

What is an ἔμβρυον? A Lexical Study of Hippocrates' and Galen's Theories on its Creation and Development

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What does the Greek term “embryo” mean? What does it consist of, how and when is it created? Contemporary science can provide straightforward answers to these questions. This article aims to explore how these concepts were approached and discussed in a Classical and early-Christian context and seeks to show the difficulties in conceptualising the term in these periods. During the classical era (Pericles' Golden Age) an epistemological way of thinking gradually began to flourish. Trying to leave behind the religious tradition, a “rational methodology” opened its way into the world's understanding and perception. In line with this regard, the Hippocratic School (5th – 4th century B.C.) attempted to explain through observation the various features of the human body, visible and invisible, and thus established the foundation of medical science. On the other hand, with the advent of Christianity, the way of thinking completely changes. Galen (2nd – 3rd century A.D.), studied the work of Hippocrates and tried to evolve his theories in line with the scientific (and religious) thought of his own period, marked by philosophical writers like Plato or Aristotle. Both Hippocrates and Galen are considered important figures who have contributed to the development of medical studies. In an attempt to show how the embryo was understood in ancient medicine, this article focuses on the works of these two eminent figures of the ancient science of healing. More precisely, our study concentrates on the following treatises: *On Generation* and *The Nature of a Child* from the Hippocratic Corpus (both attributed to Polybius), and Galen's *The Formation of the Embryo*.¹ In order to expose not only the creation and the evolution of the embryo, but

¹ Hp. *De genitura, De natura pueri*; Gal. *De foetuum generatione*.

also the difficulties which come from the Greek vocabulary on the embryo, this discussion will be followed by an abbreviated lexical study about the words linguistically and conceptually related to ἔμβρυον, taking into account the nuances in both traditions. In fact, the lexical sphere and the notion of embryo in ancient thought are intimately related, as it will be exposed below.

I. Methods

The meaning of the concept “embryo”, where it came from and how it evolved was an important debate in ancient history. There are two principal traditions on the matter: the medical tradition and the philosophical tradition. While the first attempts to study the embryo using science, the latter uses theories based on speculation.² For example, the Hippocratic tradition used two methods to gather information: observing nature (bird eggs in particular), and inspecting women who suffered miscarriages.

While ancient philosophers discussed the origin of the soul and its development in the embryo, the Hippocratic school of thought and rational medicine never interpreted the role of the soul because they believed it was none of their concern. The lack of interest in the embryo’s soul stems from the rationalisation of medical science. Ancient physicians believed they could only heal the body. The soul, on the other hand, could not be healed as it was neither visible nor tangible.³

² Cf. Congourdeau, “L’embryologie dans le corpus Hippocratique” in *Porphyre: Sur la manière dont l’embryon reçoit l’âme*, pp. 20-21.

³ Cf. G. Aubry, “La doctrine aristotélicienne de l’embryon et sa réinterprétation par Porphyre” in *Porphyre: Sur la manière dont l’embryon reçoit l’âme*, pp. 47-67.

II. The philosophical approach to the embryo

Before proceeding any further, we would like to provide a brief introduction to the philosophy of the embryo in Hippocrates' and Galen's period.

On the one hand, Hippocratic medicine coexists with Aristotle's philosophical thought (4th century B.C.), even if it does not influence his medical theory. The summary of Aristotle's views on the embryo below⁴ is an example of the philosophical tradition. It is useful for understanding how the medical field researched and explained embryos at the time. Even if he speculates about the origin of the soul, he is primarily offering an explanation of where the embryo comes from, while also discussing the evolution of the "conceived products".

Aristotle believed there was only one seed, the male seed, made by the warmth of food being absorbed into a man's blood. The female was the receiver, the uterus providing the substance of the embryo. The seed would develop inside the uterus as an egg does in a nest.⁵ He believed that when the male seed was inside the uterus, it encountered female menstrual blood. Regarding the embryo's material development, he claimed that when the male seed entered the uterus it was slowly covered by a blood clot. The clot would gradually turn into a membrane and the chorion which separates the embryo from the uterus and fluid. The heart would be the first organ to take form (connected to the animal principle, ἀρχή, because this is the moment when the embryo starts to live its own life), followed by the body gradually being built around the heart and various parts starting to emerge and grow.

Aristotle mentions, in line with his theory on the soul, that although the embryo acts like a plant, it has the growing potential of an animal (δύναμις). The power in the embryo would turn it into an animal: it is a continuous process from "non-being" to

⁴ Cf. Ibid.

⁵ Cf. L. Brisson, *L'embryon: formation et animation*, Préface, pp. 9-10.

“being”. Thanks to this power and inner principle (δύναμιν καὶ ἀρχήν), the animated embryo is able to feed and grow. A potential soul acting like a plant (the embryo is attached to the mother/source of nutriment just like a plant’s roots) would become an actual soul when the embryo was able to feed for itself, in other words, without the direct intervention of the mother. Then, finally, after evolving from a feeding soul to a sensitive one, the embryo would turn into an animal. This “sensitive power”, inherent to the embryo, would be transmitted by the father’s sperm. Later, the animal would acquire an intellectual soul that comes from the surrounding world (θύραθεν) and is divine. The concept of the embryo’s soul is therefore an epigenetic theory: the embryo goes through a process that makes it continuously evolve and develop its potential.⁶

On the other hand, even if the Aristotelian philosophical position on the embryo does not change much in the subsequent centuries, we find in the *Ad Gaurum* treatise,⁷ attributed to the philosopher Porphyry (3rd – 4th century A. D.), a representative example of embryology in Galen’s time. In this work (at the crossroads of medical, metaphysical and cosmological questions),⁸ Porphyry collects different opinions on the topic from Hippocrates to Galen. Regarding the embryo’s status and development in the mother’s womb, it is first comparable to a vegetable, moved by a power (δύναμις), derived from the soul of the world (which ensures nutrition and growth) and administered by the higher soul of the mother. Here, sexual reproduction is only responsible for the formation of the body of the individual (the organs are fully formed at the time of birth), but by no means for the transmission of the soul. It is only at the moment of the birth that the embryo obtains, from the outside, an animal soul, because it is already qualified to receive it.⁹

⁶ G. Aubry, “La doctrine aristotélicienne de l’embryon et sa réinterprétation par Porphyre”, p. 51.

⁷ The real title is Περὶ τοῦ πῶς ἐμψυχοῦνται τὰ ἔμβρυα, but it is also known as *Ad Gaurum* because it is dedicated to a certain Gaurum.

⁸ J. Wilberding, *To Gaurus on how embryos are ensouled and On what is in our power, Porphyry*, transl. by James Wilberding, pp. 10-11.

⁹ This theory is connected with Stoicism, based on the natural breath (πνεῦμα). Cf. J. B. Gourinat, “L’Embryon végétatif et la formation de l’âme selon les stoïciens”, in *L’embryon: formation et animation*, p. 61.

Porphyry agrees with Aristotle when utilising the idea of power in the embryo and its nature as a potential animal, but, as G. Aubry shows, the sense of power used here goes in some way against Aristotle's position.¹⁰ While Aristotle considers that the embryo already possesses the power to become an animal in the womb, Porphyry thinks that it is only at the end of the embryo's formation that animal power is acquired. That is to say, for Aristotle, the embryo becomes an animal in the process of its development, whereas Porphyry denotes that it is still a plant while placed in the mother's womb. This new understanding of Aristotle's power (δύναμις)¹¹ and in general the question of the time when an embryo becomes an animal, caused a great controversy in later discussions during the Christian period by the Church Fathers, in the Byzantine world and in the Middle Ages¹², especially concerning the practice of the abortion and its morality.¹³

III. The Hippocratic tradition: the creation and evolution of the embryo

According to the Hippocratic treatises *On Generation* and *Nature of a Child*,¹⁴ attributed to Polybius, Hippocrates' son-in-law, the embryo goes through a five-stage process: conception, first formation, first movement, full articulation and birth.¹⁵ The body heats up during intercourse due to movement¹⁶ and conception only occurs if the sperm stays inside the woman's body.¹⁷ Therefore, if the woman has no secretions afterwards, she knows the day she conceived.¹⁸

¹⁰ G. Aubry, "La doctrine aristotélicienne de l'embryon et sa réinterprétation par Porphyre", pp. 47-67.

¹¹ On the notion of ἐπιτηδειότης ("suitableness"), cf. G. Aubry, "Capacité et convenance. La notion d'ἐπιτηδειότης dans la théorie porphyrienne de l'embryon" in *L'embryon: formation et animation*, pp.139-155.

¹² Cf. L. Brisson, *Porphyre: Sur la manière dont l'embryon reçoit l'âme*, avant-propos, p. 8.

¹³ Ibid.

¹⁴ All the texts are taken from the following edition: É. Littré, *Oeuvres complètes d'Hippocrate*, vol. 7. For the translations, we used LOEB online editions (see bibliography).

¹⁵ Cf. the lemma: *embryology* in *The Oxford Encyclopaedia of Ancient Greece and Rome*, ed. by Michael Gagarin, pp. 44-45.

¹⁶ Cf. G. R. Dunstan, p. 13.

¹⁷ Hp. *Gen.* 5, pp. 2-4.

¹⁸ Ibid., pp. 7-9.

In the next stage the seed from both sexes heats up inside the woman's womb. As both partners are moving, the seed is heated up and thickens, simultaneously acquiring the capacity to breathe via the mother's own breathing. There is a significant development in the woman's body as an outer membrane is created around the plump seed. At the stage of membrane creation, there is a very little seed within and the rest of the seed is well rounded in the membrane.¹⁹ The physician who wrote this treatise backs his claims by telling the story of a woman who had intercourse with men for money. This woman would take the seed out of her womb herself by jumping up and down seven times (she would cause herself to miscarry). He could then see what a seed looked like that had been inside a woman's womb for six days. This is how he describes the schematization of the embryo:²⁰ the "product"²¹ resembled a raw egg²² from which the outer shell had been removed with transparent fluid in the internal membrane. It was also round and red with thick white fibres entangled in a red and thick fashion. Clots of blood were found on the exterior membrane. Something thin that seemed to be from the umbilicus was in the middle of the membrane. And the seed lay inside the membrane.

After describing the six-day seed, he proceeds to the next stage of creation: the seed grows as the mother's blood descends to the matrices,²³ and membranes from the umbilicus multiply by creating connections via respiration. Afterwards, the flesh is created by the blood descending through the mother.²⁴ The umbilicus is in the midst of the flesh, through which the embryo can breathe and grow.²⁵ Membranes grow as the product grows, taking the form of sinuses into which the blood flows. The chorion is created when the sinuses are formed and receive the blood.²⁶

¹⁹ Hp. *Nat. Puer.* 12., pp. 1-4.

²⁰ See the whole paragraph Hp. *Nat. Puer.* 13.

²¹ The doctor here doesn't give a name of this "product".

²² Cf. G. R. Dunstan, pp. 10-11.

²³ Hp. *Nat. Puer.* 14.

²⁴ Cf. G. R. Dunstan, p. 15.

²⁵ Hp. *Nat. Puer.* 15.

²⁶ *Ibid.* 16.

After that, limbs start to grow as the flesh is divided into limbs and allocated to various parts of the body. Body parts become more articulated and the head is detached from the shoulders. The arms, forearms, sides and legs are now all separate from each other. The nerves are thrown around the joints and come into contact with each other. The nose and ears are designed and the eyes are filled with pure liquid. At this point, the sex and the viscera can be seen. Breathing through the nose and mouth occurs; the belly and the intestine fill up with air as the breath comes from the umbilicus. External tubes are made from the belly and the intestine to the anus and bladder. All these parts take shape through breathing.²⁷

Following this stage, the bones harden and are hollowed out by breathing;²⁸ then fingers and toes appear and nails grow. According to Hippocrates, a male embryo requires thirty days to form and a female forty two days.²⁹ Finally, the child's hair starts growing and then it begins to move,³⁰ arriving at the final stage of breaking through the membranes to come out of the womb. Here, Hippocrates declares the end of pregnancy comes with the first movements of the child, who now takes the initiative to push the membranes away and force its way out into the world because of the need for food.³¹

IV. Galen: the creation and evolution of the embryo

In line with the Hippocratic school of thought, Galen claims there are two seeds, one from the male and the other from the female. These two seeds are combined in the matrix. There, the embryo undergoes a continuous process which consists of several phases: from the embryo's plant status to the shape of the encephalon, which leads to the animal stage. While Hippocrates divides the evolution of the embryo into different

²⁷ See the whole §17, Hp. *Nat. Puer.* 17.

²⁸ Hp. *Nat. Puer.* 19.

²⁹ Ibid. 18 and see also the lemma birth in *Brill's New Pauly*.

³⁰ Ibid. 20: "at the same time as the nails are formed hairs also take root in the head."

³¹ Ibid. 30: "Here is my argument for the fact that a foetus is born when its nourishment runs out." see also the lemma *birth* in *Brill's New Pauly*.

phases from the time of conception, Galen refuses to categorize the various stages of formation.

Galen describes the creation of the embryo in *The Formation of the Embryo*³² as follows: firstly, two of four vessels in the embryo become one, and form a great vein that is inserted into the liver. On the other hand, the vein formed in the navel divides internally, like the trunk of a tree, separating firstly into two and then into more parts, until one produces the substance of the liver and the other forms the *mesenterion*, acquires the stomach and spleen, and then covers the intestines, the *omentum* and the rectum. These organs do not exist before and, like the liver, they are constructed by the veins.

Two arteries are fixed into the embryo's bladder and proceed to the lower end of the body up to the sacrum, where they grow separately down to each leg. In the upper part of the body, the great spinal artery is connected with the left ventricle of the heart and divides into two parts. While the liver is created in the first days of conception, the heart is gradually created from the blood provided by the mother through the arteries or through the liver.

Here Galen gives his opinion³³ about Polybius's observation of the product expelled by the pregnant woman.³⁴ He assumes that the object (the six-day foetus) inside the chorion was probably the liver in an undeveloped and unformed state.

In these first stages, the embryo grows in the same way a plant does. It continues to form and grow and, as Galen postulates, the whole division of the veins takes place in the liver. The navel's vein continues to divide like a tree and terminates in the extremities of the embryo. The material specific to the liver expands around the veins and the spaces between them are filled in.

³² The source of this summary is Galen's *The Formation of the Embryo*, chapter 3, in Singer's edition, pp. 180-87.

³³ Gal. *De foet. gen.* pp. 662-63.

³⁴ Cf. Hp. *Nat. Puer.* 13. See description on p. 5 of this article.

The liver has two “gates”. The higher gate aims to develop the veins in the liver region, while the lower one builds all those leading to the stomach, spleen or the intestines. The hollow vein extends down the whole length of the animal. One part is fixed in the middle of the spine and the other goes up through the middle of the chest to the throat.

Moreover, the heart has two ventricles. The blood which is moderately hot flows from the liver through the right gate whereas the blood which is much hotter flows from the arteries through the left gate. Because of this movement, which at the beginning is a very slow pulse, the heart starts to beat, moving the arteries at the same time. At this stage, the embryo is no longer considered a plant, but lives like an invertebrate animal.

Galen knows that the heart needs the blood to operate, which, according to him, is created in the liver. This is the reason why he considers that the liver is created first, whereas the heart is gradually formed.³⁵ The brain is produced and developed at a later stage because the embryo does not need sensitive faculties in the mother’s womb. In the third phase, the brain is constructed along with the various parts of the face, the limbs are articulated, and the skull acquires solidity.

In the fourth phase, after the heart and all other body parts are strengthened, the infant assumes the functions of a nutritive Soul: teeth appear, hair grows, etc. The faculty of the Soul, the rational capacity, is progressively acquired when the new-born child is able to use its body and the senses and organs operate perfectly.³⁶ As demonstrated above, the developing embryo has, in the first phase, a vegetative life. Later it mutates into an invertebrate shape in order to finally exist as an animal.

³⁵ See for example, Gal. *De foet. gen.* p. 664: *δυσὶν γὰρ δὴ που τούτων ἀναγκαῖον εἶναι τὸ ἕτερον, ἢ παρὰ τοῦ ἥπατος, αἵματος ἀνιόντος, ἅμα τῇ τῆς ἥπατίτιδος φλεβὸς γενέσει καὶ τὴν καρδίαν ἐκ τούτου γεννᾶσθαι δεῖν, ἢ διὰ τῆς μεγάλης ἀρτηρίας [...]; Now, one of the two procedures must be the case: either the heart is formed by blood coming up from the liver at the same time as the formation of the vena cava ascendens, or from blood coming from the great artery.*

³⁶ Gal. *De foet. gen.*, p. 666.

Galen also calls the different faculties within the living being “powers” (δύναμεις).³⁷ The appetitive (ἐπιθυμητικήν), natural (φυσικήν) or nutritive (θρεπτικήν) “faculties” are present at the beginning of the embryo’s life.³⁸ It all starts with the liver supplying nutrition through the umbilical cord, thus allowing the embryo to exist as a plant. Subsequently, the vital (ζωτική) and affective (θυμοειδής) faculties residing in the embryo turn it into an animal. These faculties come from the heart once it is formed. Finally, when the encephalon is formed, the rational faculty (ψυχή λογική) gains power over desire, sensations and movement. The embryo’s development does not end here, but after birth (bones harden, teeth grow etc.), when it will no longer be designated as an embryo (ἔμβρυον), but as an infant (βρέφος).

Regarding the existence of the Soul, Galen’s school of thought, like Hippocrates’, does not wish to take a firm position on the matter, as it is based on rational methodology. In *On my Own Opinions*,³⁹ he says that he ignores the question of what the soul is because it cannot be studied from a scientific point of view. However, unlike Hippocrates, who does not mention it at all, Galen talks about the animation of the embryo in at least two places. He claims that the soul is created with the body (*On my Own Opinions*), and that it is present in the seed (*The Construction of the Embryo*).⁴⁰

V. Lexical study:

There are five words that can describe the embryo in ancient thinking, namely παιδίον, τέκνον, ἔμβρυον, βρέφος, κύημα. It is extremely difficult to understand the distinction between ἔμβρυον, βρέφος and κύημα, and the difference between ἔμβρυον and κύημα.

³⁷ The meaning of δύναμεις is equivalent to Plato’s ψυχάς.

³⁸ Cf. V. Boudon-Millot, “L’*Ad Gaurum* attribué à Porphyre et les théories galéniques sur l’animation de l’embryon” in *Porphyre: Sur la manière dont l’embryon reçoit l’âme*, pp. 87-102.

³⁹ *De propriis placitis*.

⁴⁰ Cf. V. Boudon-Millot, “La naissance de la vie dans la théorie médicale et philosophique de Galien”, in *L’embryon: formation et animation*, pp. 79-94. She properly demonstrates the translation problems in pp. 87-88.

The exact sense of these words evades distinction, especially when they have been translated into other languages. It has always been very complicated to determine the equivalent vocabulary in modern languages in order to translate these terms. For example, the Greek-English reference dictionaries *LSJ* and Bailly's Greek-French dictionary prefer to give both "embryo" and "foetus" as the definitions of ἔμβρυον, without pointing to the multiple uses of the term.⁴¹ The choice eventually depends on the translator.

Our first objective in this article is to offer the results of previous analyses of contexts where Hippocrates or Galen used these words and their various meanings. To illustrate the depth of the discussion about the various senses within "embryo", we have examined how ancient lexicographers Orion of Thebes and Hesychius of Alexandria understood the term. They lived during the era of Late Antiquity and their lexicons are the first to define these concepts.

The term παιδίον is the easiest to explain. Hesychius claims that it designates something which is already produced,⁴² as in the case of the verb τέκνον. Therefore, it would not be pertinent to lexically analyse these two terms because they are generally used to designate a baby or a child, in a post-delivery context.

Regarding the word ἔμβρυον, Orion explains it as something that is developing inside and is about to burst, or something that contains the food or that is fed from within.⁴³ In contrast, Hesychius of Alexandria characterizes ἔμβρυον as a neonatal infant (νεογνόν, βρέφος) in the womb or even as a model or a shape.⁴⁴

However, Hesychius' sense of the word ἔμβρυον also includes βρέφος. We can therefore deduce that βρέφος characterizes the post-delivery stage, i.e. the moment

⁴¹ Ibid.

⁴² Hesychius, *Lexicon*: γέννημα as παιδίον; cf. also the concerned lemma in *LSJ*.

⁴³ See the concerned lemma in Orion, *Etymologicum*. **ἔμβρυον**: ἀπὸ τοῦ ἔνδον βρύειν καὶ αὐξεσθαι. ἢ ἔνδον ἔχειν τὴν βοράν. ἢ ἔνδον εἶναι βροτοῦ. ὡς ἐνδόβρυον.

⁴⁴ See the s.v. in Hesychius' *Lexicon*: **ἔμβρυον**: νεογνόν βρέφος τὸ ἐν γαστρὶ γυναικὸς ἢ ἐν διάπλασμα. It is also interesting that Hesychius mentions †ἔμβραχον as ἔμβρυον.

when the embryo becomes an infant (βρέφος). Orion explains that βρέφος is firmly connected to food by showing that a metathesis of two consonants schematizes the word φορβή. The word is associated with the lack of food. Therefore, the word βρέφος means “after childbirth”, or, from their point of view, the moment when the “product of conception” needs to leave the mother’s womb in search of nourishment outside the body due to the lack of food within.⁴⁵ On the other hand, Hesychius does not connect βρέφος with the search of food, but with an embryo and a small child.⁴⁶

The analysis becomes more and more interesting when we discover that the word κύημα also characterizes a situation taking place inside the womb. Orion links the etymology of κύημα with the verb κύω, “something that is being conceived”⁴⁷ and Hesychius mentions that a κύημα is something that is inside the womb, while it also refers to plants.⁴⁸

After analysing both Hippocratic treatises, we can deduce that his conclusions differ greatly from Galen’s due to the systematic use of ἔμβρυον found in his corpus.⁴⁹ Neither βρέφος nor κύημα are mentioned in *On Generation* and *The Nature of a Child*. Other corpus treatises need to be read to locate them. For example, the term κύημα is only mentioned in *Epidemics*, *Barrenness* and *Superfetation* and the term βρέφος in *On Aliment* and *Letters and Speeches*.

[...] καὶ τὸ κύημα ἐπὶ πλείστον χρόνον ἀκίνητον ἦν, ὡς διεφθαρμένον, καὶ μετέπιπτεν;⁵⁰

and the **foetus** was immobile for a long time, as though it had died.

⁴⁵ See the explanation given from Orion, *Etymologicum*: **Βρέφος**, παρὰ τὸ φέρβω φέρβος· καὶ μεταθέσει τῶν δύο συμφώνων, βρέφος· τὸ δεόμενον φορβῆ.

⁴⁶ Hesychius, *Lexicon*: **βρέφος**· *ἔμβρυον Ψ 266 as νήπιον, παῖς.

⁴⁷ Orion, *Etymologicum*: **Κῦμα**. κύω, κῆσω, κύημα, καὶ συγκοπῆ κῦμα. οἱ δὲ παρὰ τὸ κυκῶ, κυκῆσω, κύκημα καὶ κῦμα and cf. also the signification of the concerned lemma in *LSJ*: “that which is conceived”.

⁴⁸ Hesychius, *Lexicon*: **κύημα**· τὸ κατὰ γαστρός· καὶ ἡ προβολὴ τῶν φυτῶν.

⁴⁹ This word is mentioned several times in the treatises examined; see the examples analysed on the previous pages.

⁵⁰ Hp. *Epid.* VII, 6.

Περὶ δὲ μύλης κυήσιος τόδε αἴτιον· ἐπὶ πολλὰ τὰ ἐπιμήνια ἔοντα γονὴν ὀλίγην καὶ νοσώδεα ξυλλάβωσιν, οὔτε **κύημα** ἰθαγενὲς γίνεται, ἢ τε γαστήρ πλήρης, ὥσπερ κυούσης⁵¹

This is the cause of a molar pregnancy: when copious menstrual fluid takes up a small amount of morbid seed, no proper **pregnancy** occurs, but the belly fills up as it does in a woman who is pregnant.

Ἐπικυῖσκονται δὲ τῶν γυναικῶν ὧν ἂν ὁ στόμαχος μετὰ τὸ πρῶτον **κύημα** ξυμμεμύκη οὐ κάρτα ἢ μὴ ἐπιφαινομένων τῶν σημηῖων ξυμμεμύκη δὲ μετὰ [...] ⁵²

Superfetal conception occurs in women when the mouth of their uterus does not close after the first **conception** – so that significant (sc. menstrual) indications appear – but only later.

This word is obviously confusing to translate and is sometimes referred to as “pregnancy”, “embryo” (foetus) or “conception,” which denote three different stages in the embryo’s evolution. However, these examples are revealing, as it is interesting to see the potential differences in the words.

Concerning the word βρέφος in Hippocratic texts, it only features in two examples:

Περίοδοι ἐς πολλὰ σύμφωνοι, ἐς ἔμβρυον καὶ ἐς τὴν τούτου τροφήν· αὐτὶς δὲ ἄνω ῥέπει ἐς γάλα καὶ ἐς τροφήν **βρέφους**,⁵³

Periods generally harmonise the embryo and its nutriment; and again, nutriment tends upwards to milk and the nourishment of the **baby**.

Ἡ δὲ γεινιῶσα ταύτη μήτηρ **βρεφῶν**,⁵⁴

⁵¹ Hp. *Mul.* III, 233 (cf. *Mul.* III, 71).

⁵² Hp. *Superf.* 1.

⁵³ Hp. *Alim.* 1 (37).

⁵⁴ Hp. *Epist.* 42-45 (L. 23, 43). Our translation.

In the neighbourhood mother of **children** [...].

It seems that there is not always one reason why a word such as βρέφος, κύημα or ἔμβρυον is used and this applies to the entire Hippocratic corpus. The dissimulation and the huge volume of the Hippocratic corpus do not clearly let us understand the reasons for choosing a specific word. There is also confusion between ἔμβρυον and παιδίον. Sometimes we come across ἔμβρυον and sometimes across παιδίον, perhaps for reasons of variation.⁵⁵ The Greek doctor uses the term παιδίον (child), presumably to distinguish between two phases, before and after the formation of the joints. The use of the specific term is not always clear, but it seems to apply in situations when various body parts have already been formed, more specifically following the formation of the extremities.⁵⁶

However, no logical explanation of the use of these words is evident and the same issue exists for κύημα and ἔμβρυον. Perhaps the word παιδίον is used to characterize creation completion, but the way the words are employed is still confusing, especially in the translated versions.⁵⁷

⁵⁵ Cf. Hp, *Genit.* 10: Τὸ δὲ πηρωθὲν ἐν τῆσι μήτρῃσι **παιδίον** φημι αὐτὸ ἢ φλασθὲν πηρωθῆναι τῆς μητρὸς πληγείσης κατὰ τὸ **ἔμβρυον**, ἢ πεσοῦσης, ἢ ἄλλου τινὸς βιαίου παθήματος προσγενομένου τῆ μητρί· ἦν δὲ φλασθῆ, ταύτη πηροῦται τὸ **παιδίον**· ἦν δὲ μᾶλλον φλασθῆ τὸ **ἔμβρυον**, τοῦ ὑμένος ῥαγέντος τοῦ περιέχοντος αὐτὸ, φθείρεται τὸ (5) **ἔμβρυον** ἢ ἐτέρῳ τρόπῳ τοιῶδε πηροῦται τὰ **παιδία**; *I assert that a foetus maimed in the uterus is maimed either on being contused when its mother receives a blow over the foetus or she falls, or when some other violent insult is suffered by the mother. If the foetus is contused, it will be maimed in the corresponding part; if it is contused more violently so that the membranes that contain it rupture, it will be aborted. Embryos are also maimed in another way.*

⁵⁶ Hp. *Nat. Puer.* 18: Καὶ γέγονεν ἤδη **παιδίον**; cf. *idem.* 19 Ὀκόταν δὲ διαρθρωθῆ τὸ **παιδίον**, *idem.* 28 Τὸ δὲ **παιδίον** ἐν τῆσι μήτρῃσιν ἐὼν τῷ χέρε ἔχει πρὸς τῆσι γένυσι καὶ τὴν κεφαλὴν πλησίον τοῖν ποδοῖν·

⁵⁷ We are referring also to the lemma of *embryology* in: *The Oxford Encyclopaedia of Ancient Greece and Rome*: “Despite a rich Greek embryological vocabulary there was no shared practice of referring to developmental stages of formation by specific terms, and there was certainly nothing that adequately maps onto our distinction between embryo and foetus. Five stages are commonly encountered: conception (seed(s) retained by the womb), first formation (limbs and organs articulated), first movement, full articulation (extremities including nails and hair articulated), and birth.”

On the other hand, when analysing Galen's vocabulary in *The Formation of the Embryo*,⁵⁸ right from the beginning, ἔμβρυον, βρέφος and κύημα have distinct meanings and are widely used, contrary to what we saw in Hippocrates' *The Nature of the Child*. Galen uses ἔμβρυον as a generic denomination for what is thought to be the embryo, in the same way as it is used in the Hippocratic treatise. The word appears in three sections: when Galen talks about embryo-formation and characteristics (sometimes from Hippocrates),⁵⁹ when it is accompanied by διάπλασις⁶⁰ (formation) and in two examples where he discusses the different souls or δύναμις.⁶¹

Galen uses the lexeme κύημα less often. It is used in relation to the first stage of the embryo; the vegetal state. In three of the following five examples, κύημα appears next to φυτόν (plant).

ὡς δὲ τοῖς ἄλλοις ἅπασιν ἰατροῖς τε καὶ φιλοσόφοις εὖρον ἀρέσκων ὁμοίως τοῖς **φύτοις** ἄρχι τῆς σαφοῦς διαπλάσεως διοικούμενον τὸ **κύημα**, πιθανώτερον ἔδοξέ μοι [...]⁶²

When, however, I realized that all other doctors and philosophers agreed that, until clear construction, the **embryo** is still managed in the same way as **plants**.

ἐκ γὰρ τῶν εἰς ταῦτα ἀναγκαίων ἔνεστι καὶ τὸ γινώσκειν, ὁποίων τε καὶ ὁπόσων δεῖται τὸ **κύημα**, μέχρις ἂν ὑπὸ μιᾶς διοικῆται ψυχῆς, ὡς τὰ **φυτά**.⁶³

⁵⁸ All the texts are taken from Kühn's edition: *Galen's opera omnia*, vol. 4, Leipzig: Car. Knoblochii, 1920. For the translations, we used Singer's edition: *Galen: selected works*, Oxford University Press, 1997, pp. 177-201.

⁵⁹ E. g. Gal. *De foet. form.* p. 657, 16-17: κατ' αὐτὸ δὲ τὸ **ἔμβρυον** ἴδια μόρια, πρῶρον μὲν ἀπάντων τὸ δέρμα; *The individual parts within the embryo itself are first of all skin.*

⁶⁰ E. g. *ibid.* p. 653, 6-8: ἔχον ἤδη σαφῆ τὴν τῆς **διαπλάσεως** ὑπογραφήν, ὡς ἐπὶ πάντων **ἔμβρύων** οὕτω γιγνόμενων ἀπεφάνετο; *and observed that the scheme of its construction was already clear, has stated this to be the case with all embryos.*

⁶¹ E. g. *ibid.* p. 700, 9-12: ὑπὸ δὲ τῶν Στωϊκῶν οὐδὲ **ψυχὴν** ὄλωσ, ἀλλὰ φύσιν ἡγουμένων, διαπλάττειν τὸ **ἔμβρυον**, οὐ μόνον οὐκ οὔσαν σοφὴν, ἀλλὰ καὶ παντάπασιν ἄλογον; *and which the Stoics consider not to be the soul at all, but nature that constructs the foetus, since this kind of soul is not intelligent, but entirely devoid of reason.*

⁶² *Ibid.*, p. 663, 17- 664, 1.

⁶³ *Ibid.*, p. 665, 4-6.

From a consideration of the conditions necessary for plants, we shall be able to learn exactly what needs the **embryo** has during the period in which it is still managed by one soul in the same way as **plants** are.

τὴν αὐτὴν οὖν ἔχοντος τοῦ **κυήματος** ἐν τῇ πρώτῃ γενέσει τοῖς **φυτοῖς** διοίκησιν ἐλαχίστη μὲν εἰκότως ἢ αὐξήσις αὐτοῦ γίνεται κατὰ τὸν πρῶτον χρόνον.⁶⁴

Since, then, the **embryo's** management is the same as that of **plants** in the first stages of their formation, it is obvious that its growth in this early period will be very little.

In fact, βρέφος only appears once in this treatise. This time it is connected to nourishing the soul inside the embryo (τῆς θρεπτικῆς ψυχῆς) at the final stage before birth.

καὶ διὰ τοῦτο ταῖς μὲν τῆς **θρεπτικῆς ψυχῆς** ἐνεργείαις τὰ **βρέφη** ῥωμαλεωτάταις χρῆται, δευτέραις δὲ κατὰ ῥώμην ταῖς ἀπὸ τῆς καρδίας [...]⁶⁵

It follows then that the strongest functions in **infants** are those of the **nutritive soul**, and second after them those of the heart.

Therefore, while ἔμβρυον is used with a general meaning, as in the previously-discussed Hippocratic treatise, in Galen the words κύημα and βρέφος are used to describe the embryo's various powers (δύναμις).

Moreover, in line with the previous observations by Orion and Hesychius, it would appear that Galen used these two words in a different way. The notion of κύημα refers to both explanations (as something conceived and as a plant), while βρέφος is used with a deeper meaning (the last stage of the embryo which turns it into an animal). The concept belongs more to Orion than it does to Hesychius.

⁶⁴ Ibid., p. 667, 1-3.

⁶⁵ Ibid., p. 673, 9-12.

Finally, we wish to explain that even though ἔμβρυον is the word more widely used due to a universal meaning, the treatise's title is Περὶ τῆς τῶν **κυομένων** διαπλάσεως ἐπεχείρησαν.⁶⁶ In fact, the term κύημα, which has the same lexical root as κυομένων, is also used in other treatises by Galen, but primarily in *Of the Uses of the Different Parts of the Human Body* and *On the Semen*.⁶⁷ However, when used as a verb, it is employed to talk about the product's natural development. Another reason for this may be connected to the necessity of distinguishing this treatise from others in which the subject of the embryo is discussed. It could be suggested that the *The Formation of the Embryo* covers not only the embryo's conception and physical evolution, but also the development of the various powers (δύναμις) within it, a result of Galen's efforts to categorise all stages of the embryo's evolution.

VI. Conclusion:

The notion of the embryo and the way it was formed was widely discussed by ancient scholars. While philosophers were interested in the embryo's nature and soul, which they discussed through speculation, ancient medical traditions, with a more scientific focus, were attempting to study the embryo from the physical point of view. Thus, the Hippocratic school of thought, followed by Galen, is characterized by rationality. Both schools break away from the theory of the unique seed and claim that the embryo is the product of two seeds.

Our study of three texts (*On Generation*, *The Nature of a Child* and *The Formation of the Embryo*) determines that, even if Galen and the Hippocratic tradition (Polybius) agree on several points, such as rational research methods and certain stages in the

⁶⁶ This is the chosen title in Kühn's edition (1920) and it corresponds to the beginning of the treatise. The German edition, N. Diethard: *Galenus De foetuum formatione*, proposes Περὶ κυομένων διαπλάσεως. Singer doesn't propose a title, because his edition presents only a translation.

⁶⁷ Also, it is interesting that the noun κύημα does not exist in *Ad Gaurum*; we only find derivatives of κυέω.

embryo's evolution, there are significant differences in their theories, for instance the reason why the child is born.⁶⁸ Both Hippocratic treatises present the matter by focusing solely and systematically on the embryo's physical evolution. The process is made up of five corporeal stages and sometimes includes time (a male embryo is formed in thirty days; a female in forty-two days).⁶⁹ By contrast, Galen describes the embryo's physical development, but without distinctively marking each phase (he remarks that the process is continuous). In addition, he connects it to the various powers within the body. Even though Galen was not interested in discussing the soul, he admitted it existed. Therefore, the new interest (related to the new philosophical discussions) required the addition of rich vocabulary with the intention to classify the different phases of the embryo's evolution in more precise terms.

The analysis of Greek texts about how an embryo is generated shows that Polybius' abundant use of the word ἔμβρυον to characterize the product's formation is comparable to Galen's. However, this term refers to an early stage in the differentiation of the body parts, in which only the principal organs (liver, heart and brain) are clearly defined, whilst the rest is still unrecognizable.⁷⁰ It is therefore significant that the Hippocratic school of thought uses παιδίον to describe the baby still in the womb. Instead, in Galen's treatise we find βρέφος.

Like Galen, Aristotle uses κυήμα to denote the immediate product of fertilisation.⁷¹ Various nuances to designate the embryo's stage of development are clear in Galen's work due to his interest in the powers of the embryo. Hippocrates, on the other hand, does not employ the noun κυήμα in the works concerned. The same can be said

⁶⁸ Galen attributed an active role in the birth to the womb, assuming that it had the capacity to retain and to expel (see the lemma *birth* in *Brill's New Pauly*), while Hippocrates believed that the embryo takes the decision by himself to get out of the mother's womb because of the lack of food.

⁶⁹ Cf. p. 5 of this article.

⁷⁰ V. Boudon-Millot, "La naissance de la vie dans la théorie médicale et philosophique de Galien" in *L'embryon: formation et animation*, p. 87.

⁷¹ E. g. Aristot. *Gen. Anim.* 724b 14-18, 728b 34-5; cf. 731a 2-4. See in 15 p. 256 D. M. Henry. "How Sexist Is Aristotle's Developmental Biology?" in *Phronesis*, Vol. 52, No. 3 (2007), pp. 251-269.

of Porphyry's *Ad Gaurum*, with the difference that he uses certain derivatives of the verb *κυέω* or of the noun *κύησις*.⁷²

As our lexical study reveals, ancient physicians and philosophers debated about the different stages of the embryo's development and the presence of a power/soul inside it. While the Hippocratic treatises⁷³ seem to categorize the embryo as a stable physical unit, Galen prefers a more complex research approach, demonstrated by the use of specific vocabulary for the categorisation of the embryo's stages.

To sum up, what the results exposed in this lexical study reveal is a clear difference of approach to the study of the embryo's status and evolution. Hippocrates is considered the founder of rational medicine, the first to attempt to study the medical discipline from an epistemological angle, distancing himself from speculation and presenting his theories in a context distinct from the research methods used by philosophy. Four centuries later, Galen still claims to base his theories on the Hippocratic Corpus. However, concerning his choice of lexical terminology, the results exposed here show his effort to surpass Hippocratic theories on the study of the embryo. In order to create a new categorisation of the embryo's developmental stages, the physician from Pergamon needed new vocabulary. The terms he selected prove that – even if Galen tried to establish his arguments on a rational methodology – he could not disregard the influence of philosophy, especially Aristotle's. On the other hand, Galen's specialised study of the embryo's phases, accompanied by new lexical terms during the 2nd and 3rd century A.D., clashed with the Christian worldview and initiated numerous debates. In fact, discussions on the moral status of the embryo are still very controversial in modern society, especially concerning questions such as abortion.

⁷² Porph. *Ad Gaurum*, 5.1.4 (κύειν), 3.4.12 (κύησιν) etc.

⁷³ In other Hippocratic treatises, there are references to the soul, but they are not related to the creation of the embryo.

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