CONGENITAL ANOMALIES OF ANIMALS IN WRITTEN AND PICTORIAL SOURCES

AZ ÁLLATOK VELESZÜLETETT RENDELLENESSÉGEI ÍROTT ÉS KÉPI FORRÁSOKBAN

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Abstract

Sources concerning various human congenital malformations are well known from early Antiquity to the Modern Times, but what about the animals? The first known source is the Šumma izbu, an ancient Mesopotamian compendium of around 2,000 teratological omens from 1300 BC. In these texts first descriptions of many disorders can be found such as different types of conjoined twinning or polydactyly. Some of these omens appear in the Roman Period by Julius Obsequens, Valerius Maximus and Tacitus. The thesis, that the Babylonian-Assyrian point of view spread through Asia Minor to the Greeks, and Romans originates from Morris Jastrow jr. (1914). The Latin term monstrum reflects the idea, that such phenomena sign some upcoming event to demonstrate the will of a deity. We have many more written and pictorial sources from the late Middle Ages from Ambroise Paré, Thomas Bartholinus and Ulisse Aldrovandi. The scarcity of comparable archaeological materials can be answered with four reasons:

1. Minor anomalies on the bones are hard to detect in the animal.

2. Many major abnormalities resulted in the animal's perinatal death. In this stage of development the bones are poorly mineralized, resulting a rapid dissolution.

3. Many inherited deformities affected the soft tissue, nearly always missing from archaeological materials.

4. Malformed stillborns were often fed to the dogs or thrown into rivers.

Kivonat

Az emberi torzszülöttekről számos forrás ismert az ókortól napjainkig, de vajon mi a helyzet az állatokkal? Az első ismert forrás a Šumma izbu, egy i.e. XIV. századi mezopotámiai jóslatgyűjtemény, amely nagyjából 2000 teratológiai óment tartalmaz. Ezek az eddig ismert első írásos emlékek olyan születési rendellenességekről, mint például a polydactylia, vagy a sziámi ikerség különböző formái. Ezek a jóslatok a római korban Julius Obsequens, Valerius Maximus és Tacitus munkáiban bukkannak fel újra. Morris Jastrow jr.-tól (1914) származik az az elmélet, miszerint a babilóniai-asszír szemlélet terjedt tovább kis-ázsiai és görög közvetítéssel Rómába is. A latin 'monstrum' terminus azt a hitet tükrözi, hogy egy ritka természeti jelenség olyan eljövendő eseményre utal, amelyben majd az isteni akarat megmutatkozik. A középkori babonák háttérbe szorulásával és a humanista orvostudomány fejlődésével többek között Thomas Bartholinus, Ulisses Aldrovandi vagy Ambroise Paré hatására egyre több olyan tudományos igényű mű született, amelyek képi ábrázolásokkal gazdagították az esetleírásokat. A forrásokkal összehasonlítható régészeti leletanyag hiánya négy pontban összegezhető:

1. A kisebb elváltozásokat nehéz azonosítani.

2. A nagyobb-fokú kóros elváltozások miatt a perinatális időszakban az állat elpusztul. Mivel ezen a fejlődési szinten a csontok mineralizációja még kezdeti stádiumban van, azok hamar feloldódnak a talajban.

3. Sok rendellenesség csak a lágyszöveteket érinti, ami szintén hamar elbomlik, így régészeti anyagban legtöbbször nem található meg.

4. A torz újszülötteket gyakran vetették állatok elé, vagy dobták őket folyóba.

KEYWORDS: TERATOLOGY, CONGENITAL MALFORMATIONS, CONJOINED-TWINS, BIRTH-OMENS

KULCSSZAVAK: TERATOLÓGIA, VELESZÜLETETT RENDELLENESSÉGEK, SZIÁMI IKREK, SZÜLETÉSI OMENEK

Introduction

The study of congenital anomalies and malformations is collectively called teratology. The term comes from the Greek word teras (τέρας), meaning 'omen, divine sign', and logos (λόγος), meaning 'the study of'. During Antiquity and the Middle Ages it was more about a discourse on monsters and prodigies, anything that was different from the normal. The name of the study reflects the concept of the times, when inexplicable phenomena of nature, birth of a 'monstrous' human or animal,

were read as divine signs (Jastrow 1914, 60; Berndorfer 1960, 104; Pataricza 2011, 21). Pioneers of early Modern Age teratology are, among others Ambroise Paré, Conrad Lycosthenes, and Ulisse Aldrovandi who already used their own scientific results in embryology and anatomy, and criticized previous myths and legends (Berndorfer 1960, 111). Modern teratology founded by Johann Friedrich Meckel, the younger and Geoffroy St. Hilaire in the 19th century is more complex. It uses the results of embryology, obstetrics, clinical genetics and comparative anatomy in deciphering congenital anomalies (Berndorfer 1960, 103). There are three main factors which lead to such malformations: teratogens (environmental impacts), chromose deformations and genetical disorders (Czeizel 1986, 9; Pataricza 2011, 19). Because the complex interrelationships between these factors, there are still many unanswered questions concerning the causes of resulting diseases.

Extraordinary and unexplainable things have always been in the center of attention, therefore there are always more sources treating the unusual than the normal. I cannot undertake the task to present all the collected material in this short paper, but will try to give a comprehensive view of different sources through demonstrating a few examples, especially from pictorial sources.

The beginning

The first known source concerning congenital anomalies is the Šumma izbu, which is an ancient Mesopotamian compendium of around 2,000 teratological omens from 1300 BC. It offers an insight on the highest levels of medical science practiced by Assyrian scholars (Esztári 2012, 1).

The birth omens are interpretations of any birth defects in animals or humans as a divine sign. They are the first descriptions of many malformations and birth defects such as intersex (Jastrow 1914, 11), different forms of conjoined twining (Jastrow 1914, 14-17), polycephaly (Jastrow 1914, 23) or polydactyly (Jastrow 1914, 23). The cases are noted primarily on sheep, which shows, that sheep played the most important role in food production, but are also clearly applicable to other domesticates (Jastrow 1914, 18). There are several unrealistic statements in the text such as: „If an ewe give birth to ten…" (Jastrow 1914, 18). This is the last omen of a series about an ewe giving birth from one to ten lambs. As a matter of fact, this is hardly imaginable in the case of sheep, but it is common with dog or cat. This makes the idea somewhat more realistic. Another major group of the omens deals with cases of animals or women giving birth to neonates from another species (Jastrow 1914, 23-28).

"If an ewe gives birth to a lion, the abandoned weapons will make an attack (again), the king will be without a rival." (Jastrow 1914, 23).

Morris Jastrow jr., the first collector of these sources presumes, that behind these sentences there is the resemblance of features between animal species instead of the belief in the real opportunity of such an event (Jastrow 1914, 23-26). He mentions, that in many cases the direct equation is lifted by the preposition 'like' (Jastrow1914, 26). There is no doubt assumed to interprete the omens do not containing 'like', a comparison as well, and not like an extreme belief in cross-breeding. Some scholars raise doubts regarding the degree to which Mesopotamian medical texts were rooted in empirical experience (Fröhlich & Bácskai 2010, 9).

Some of these omens also appear during the Roman Period by Julius Obsequens, Valerius Maximus and Tacitus. The thesis that the Babylonian-Assyrian point of view spread through Asia Minor to the Greeks and Romans also originates from Jastrow (Jastrow 1914, 64, 79). The term monstrum, comes from the Latin verb monstrare 'pointing', reflecting the idea, that such phenomena signify some upcoming event and demonstrate the will of a deity (Jastrow 1914, 60; Pataricza 2011, 21). These 'signs' became divine warnings or punishments for sins in Christian philosophy (Jastrow 1914, 73, 79; Berndorfer 1960, 108, 110; Pataricza 2011, 21). During the Middle Ages the search for causes was overshadowed by narrow-minded Christian theology and the rise of demonology (Tóth G. 2009, 7, 9-10).

The imagery of human congenital malformations is well known from early Antiquity to Modern Times (Józsa 2006a, 2006b, 2007, 2008, 2011, 2012). In the following part of this paper I will attempt to demonstrate animal congenital disorders in pictorial sources, and compare them with modern clinical cases.

Conjoined twins

Conjoined twins are well-known among humans, in domesticated animals and even in wild species (Kompanje 2005a; Kompanje & Hermans 2008). There are different types of conjoined twins according to one of the eight possible points at which their bodies are conjoined (Kompanje & Hermans 2008, 177).

In horse breeding even twins are considered pathological, thus undesirable and in cattle the likelihood of giving life more than one calf, is between 1-4% (Zöldág et al. 2012, 74-75). The twin pigs shown in **Fig. 1.** belong to the syncephalus thoracopagus type: they have one head with a single face but four ears, and two bodies. This type is also mentioned in the Šumma izbu (Jastrow 1914, 13).

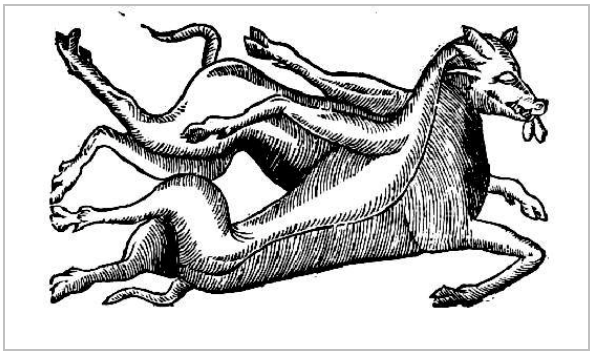

Fig. 1.: *Syncephalus thoracopagus* type conjoined pigs (Paré 1652, 653)

1. ábra: *Syncephalus thoracopagus* típusú összenőtt sertésikrek (Paré 1652, 653)

There are numerous engravings by Aldrovandi, illustrating such animals in older age (Aldrovandi 1642, 616-617., 620., 625-626), which may result from using an older source, or rooted in a rumour, but the picture of the stillborn conjoined cats on **Fig. 2.** is clearly based on personal observation by the author.

A special form of conjoining when the bodies are united laterally is called parapagus. This condition has two forms: 1. parapagus dicephalus - one shared body and two heads (also known as polycephaly); 2. parapagus diprosopus: one shared body and two faces on the head (Kompanje & Hermans 2008, 177). The first known appearence of this formation is a 120 million-years-old embryonic or neonate reptile fossil from northeastern China (Buffetaut et al. 2007). In some fortunate cases the animal also have the chance to survive and live with this kind of conjoining (Caulfield 2011). Parapagus dicephalus is well documented by Aldrovandi in domesticated animals (**Fig. 3.**) and also in fish, bird and reptile species (Aldrovandi 1642, 416-430). The malformation is also well known and documented in recent times in both wild (Gould & Pyne n. d., 157; Dabin et al. 2004; Kompanje 2005b) and domestic animals (Hámori 1974, 345). An intresting aspect of symbolism of the two-headed animals is that in Šumma izbu the two heads mean some kind of a division, and are thus always recorded as a bad sign (Jastrow 1914, 14-15), while in Antiquity and in the Middle Ages the double-headed eagle became the symbol of unity in the iconography of many noble and royal families in Europe and Asia (Hohenlohe-Waldenburg 1871, 17).

Dysmelia

Dysmelia is a collective name for various congenital diseases of the locomotor system. It can be caused by abnormal genes, inbreeding, external causes during pregnancy, infections and many other effects (Hámori 1974, 62-66).

Fig. 2.: Stillborn conjoined cats (Aldrovandi 1642, 621)

2. ábra: Halva született sziámi-iker macskák (Aldrovandi 1642, 621)

In the case of polymelia the individual has one or more supernumerary limbs (Moura & Pimpão 2012, 84). Jastrow (1914, 23) mentions omens, which possess supernummerary limbs and joints, but unfortunately he didn't publish the relevant omen. Julius Obsequens writes about a foal, born in 137 BC with five legs (Obsequens 24). This anomaly is richly documented by Aldrovandi (1642, 537, 539-569), but we also have modern examples in wild as well as domestic animals (Hámori 1974, 464; Denholm et al. 2011; Moura & Pimpão 2012, 73). In some of the illustrations there is no doubt, that the malformations represented are rather parasitic conjoined twins (Kompanje 2005a), which could be easily identified as polymelia (Aldrovandi 1642, 544-548).

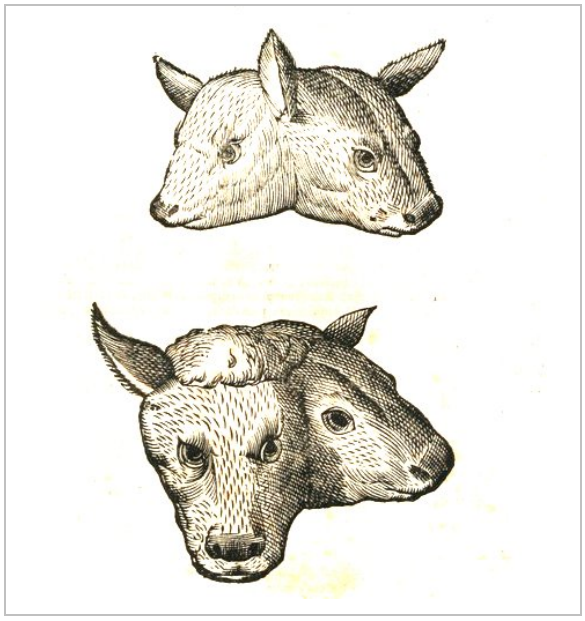

Fig. 3.: *Parapagus dicephalus* calves (Aldrovandi 1642, 423)

3. ábra: *Parapagus dicephalus* típusú ikerborjak (Aldrovandi 1642, 423)

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Fig. 4.: Dog with amelia (Aldrovandi 1642, 428)

4. ábra: Kutya veleszületett végtaghiánnyal (*amelia*) (Aldrovandi 1642, 428)

Apodia is a collective term describing disorders when the individual has completely or partly missing legs, such as arthrogryposis, phocomelia or amelia. It is result of the limb formation process being disrupted very early in its development. It could also be also caused by grave malnutrition, toxicity or radioactivity (Hámori 1974, 464). Amelia is a homogene hereditary anomaly, in which the forelimbs are completly missing. It has been described in recent cattle, pigs, goats, dogs and cats (Hámori 1974, 465; Zöldág 2003, 175). Aldrovandi (1642, 527-528, 526) reported three cases of amelia: two in dogs (one shown in **Fig. 4.**) and one in the case of a calf.

Polydactyly (having supernumerary digits) is a minor hereditary anomaly, well known both in human and veterinary medicine (Józsa 2006c, 58). It is usually associated with other genetic mutations such as syndactyly (the fusion between digits; Hámori 1974, 464), but it has only little of no effects on the animal's quality of life (Moura & Pimpão 2012, 76). Even so there is only one secondary reference to polydactyly by Aldrovandi (1642, 539) taken from the Historiae monstris of Honorius Beatus without any further usable information (**Fig. 5.**). Baker & Brothwell (1980, 41) mention without refenrence, that the Incas bred camelids with polydactyly. This minor anomaly is known even in wild guanaco populations (Zapata et al. 2008).

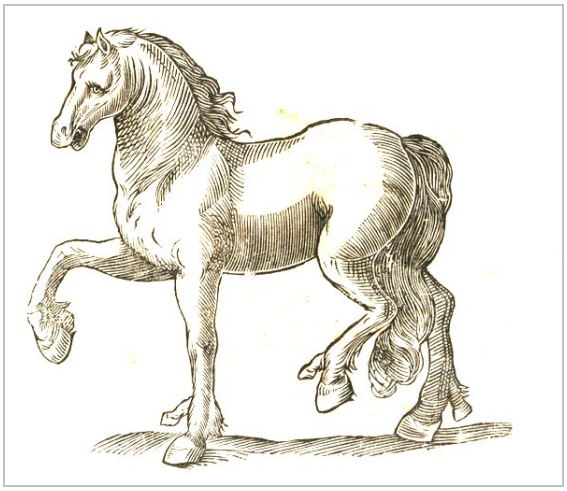

Fig. 5.: A horse with polydactyly (Aldrovandi 1642, 438)

5. ábra: Ló polydactyliával (Aldrovandi 1642, 438)

Missing material

The imagery of human dieseases is more common, but there can be different reasons: why? Thanks to the human medicine we have always had better chances to survive with a non- lethal malformation or defect than an animal. For example, dwarfs have been in the centre of attention since the dawn of civilisation (Józsa 2011, 21), and many were denoted for their outstanding intelligence (Józsa 2006c, 57). This also applied to conjoined twins. Unfortunately I have found only a few hungarian reports of such anomalies, but none of these deals with animals, but humans.

Baker & Brothwell (1980, 33) explained the lack of comparable archaeozoological material with three simple reasons. These factors are common both in human and animal paleopathology:

1. The discovery of minor bone anomalies requires a very detailed knowledge of anatomy and solid research. However, they are still hard detect not only during analysis, but already when collecting bones in the field (Józsa 2006, 55).
2. Many abnormalities result in the animal's death already within the perinatal period. At this early stage of development the poorly mineralized young bone is prone to taphonomic loss, such as scavenging or rapid dissolution (Józsa 2006, 55).
3. Genetic deformities often affected the soft tissue, which is nearly always missing from the archaeological material.

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There is another aspect, that Baker & Brothwell (1980) included in the second group: stillborns are also often fed to the dogs or thrown into rivers (Jastrow 1914, 72; Baker & Brothwell 1980, 33). In my opinion this is a fourth reason worth distinguishing, because it is related to the contemporaneous cultural context rather than to natural (physiological or environmental) factors.

Conclusions

Currently, archaeozoological evidence for such disorders is limited to the rare evidence of non-lethal malformations such as syndactily in the form of fused distal phalanges of an undated pig reported from Osborne House (Romsey, England; Siegel 1976, 369, Fig. 8/c). Late Bronze Age cattle metatarsi from Dun Aonghasa (County Galway, Ireland) showed signs of polydactily in the form of minor outgrowths on the side. These two distal fragments probably originated from the same adult individual (Murphy 2005, 11, Fig 4). In sheep and goat archaeological finds of multiple horns (polyceratia) are not considered pathological and have in fact been embraced by breeders in various periods (Putelat 2005). They include a three-horned bock, a childhood pet of the Grand Duke of Saxony in the 1820's (Wussow 1997, 84, Abb. 3).

It is clear, that there is a need for a more expansive and systematic collection of the written and pictorial sources as well as careful observation recording of rare archaeozoological finds to answer all questions relevant to the topic and develop a better understandig of animal breeding in the past and the historical perception of congenital disorders.

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