

Neonatal medicine in ancient art

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There are a limited number of artistic objects from ancient times with particular importance in neonatal medicine. The best examples are figurines from ancient Egypt of Isis nursing Horus, showing the importance of breastfeeding. The earliest images of the human fetus were made by the Olmecs in Mexico around 1200- 400 BCE. One of the earliest representations of congenital anomalies is a figurine of diencephalic twins thought to be the goddess of Anatolia, dated to around 6500 BCE. In addition to these figurines, three sets of twins in the ancient world have medical importance, and Renaissance artists often used them as a subject for their paintings: “direct suckling animals” (Romulus and Remus), “heteropaternal superfecundation” (mother: Leda, fathers: Zeus, the king of the Olympian gods, and Leda’s husband, Tyndareus), and “twin-to-twin transfusion” in monozygotic twins (Jacob and Esau).

Key words: neonatal medicine, ancient art, history of medicine.

As in all areas of daily life, the gods of Egypt were also connected to the birth process. The god Thoth was often called upon for help. Severe labor pains might be soothed by the god Amun, gently blowing in as a cool northern breeze. Khnum was the creator of human's bodies on his potter's wheel, and breathed the life force into the child and gave health to the newborn after birth. The chthonic frog goddess Heqet was also associated with fertility and giving birth. A guardian of women and children, the mother goddess Het-Hert (Hathor), often depicted as either a cow or a woman with the head of a cow, was believed to be present at every birth.

During delivery, women would place two small statues for the gods Bes and Taweret. Dwarf-god Bes was the protector of women and children. He is often seen holding a knife in his raised hand, prepared to scare off evil with his ugly looks. But the chief deity of women in pregnancy, childbirth, and breastfeeding was Taweret. She in the figure of a pregnant hippopotamus, with a tail of a crocodile and arms and legs of a lion, and carries a magic knife or the knot of Isis to ward off evil. Meskhenet is a personification of the so-called birthing bricks upon which women squatted during childbirth. The goddess Meshkenet,

who created the soul (ka) of the baby while it was still in the uterus, helps to protect the delivery, and further predicts the future of the infant.

Despite this divine intervention, birth itself was dangerous both to the mother and baby. Even if safely delivered, the newborn Egyptian's future was far from secure. Infant mortality was high, probably around 30 percent. Natural selection played its part by eliminating the weak and sickly or those with congenital defects and deformities in the first days of life. Many succumbed to disease, especially to infections that were so prevalent where hygiene was poor.

Depictions dealing with the actual practicalities of giving birth are very rare. There are some reliefs in the “mammisi” (birth-house) of Ptolemaic temples showing the birth of a divine child. These depictions are of course rich in symbolic and ritual content but say nothing about the practical conventions employed. Women delivered their babies kneeling, or sitting on their heels (Fig. 1), or on a delivery seat. In the Sobek temple at Kom Ombo, there is a depiction of pregnant woman sitting on a birthing chair. The birthing chair dates back to the Babylonian culture, 2000 BC, and the



Fig. 1. Cleopatra VII Philopator (69–30 BC), known in short as “Cleopatra” (Greek for “father’s glory”), gives birth in a ceremonial picture of ancient Egypt based on a bas-relief from the Temple of Esneh, a town on the Nile in Upper Egypt.

practice then spread to many parts of the world. In some areas, various traditional birthing chairs are still used. The horizontal birthing position, which has been the subject of a great deal of controversy, has been widely used in Western cultures only for the last 200 years. Prior to this time, the recorded history of birthing indicates that upright birth postures were used extensively¹.

Breast-feeding

The most essential need for the child’s early development was of course nutrition, and the only way to ensure this in those days was breast-feeding (Fig. 2). Babies were usually nursed for three years in ancient Egypt. Rich

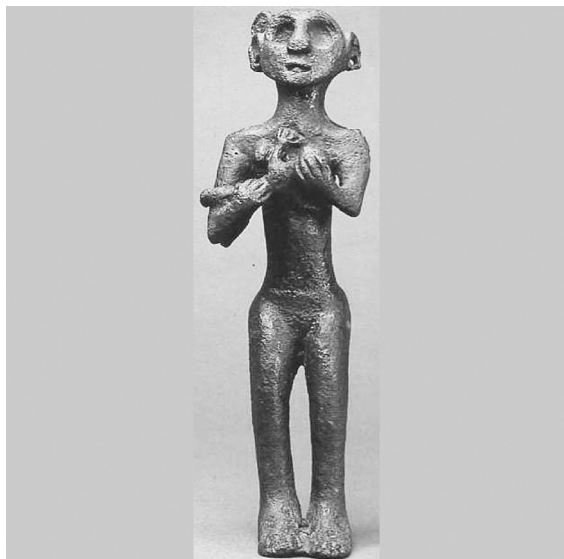


Fig. 2. “Mother Breastfeeding a Child”, bronze figurine, found in Early Bronze Age cemetery in Horoztepe, near Tokat in Central Anatolia, c. 2400–2200 BC, Museum of Anatolian Civilizations.

families often hired a wet nurse, who became an important part of the family.

The popular figurines of Isis giving suck to her son Horus's (Fig. 3) were sometimes featured in household altars, or were worn in miniature by women as amulets. In the traditional form, Isis sits on a plain throne with her left hand on the infant Horus’s back for support, proffering her left breast to the child. Horus is not usually placed on or at Isis’s nipple or breast but is generally a little distant, offering the viewer the focus on Isis’s breast more than on Horus nursing at the breast. In many of the images of Isis and Horus found in the official tombs and monuments dedicated to the deceased pharaoh, Horus symbolically represents the dead pharaoh himself, who nurses at the breast of Isis in order to gain the afterlife.

The portrayal of Isis in the Egyptian style changed drastically as the Greek Ptolemaic Empire (323-30 BCE) adopted and exported the Isis cult to the Mediterranean world. Isis became rounder, more in keeping with the classical renderings of the Greeks and Romans. Her hairstyle became northern Mediterranean, as did her throne, her clothing, and her child, so much so that the Europeanized Isis becomes



Fig. 3. Isis nursing Horus.

only a distant replica of her Egyptian ancestor. In one such mural painting from the third century, Isis is indistinguishable from a Greek matron of the time, identifiable only by the gesture of the child that she holds, i.e., the traditional index finger to the mouth or cheek that identifies Horus (Harpocrates in Greek) (Fig. 4). With the advent of Christianity, many of the chapels of Isis were converted to churches, and images of her with the infant Horus became the Virgin Mary holding Jesus. Greek and Roman statues of Isis and Horus have even been known to have been worshipped as images of the Virgin Mary and her child Jesus up through the 15th century of the Common Era.

Early neonatologists

In ancient Rome, the process of labor and delivery occurred in the home of the pregnant woman. Females were regarded as more appropriate to treat women, while male physicians were available for treatment of a complicated labor or diseases common to women. In any case, childbirth was associated with a high risk to both the fetus and mother, with substantial infant and maternal mortality.

When Hippocratic physicians entered Rome from the first century BC, the new medical knowledge was welcomed and adapted to local culture. The most eminent ancient authority on childbirth and gynecology was Soranus. He was born in Ephesus on the Aegean coast of Anatolia, and trained in the famous medical



Fig. 4. Isis (Aset) nursing Harpocrates (Heru-pakhered); wall painting, 4th century, from Karanis (or “the Lord’s Town”), one of the largest Greco-Roman cities in the Fayoum, some 50 miles southeast of Cairo.

school of Alexandria and practised in Rome during the reigns of Trajan (98-117 AD) and Hadrian (117-138 AD). He is the best-known adherent of the Methodist School of Physicians, which relied on the Hippocratic doctrine. Over twenty works have been ascribed to him. His most important work was *Gynaecology*, which is the most complete account of gynecology, midwifery, and neonatology in classical times. It was translated into Latin, Arabic, German and English, and survived as a textbook until the 16th century in Europe^{2, 3}.

Cesarean birth

Contrary to popular mythology, cesarean section was seldom performed. It was once thought that the name came from Julius Caesar, who was supposedly delivered in this manner in 102 BC. However, this idea is not generally believed, because his mother Aurelia was still alive when he invaded Britain, and the understanding of human anatomy and physiology was so crude at the time that it is inconceivable that any anyone could have recovered from such a major operation.

The origin of the name is obscure, but may derive from Roman law called Lex Regia from 715 BC (also called Lex Caesare or Cesarean Law), which states that if a woman with an advanced pregnancy died, the infant should be delivered soon after her death, i.e. the body could not be buried until the child had been removed (Fig. 5). The Christian church favored the operation, being concerned with the saving of souls and lives. If the baby was alive, this operation would produce a living child able to be baptized. The term originates from the Latin “caesum” meaning having been cut and the term “caesomes”, referring to the infants born by post-mortem operation. It could not be performed in a living woman until the tenth month of gestation, as the mother would not survive the operation, and consequently it was rarely undertaken⁴.

Cesarean birth was believed to be a supernatural phenomenon, and it necessitated the gods performing the operation. According to the myths, Aesculapius and Bacchus were delivered by cesarean operation by gods. Aesculapius was the son of Apollo and his mortal mistress Coronis. Apollo killed Coronis in a fit of

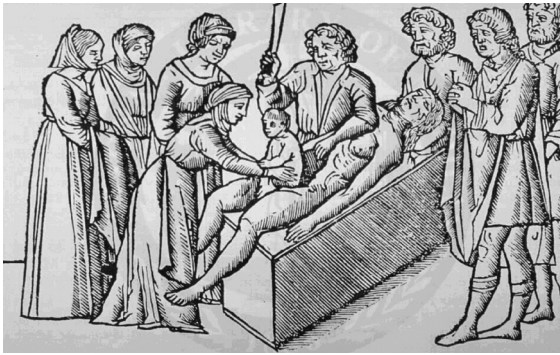


Fig. 5. A cesarean section being performed on a dead woman; to the left stand three men, to the right stand three women; a surgeon stands next to the body holding a razor, and a midwife extracts the baby. Wooden carving from 1506 edition of Suetonius's *Lives of the Twelve Caesars*.

jealous rage after her infidelity. As her body was placed on the funeral pyre, he discovered that she was pregnant. He delivered their unborn child, Aesculapius, from her womb by cesarean operation (Fig. 6) and gave him to Chiron, the centaur, to raise and to train in the art of healing.

Bacchus was the son of Semele, a mortal woman, and Zeus, the king of the gods. Zeus's wife, Hera, discovered the affair while Semele was pregnant, and she befriended Semele. On the advice of Hera, Semele demanded that Zeus reveal himself in all his glory as a proof of his godhood. He came to her wreathed in bolts of lightning; however, mortals cannot look upon a god without dying, and she perished in the ensuing blaze. Zeus rescued the fetal Dionysus (by cesarean operation), by sewing him into his thigh (referred to as his testicles) from where he was born, a few months later. Therefore, Dionysus was borne by two mothers (Semele and Zeus) associated with "twice-born".

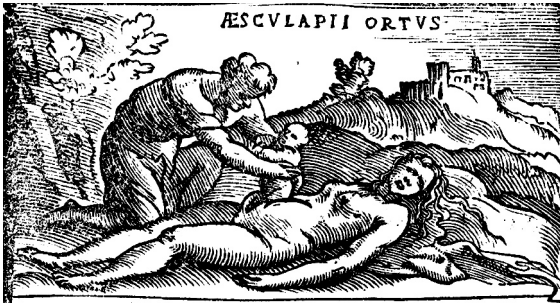


Fig. 6. The extraction of Asclepius from the abdomen of his mother Coronis by his father Apollo. Wooden carving from the 1549 edition of Alessandro Benedetti's *De Re Medica*.

Fetus

To date, the earliest known drawing of an accurately defined human fetus was the celebrated depiction by Leonardo da Vinci, probably dating to the early 16th century, and the earliest known sculpture of the developing human was an 18th century piece intended for medical instruction. Position of the fetus is also illustrated in the Muscio manuscript (Fig. 7). Muscio (Mustio), who borrowed the text heavily from the Greek physician Soranus, is the supposed author of the *Gynaecia*, a treatise of gynecology dating to c. 500 AD.

The earliest images of the human fetus were made by the Olmecs, who were an ancient Pre-Columbian people living in the tropical lowlands of south-central Mexico, who flourished during the Formative (or Preclassic) era, dating from 1200 BCE to about 400 BCE. The Olmec sculptures of fetuses are extremely naturalistic. For example, on the sculpture below, note the careful attention to the swelling and folds around the eyes, the chin, the bony protrusion of the clavicle, the subtle shapes of muscles in the upper arms and legs, and the rendering of cuticles and fingernails. In contrast, most adult stone figurines exhibited stylized shapes for the limbs, little attention to definition of bony or muscular protrusions, and an idealized face. In addition to their



Fig. 7. "Position of the fetus" from Muscio Manuscript, c. 500 AD.

naturalistic features and proportions, several of the figures possessed specific details of anatomy (e.g. visible subcutaneous vessels) found in fetuses. In terms of specific abnormalities portrayed in the fetus sculptures, agnathia or micronathia (underdeveloped/absent chin) was the most obvious (Fig. 8).

Why the Olmecs used a greater degree of naturalism in their portrayal of fetuses than when depicting adults is unknown, and questions remain as to what the Olmecs intended to symbolize with the fetus sculptures. Because of the presence of deformed/malformed fetuses, these figurines would not be used as amulets for a successful birth⁵.

Congenital anomalies

One of the earliest representations of an individual with congenital anomalies ever found is a white marble figurine of diencephalic (omphalopagus) twins thought to be the goddess of Anatolia (Fig. 9). This statue was found in 1962 by archaeologists in Catalhöyük in southern Turkey and was dated to around 6500 BCE.

A rock etching of dicephalic twins was also found outside of Sydney, Australia, dating to 4000-5000 BC. The drawing is of a double-headed figure with six fingers on one hand and four on the other. Similar clay figurine was found in tombs of a high valley of Mexico, dated to about 900 BC, having three eyes,

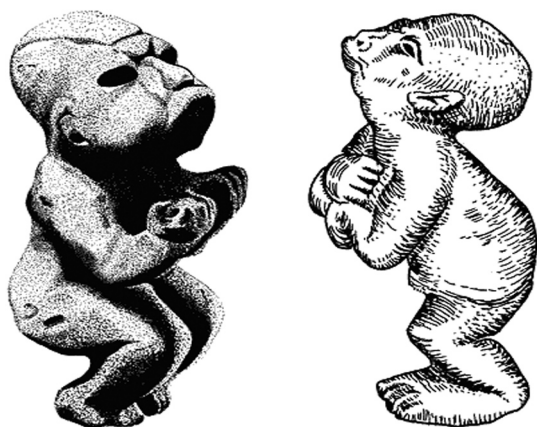


Fig. 8. Left: Fetus effigy with head tilted back and raised arms, of unknown provenance, stone, Amparo Museum, Puebla (Drawing G. Bendersky). Right: "Agnathic fetus" effigy from Guerrero, stone, National Museum of Anthropology, Mexico (Drawing: C. Tate) (Ref. 5).

two noses, two mouths, and two auricles (Fig. 10). Another early example is a stone carving of pygopagus twins (joined together at the buttocks) dated to 80 BC discovered in Fiesole and housed in the San Marco Museum in Florence, Italy.

The oldest written records of malformations were found on clay tablets on the bank of the Tigris river. The Tablet of Nineveh, written by the Chaledans, is approximately 4000 years old. It contains a list of 62 malformations, including the interpretation of the birth defects. These malformations were used to predict the future of several events, such as the future of the king, the weather, and the year's harvest.

Malformed children were used as communications from the gods, giving warning to those on earth. These babies were believed to be the result of demonic activity, a punishment from the gods, or even the result of the stars and moon. The word "monster" historically refers to a malformed infant, yet it is most likely derived from *monstrare* (to show) or *monere* (to warn).

As stories were passed from generation to generation, they were greatly exaggerated, eventually forming myths and (possibly) the gods of ancient times. For instance, the Egyptian gods Ptah and Bes were achondroplastic dwarfs⁶.

In Sparta, under the laws of Lycurgas, infants with visible physical anomalies shared the same fate as weak infants who were allowed to perish from exposure or were thrown into



Fig. 9. "Double Goddess", marble, height 17.2 cm, width 9.7 cm, found in a Neolithic period shrine, Catalhöyük near Konya in Central Anatolia, dating from first half of the 6th millennium BC, Museum of Anatolian Civilizations.



Fig. 10. Diprosopus (two-faced), Tlatilco, Mexico, c. 900 BC.

the Eurotas River. In ancient Rome, although a midwife may have examined a child and decided if it was worth rearing, the ultimate decision about exposure (adoption or slavery) or infanticide rested with the paterfamilias, the male head of the household⁷.

During the medieval period in Europe, deformed infants or children were viewed as products of the devil, or as an indication of God's wrath, which then justified the destruction of the infants. Children born with malformations such as phocomelia, syndactyly, ichthyosis, club foot, etc. were believed to be offspring of the devil. These children and/or mothers were often put to death shortly after the child was born.

Weak and small newly born infants were not wanted. In the Middle Ages, a test of viability was to demonstrate the newborn's ability to cry loudly enough that it could be heard in the four corners of a room. This was handed down in the illuminated manuscript of the "Sachsenspiegel," an illustrated book of law of Saxonia, in which, it reads, "Born alive is any child, if one can hear its voice at the four walls of the house." The half figures in the corners (Fig. 11) represent the statement that "one can hear its voice at the four walls of the house." The mother emphasizes this

by pointing with her index finger. This is also one early depiction of the ability to hear by holding the ear forward with the index finger in the direction of the sound. At one time, a common method of disposing unwanted and handicapped children was by drowning.

With the development of Christianity in Europe, the status of the handicapped infant and child began to improve and, on occasion, they were given homes in the monasteries. In this era, a protective attitude was more characteristic of Eastern than of Western religions. Confucius and Zoroaster instructed their followers to care for these infants and to treat them kindly.

In Islamic countries, surgical techniques were developed for the treatment of a small number of congenital abnormalities. Serefeddin Sabuncuoglu (1385–1470), a Turkish physician described the surgical treatment of anal atresia (Fig. 12) and imperforated hymen in his illustrated medical book titled *Cerrahiyetü'l Haniyye* (Imperial Surgery), which was presented to Sultan Mehmet II (the Conqueror). As the paintings depicting humans were severely banned beginning in the early periods of Islam, providing even such incomplete and imperfect illustrations was quite an encouraging initiative.

Twins

Three sets of twins in the ancient world have medical importance. The first is of "*direct suckling animals*". Romulus and Remus's grandfather Numitor and his brother Amulius received the throne of Alba Longa upon their father's death. Numitor received the sovereign



Fig. 11. Hearing the voice of a newly born infant at the four corners of the house, Sachsenspiegel, c.1330.

powers as his birthright while Amulius received the royal treasury. Because Amulius held the treasury, thus having more power than his brother, he dethroned Numitor as the rightful king. Out of fear that Numitor's daughter, Rhea Silvia, would produce children that would one day overthrow him as king, he forced Rhea to become a Vestal Virgin. According to the myth, Mars, the god of war, saw Rhea Silvia one day and fell in love with her. Some time later she gave birth to twin boys, later named Romulus and Remus. Amulius was enraged and ordered Rhea thrown in the Tiber with the twins. The servant ordered to kill the twins could not, however, and placed the two in a cradle which he left on the banks of the Tiber river. Romulus and Remus were kept safe by the river deity Tiberinus. He then brought the infant twins up onto the Palatine Hill, where they were nursed by a she-wolf.

Direct suckling from animals is well documented throughout recorded history as in the story of Romulus and Remus. In Greek mythology, Zeus was reported to have been suckled by the goat Amalthea. In legend, heroic infants are often suckled by animal nurses, for example, Midas by ants, Cyrus by a bitch, and Croesus, Xerxes and Lysimachus by mares. In ancient Egypt, the mother goddess Hathor (literally means "House of Horus") is often shown suckling the pharaoh when he was a child (thus also her associations with motherhood). In this way, Hathor even shares common elements with the Virgin Mary (and depictions of her suckling the baby Jesus).

The second twin story is of "superfecundation". Zeus, the king of the Olympian gods, spotted the beautiful Leda romping in the Peloponnesian woods. He changed himself into a swan, swept

up on the unsuspecting Leda and had sexual relations with her. Later that night, Leda's husband, Tyndareus, came home from a long journey, and having missed his beautiful wife, also had relations with her. This is a famous image in the classical world and a host of Renaissance artists have used it as the subject of their paintings. These two unions on the same evening produced two sets of twins - twin daughters, Helen (who caused the Trojan war) and Clytemnestra, and twin sons, Castor and Polydeuces. According to the sources, Helen and Castor were the offspring of Zeus, and Clytemnestra and Polydeuces were the offspring of Tyndareus.

Superfecundation occurs when two eggs (ova) from the same cycle are fertilized by sperm in separate acts of sexual intercourse. It is estimated that at least one in twelve dizygotic twin pregnancies is preceded by superfecundation. Presumably this parameter varies from population to population, e.g. with coital rates and rates of double ovulation. When the sperm is from two different men, the appropriate term is heteropaternal superfecundation, and describes twins who have the same mother, but two different fathers. The frequency with which this occurs must depend on rates of infidelity (promiscuity). It is suggested that among dizygotic twins born to married Caucasian women in the United States, about one pair in 400 is bipaternal. The incidence may be substantially higher in small selected groups of dizygotic twin pregnancies, e.g. those of women engaged in prostitution⁸.

The third set of twins from ancient times with medical importance is Jacob and Esau. Polycythemia as a result of "twin-to-twin transfusion" in monozygotic twins has only been recognized as a clinical entity in the last few decades. The first recorded case of polycythemia in the newborn due to twin-to-twin transfusion, however, was reported in the Bible (Genesis 25: 24-26): "And when her (Rebekah) days to be delivered were fulfilled, behold, there were twins in her womb. And the first came forth *ruddy*, all over like a hairy mantle; and they called his name Esau... (Fig. 13). A *ruddy* newborn twin is a clear description of polycythemia in the newborn presumably



Fig. 12. Surgical treatment of anal atresia from *Cerrahiyetü'l Haniyye (Imperial Surgery)*, Serefeddin Sabuncuoglu (1385-1470).

due to twin-to-twin transfusion. Despite the contrasting differences between Esau and Jacob, they were identical twins with complete exterior similarity. Twin-to-twin transfusion occurs in 15% of identical twins (9,10).

One may further speculate that because of the marked intellectual and emotional differences between Esau and Jacob, Esau's intellectual restrictions might well have been evidence of brain damage due to cerebral sludging as a result of polycythemia or kernicterus due to uncorrected hyperbilirubinemia pursuant to polycythemia. As is known, Esau forfeited his birthright to Jacob for a bowl of stew. Esau later regretted his decision and became very angry, leaving his family and ultimately fostering another great nation. Jacob, however, remained at home and was the ancestor of Jesus Christ, who changed the entire history of the world, some 2000 years later.

Circumcision

Ritual circumcision, according to the Old Testament, was first ordered by God through Abraham as the seal of a divine covenant (Genesis 17: 9-27). Reference to the operation appears again later, when Moses's wife Zipporah performed it on her son (Exodus 4: 25). The circumcision of the infant Christ, according to St. Luke, took place on the eighth day (Luke-2: 21-39). There are many pictures showing the circumcision of the infant Jesus, as it was a favorite topic both with the early

painters and some later ones. Every type of an operation has been depicted by one artist or another, and there are a great variety of poses and of assistance. The mohel the Jewish ritual circumciser, is always represented with a long flowing beard, a great handicap for a surgeon of any kind. The most interesting thing seen in these drawings is the absence of any evidence of surgical instruments or the holding a very large knife by the mohel. One can thus speculate that these artists had never witnessed a circumcision first-hand and relied entirely on their imaginations.

Since Jewish males were traditionally circumcised on the eighth day after birth, Moses should already have been circumcised since he was three months old when found by the Pharaoh's daughter. At his birth, the Hebrews, descendants of Abraham and Jacob (Israel), were slaves to the Pharaoh, who ordered newborn males killed. Moses's mother hid him in a papyrus basket among the Nile's reeds; the Pharaoh's daughter found him, took pity and adopted him, and called him Moses, saying "because I took him out of the water" (Exodus 2:1-10).

Nearly all famous masters of art used the infant Moses as a subject of their paintings. However, Hebrews likely borrowed this myth from the Sumerians. On a clay tablet a thousand years older, dated ca 2300 BC, there is an identical story of how the high priestess in the city of Azupia by the Euphrates gave birth to a son in secret since she as high priestess was expected to live in chastity. She placed her newborn son in a basket made tight with dirt and pitch, and placed it into the river (Euphrates). The child was found by Aqqi, the water bearer, and grew up to be a great king. The name of this child was Sargon (the true king), and he became one of the most important and influential Sumerian rulers and conquerors, with his reign lasting for 56 years (2382-2327 BC).

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