bodily differences change both in the short-term, such as during pregnancy or as a result of traumatic injury, and through the life course. This continuum view of disAbility is crucial for understanding Egypt and Egyptian society's changing demands of its participants. Individuals were not classified as disabled or not disabled, but rather viewed as individuals with their own personal and individual range of abilities, special traits and/or gifts. Bioarchaeology must move beyond simply the identification of impairment to fully integrate the biosocial worlds of disAbility and identity. "Ethnographic evidence..., historical and iconographic data can... serve to flesh out the bones" (Roberts 2000:54). Bioarchaeology thus has the potential to enable a more nuanced insight into understanding of disAbility in Egypt through the synthesis of bodily remains, including skeletal and mummified remains, with paintings, representations and depictions, including statuary, from funerary and other contexts, and textual sources (primarily from medical and literary papyri). Egypt seems to have been accommodating of at least certain forms of physical 'difference,' such as dwarfism or clubfoot (Jeffreys & Tait 2000). Despite the rich and diverse range of source material for ancient Egypt, and the inclusion of magic within medical treatment (Veiga 2009), understanding and recognising mental impairment remains difficult to access. DisAbility needs to be viewed as one enmeshed and entangled aspect of identity, mediated by individual and social factors, such as (potentially archaeological visible) social hierarchy or stigma and (less archaeologically visible) pain thresholds and personality, but with potential for nuanced interpretation and recognition in Egyptian bioarchaeology.

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