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Cyclopes and giants: ancient mythological figures through an anatomical and palaeopathological lens

This paper examines the origin of the myths about giants and cyclopes from the palaeontological and palaeopathological perspectives, highlighting how much more attention should be devoted to the possibility that a pituitary condition may have indeed played a role in the mythopoietic process.

Myths about giants and cyclopes has always fascinated mankind. The search for an interpretative key to these figures has involved various fields of knowledge, including the natural sciences, biology and medicine. The quest for an answer or, at least, some theoretical model close to an answer – as demonstrated by previous research of this kind¹ – requires a careful evaluation of past sources of information,

¹ Galassi et al. (2017a,b); Papa et al. (2019).

recognising their potential but also their intrinsic limitations,² particularly when a scholar seeks not only to describe morphology of an ancient biological structure or medical condition, but also their exact origin or aetiology.³

In ancient literature – first and foremost of the *Odyssey* – the cyclopes, monocular monsters, are described as beings of a bigger size than other human beings, hence true giants. Therefore, it is legitimate to analyse the question from a ‘biological’ perspective, not only in terms of monocularity, but also of abnormal body size.

Contemporary medicine defines cyclopia as a rare congenital condition characterised by the presence of only one eye.⁴

Cyclopia is an aetiologically heterogeneous condition, which can result from chromosomal defects, genetic mutations or environmental teratogenic factors. This malformation is caused by the abnormal embryonic development of the eye and the failure of the embryonic prosencephalon to properly divide the orbits of the eye into two cavities during the first month of intrauterine life. Trisomy 13 is the most common chromosomal disorder associated with this condition. The trisomies 18 and 21 have also been described, as well as triploidy.⁵ Moreover, Sonic Hedgehog Gene Regulator (SHH) defects are likely to be involved in cyclopia as SHH drives the separation of the single eye field into two bilateral fields.⁶ This malformation sequence is remarkably common in utero (1 in 250 human fetuses). Therefore, the majority of these fetuses are either naturally aborted or are stillborn on delivery but 97% typically do not survive to birth.⁷

In most cases cyclopia occurs in the form of synophthalmia, i.e. a fusion of the two optic vesicles, while true cyclopia, characterised by only one eye, is particularly rare. The prevalence of the condition is estimated at around 1/13,000–20,000 newborns.⁸

Although the Cyclopean myth is usually associated with the Hellenic civilisation, it has much older origins.⁹ Monocular monsters are already described and depicted on Babylonian clay tablets, often in the act of being killed by the plague-bringing god Nergal.¹⁰ Thus, the birth of a monocular foetus was interpreted as a bad

² Mitchell (2017).

³ Galassi and Gelsi (2015).

⁴ Sedano and Gorlin (1963).

⁵ Orioli et al. (2011).

⁶ Roessler and Muenke (2010); Sharma et al. (2014).

⁷ Roessler et al. (2018).

⁸ Kalantzis et al. (2013); Syrrou et al. (2021).

⁹ Cohen (2010); Stahl and Tourame (2010).

¹⁰ George (2012).

omen, the harbinger of a coming a plague. This Mesopotamian Cyclopean evidence has led scholars such as Knox to write that the cyclops should be categorised as a Greek monster of oriental origin.¹¹

However, cyclopic foetuses typically do not survive birth. How, then, can mythological descriptions of cyclops of adult age and gigantic body size be reconciled with infants unable to survive to even slightly older ages?

A second explanation is offered by palæontological studies, in particular those of the Austrian scholar Othenio Abel (1875-1946). In his work *Die Tiere der Vorwelt* (Eng. *The Animals of the Prehistoric World*, 1914), Abel argues that the skulls of prehistoric dwarf elephants, about twice the size of a human skull and found in Cyprus, Malta, Crete and Sicily, may have been at the origin of the Cyclopean myth because of the very special nasal cavity located at the centre of the skull in the frontal norm, where, more or less, the orbital cavities are located in the human species.¹² According to Abel: *Seefahrer der homerischen oder vorhomerischen Zeit waren wohl die ersten, welche von diesen Giganten Kunde in ihre Heimat gebracht haben.* («Seafarers of the Homeric or pre-Homeric period were probably the first to bring news of these giants to their homeland»)¹³

This phenomenon, insular dwarfism, is of particular interest to biologists, who have long studied it and have recently demonstrated, by means of a combination of molecular, palæontological and chronological evidence, that the Sicilian elephant lineage to which an extinct example from the Grotta dei Puntali (Carini, Palermo) evolved from a larger sized mammals resulting in 20% loss of its original weight and a «height reduction between 0.15 and 41.49 mm per generation».¹⁴ However, it should be highlighted that the nasal cavity could have been interpreted as a large monocular cavity, the seat of the cyclops' only eye, although as is clear from the fossil remains and from the same image in Abel's publication, the shape, which is not at all round, is more like that of two intersecting ellipses. In any case, it is well understood that, rather than the morphology of the cavity, it is its particular topography that suggests the Cyclopean anatomical interpretation.

These skeletons were probably found by sailors arriving on islands such as Sicily in caves along the coast, where large quantities of osteological remains could be found. These findings were most likely interpreted as evidence of an ancient race of giants that lived in isolation and perhaps even practised cannibalism. The hypothesis is undoubtedly suggestive and still enjoys consensus among some scholars,

¹¹ Knox (1979).

¹² Abel (1914), p. 33.

¹³ Ibid.

¹⁴ Baleka et al. (2021).

although, as correctly observed by classicist Adrienne Mayor, part of the gravitas of Abel's position must be attributed to the fallacious mention made by him of an early elephant-cyclops skull connection by the Greek philosopher Empedocles (5th century BC).¹⁵

In addition to these phenomena of erroneous attribution of notions created by modernity to the ancients, such an interpretation can also be supported by a recent news event, which took place in Sicily, the land of the cyclopic giants mentioned by Homer, and which involved one of the authors of this communication. The discovery in 2015 on the coastline of Avola (Syracuse, south-eastern Sicily) of a molar of a dwarf elephant, which was initially interpreted by the locals as a human thorax, a misinterpretation that was only resolved through an anatomical and osteological evaluation.¹⁶ This event, although of a purely anecdotal value – yet rather remarkable given that it occurred to the present day – makes it easy to imagine how it could happen that in ancient times, not yet characterised by the development of biological and naturalistic sciences, faunal remains were confused with anthropological remains, and this may therefore have contributed to the complex mythopoeic process.

A final interpretation,¹⁷ which has emerged in more recent years, is purely medical, or rather endocrinological, and which attempts to explain the exuberant body size and monocularity of the cyclops in the light of conditions characterised by an excess of growth hormone (GH), known as gigantism and acromegaly. Gigantism is typical of youth and acromegaly of more mature ages. The main feature of gigantism is particularly tall stature, whereas acromegaly is characterised by growth of the extremities (hands and feet) and the splanchnocranium. The internal organs are, however, equally affected (visceromegaly). The term acromegaly was not coined until 1886 by a Frenchman, Pierre Marie (1835-1940),¹⁸ although the disease is a very ancient condition, dating back to between 11,500 and 9,500 BC (New Mexico)¹⁹ and also found in the Classical World, for instance in the Roman Emperor Maximinus Thrax.²⁰ Gigantism is also very ancient, with the first case described to date, that of the remains attributed to Pharaoh Sa-Nakht, dating back to about 2,700 years before Christ.²¹ Gigantism is typical of youth and acromegaly of more mature ages. The main feature of gigantism is particularly tall stature, whereas acromegaly is

¹⁵ Mayor (2011), pp. 67-70, pp. 122-124.

¹⁶ Varotto and Armocida (2018).

¹⁷ Martino and Macrì (2012).

¹⁸ de Herder (2009); de Herder (2016).

¹⁹ Brauer (1991).

²⁰ Armocida et al. (2020).

²¹ Galassi (2017b).

characterised by growth of the extremities (hands and feet) and the splanchnocranium. However, the internal organs are also affected (visceromegaly).²² Amongst the studies on gigantism, one cannot fail to mention those (albeit with controversial ethical connotations) by John Hunter (1728-1793) on the mortal remains of the giant Charles Byrne, followed in 1909 by the discovery, again on the same skeleton, of the cause of gigantism (and acromegaly), i.e. the growth of the hypersecreting growth hormone pituitary gland, by the American surgeon Harvey Cushing (1869-1939).²³

In the light of the clinical picture provided by this endocrinological condition, it is useful to return to the Homeric verses in which the Cyclops is described. First of all, it should be pointed out that it is never explicitly stated that Polyphemus had only one eye, but that this deduction follows from the mention that Odysseus and his companions only need one blow from a red-hot log to make the fierce giant blind. Other anatomical details are more important. For instance, of Polyphemus it is written that he had a deep voice (φθόγγον τε βαρὺν, Od. IX.257) and a thick neck (παχὸν ἀγχένα, Od. IX. 372). These features are often associated with acromegaly, a condition in which, due to the volumetric growth of the pituitary gland, there is a compression of the optic nerves where they cross (optic chiasma) around the sella turcica (where the pituitary gland rests). In this clinical eventuality, the compression leads to obliteration of the lateral visual fields, while the central one remains preserved.²⁴ From this point of view, Polyphemus's monocularity should be read not so much anatomically, i.e. expressed by the presence of only one eye, as physiopathologically, i.e. the Cyclops would have been endowed with central vision only.

In conclusion, the endocrinological interpretation, supported by paleopathological discoveries confirming the antiquity of this condition – as recently underlined in an academic debate on this very point –²⁵ presents elements of greater solidity than other biomedical interpretations seen above, although it is by no means legitimate to lean with complete certainty towards one of these options, ignoring the rich harvest of ethnic, social, religious and cultural elements that contributed to the genesis of the myth of the giants and the cyclopes.

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²² de Herder (2009); Melmed (2009).

²³ de Herder (2012).

²⁴ Varotto and Armocida (2018).

²⁵ Galassi et al. (2021).

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