

Articoli/Articles

FORMS AND LIMITS OF THERAPEUTIC TREATMENTS
OF HEREDITARY DISEASES IN ANCIENT GREECE

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SUMMARY

Not being epistemologically different from treatment of congenital diseases, the therapy of hereditary diseases has to be considered in its complex relationship with the concepts of nature and culture, and with the ideas of Greek authors about generation and education. As such, therapy of hereditary diseases can be described as the (often hopeless) attempt by the ancient, particularly Hippocratic physician to restore the health condition or to contrast the natural tendency of the patient to develop and give expression to his or her pathological inheritance. If for the Greek physician dietetics represents the most widely practised way of treating diseases on a presumed inherited basis, the notion of therapy may be more generally applied to the various forms of eugenic measures and rules controlling and shaping the social and political life of Greek citizens according to the real and ideal political systems.

Introduction

The following remarks are the fruit of a broader study on the *therapy of hereditary disease* in ancient Greece, in the light of the existing sources, especially the technical literature on the subject¹.

The question of heredity is in general central to reflection by the ancient Greeks, as concerns both ethical-political aspects and more

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strictly medical-biological aspects. The centrality of the issue of heredity has an ethical-political as well as a religious basis in the conviction of the Greeks that, faced with the difficulty for the new generations of appearing up to the past generations², the children always and in any case inherit the fathers' sins³. Thus, starting from Homer and Hesiod, the aristocratic culture of the Greeks conceives the becoming of generations as a continual challenge to the limit, as a contest that aims to emulate the virtues of the fathers (if there are any), or even to repair the contamination of their misdoings⁴.

No less important, obviously, is the theme of heredity on the medical-biological plane, and this is the focus of this paper. It centres on the forms and limits of the therapeutic measures that Greek thought conceived of in relation to illnesses of hereditary origin, particularly in the 5th century B.C. But the prime question to be settled here is that concerning the extent to which the modern topic of transmission of a disease by heredity may be applied to the nosological frame of ancient Greek medicine. As Mirko Grmek observes with lucid brevity in a paper on "Ideas on Heredity in Greek and Roman Antiquity": "*Ancient scientists considered heredity as a part of a whole range of interrelated aspects of the problem of 'generation'*"⁵. Far from possessing a specific science like today's genetics⁶, the Greeks (from the so-called physiologists to Aristotle passing through the writings of the Hippocratic Corpus) willingly included discussion of matters of heredity. Hence, they related it to transmission of physical or sexual characteristics, in the issue of procreation, for them a priority⁷. From this it follows that issues regarding transmission of hereditary characteristics were mainly used as "proof" of or "clues" to (cf. the corresponding Greek terms τεκμήριον, ιστόριον) the purported truthfulness of a theory regarding *nature or the origin of the seed*.

As an example, it is sufficient to consider what is said by the author of the Hippocratic treatise entitled *On Generation*, to explain, according to him, that in "parentage" (γονή) there is a part that is a

strong seed (ισχυρή or ισχυρόν, viz. σπέρμα), masculine, and a part that is a weak seed (ἀσθενής/-ής), which is female, and that every single part of the body of children in its features reproduces the prevalence of the seed, strong or weak, coming from the parents⁸. In conclusion, given certain premises, there can only be certain consequences. In the terms of the ancient author this means that if it is true that a child is the child of two parents (εἴτερο ἀπ' ἀμφοτέρων τῶν σωμάτων τὸ σπέρμα χωρέει ἐς τὸ τέκνον), it is not possible a) for it entirely to resemble the mother and in no respect the father (ἔστι δὲ οὐκ ἀνυστὸν πάντα τῇ μητρὶ εἰκέναι, τῷ δὲ πατρὶ μηδέν); b) for it, on the contrary, wholly to resemble the father and in no respect the mother (οὐδὲ τὸ ἐναντίον τούτου); c) for it not to resemble either in anything (οὐδὲ μηδετέρῳ εἰκέναι μηδέν). In other, almost syllogistic, terms, if a) is the child of b) + c), it must necessarily resemble b) + c): ἀλλ' ἀμφοτέροισιν ἀνάγκη τίς ἐστιν εἰκέναι τινί⁹, whereas noteworthy is the occurrence of the word ἀνάγκη, “necessity”. We have thus seen that in effect the crossover similarities between parents and children are treated *sub specie genetica*, and not in the framework of an *ad hoc* reflection on the heredity nature of characteristics.

The origin of human diseases lies in family/in birth (ἄρχεται κατὰ γένος)

Ancient thought sets up a close connection between causes, diagnosis/prognosis and therapy of illness in general¹⁰. There is no exception regarding the treatment of illnesses that the ancient physician deemed to be due to *familiality*. Here it must be observed that the confines, also terminological ones, between familiality and the congenital character of illness are not always clear to the ancient author and distinguishable for us. An important reason for this nosological lacuna may consist, as we shall shortly see, in the substantial ambiguity of the terms used by ancient physicians (for example the word

γένος) regarding the transmissibility of illnesses from one generation to another¹¹. More in general, very rare are those cases in which in the words of the ancient sources we can recognize any distinction between the categories that can be summed up in the concept of *hereditary* on one side and *congenital* on the other¹².

Faced with the rise of the pathological process and the need to administer treatment, the physician first of all asks himself what the origin and the cause of the illness are (aetiology), and then through what symptoms the illness is recognizable and what the chances of treating and saving the patient are. Thus it is not surprising if some important hints for our reflection on the forms and limits of the therapy of hereditary illnesses originate from writings that have a specifically aetiological point of view and reason on the causes of illness to propose a therapeutic model which breaks away from the traditional forms of therapy. The latter forms no longer have a place in the context of the knowledge that the Greek physician in the 5th century B.C. claims to be more and more technical and based on knowledge of the deep causes of physiopathological processes.

In one of the writings in the Hippocratic Corpus that most clearly express the epistemological distance of so-called *ιατρική* (τέχνη) from the therapeutic practices of magicians and impostors, entitled *On the Sacred Disease* (*OSD*, chapter 2, 1-2 Jouanna), it is stated that, like other illnesses, the sacred disease too has “a natural cause” (φύσιν καὶ πρόφασιν) and that this consists in the fact that the illness is inherited; in Greek we find the expression “it has its origin in the *ghenos*” (ἄρχεται κατὰ γένος)¹³. The expression is substantially, and probably also deliberately, ambiguous¹⁴. Thus, the Hippocratic author tells us that epilepsy is not due to a divine influence, but on the contrary is an illness that is explained by the familial factor, i.e. by its being inherent in the first nucleus of the formation of the human being, precisely in its *ghenos*. Because of the particular semantic pregnancy of the terms involved, saying that the *phy-*

sis of an illness is due to its *ghenos* could appear tautological, and the continuation of the passage does not help to disambiguate the expression. Harking back to a so-called pangenetic theory whereby the seed originates from all the parts of the body, and therefore the healthy seed from the healthy parts, and the sick seed from the sick parts, the Hippocratic author asks a typically rhetorical question, whose implications are very important for us: “If a phlegmatic person has a phlegmatic child, a bilious person a bilious child, a person with consumption a child with consumption and a person suffering with the spleen a child suffering with the spleen, what prevents (τί κωλύει) one of the descendents (τινα τῶν ἐκγόνων) from also having this illness by which the father and the mother were affected?”¹⁵ Thus, it is expressly affirmed that, like the so-called sacred disease, other illnesses too are by definition κατὰ γένος. This passage is important for us from different points of view: a) first of all it clarifies that the origin of (hereditary) illnesses must be sought in human nature, invoking the concept of *physis*; b) it allows us to understand the close relationship in Greek scientific thought between the order of causality and that of therapy, in the sense that only a person that knows the *physis* of the patient can undertake his or her treatment; c) through the use, rhetorically and epistemologically studied, of the interrogative expression “what prevents?” (τί κωλύει), it implicitly affirms that it is possible for parents affected by epilepsy to have an epileptic child, but that the constitution of the single individual is not in itself a guarantee of the real pathological manifestation (we would say that the genotype is different from the phenotype). In other words, nothing prevents the offspring from being born healthy, that is to say the illness from being transmitted from the parents to their grandchildren and not directly to their children, or even from not being transmitted at all¹⁶.

At this point, some additional remarks may be useful in order to give a more precise answer to the question of what is meant here by the

expression κατὰ γένος. A collation of proposed translations of the expression, in this form absolutely peculiar to *OSD* in the whole Hippocratic Corpus, shows how its interpretation by modern scholars wavers between the familial and the congenital aspect of disease transmission: in this sense, at a first semantic level it certainly means “through heredity”¹⁷, but it must mean nevertheless “on a congenital basis”, “by birth”¹⁸. The fact is that the origin of illness is anchored to the first genesis of the human being, and linked to that state of formless embryonic matter, in which the child is forming beginning from the brain (ἐγκέφαλος), the first organ and intermediary of consciousness and of reason, if appropriately nurtured by *pneuma*. From this first phase of development of the human being, which is its being generated starting from a specific family line (its *ghenos*, precisely), there would date the origin of the illness, the original defect, consisting in insufficient or missing “purification” (κάθαρσις) of phlegmatic humour at the cerebral level “before birth” (πρὶν ἢ γενέσθαι)¹⁹. In a close connection between causes and effects, the central chapters of the work describe the physiological and mechanical process that leads to the manifestation of crises, and, in the case of particularly violent crises, to the patient’s death. Summing up what is expounded by the Hippocratic author, when excessive phlegmatic flow clogs the vases that transport *pneuma*, essential to correct operation of the brain, and the flow does not find a natural outlet, the crisis is manifested²⁰. The conditions that determine the crisis vary, and among them there stand out contingent climatic and meteorological conditions, particularly hostile to the epileptic type, with the blowing of warm damp winds coming from the south²¹. The age of the patient also plays an important role in diagnosis. The earlier the illness is manifested, the easier it is to fight it²²; when, instead, it grows old with the patient it “becomes a habit for the patient” (ἔθος πεποίηται) and its “treatment” (ἀπάλλαξις) is difficult, if not impossible²³. Driven by the (allopathic) principle whereby it is not necessary to feed the illness

with what it most usual for it, but to oppose it by resorting to what is most hostile to it (τῆ νούσῳ τὸ πολεμιώτατον)²⁴, the author of *OSD* shows with particular awareness the different factors that come into play at the origin of the hereditary/congenital illness and therefore determine its possible treatment²⁵: the physician has to reckon with the parentage of the patient, with the more or less complete pre- and postnatal cathartic processes, and hence with the patient's lifestyle and the environment that surrounds him or her. In short, the therapy of the illness, like the conception of the causality that determines it, is worked out by Greek medical thought as a phenomenon with complex contours, in which deep causes are involved (order of φύσις), occasional causes and triggering factors (πρόφασις), and the capacity of the physician to foresee and therefore treat the single case with the proper correctives²⁶.

Gender constitution and maternal inheritance in treatment of gynaecological disorders

Actually, such a clear statement of the hereditary character of diseases as that expressed in *OSD*, remains an exception in the whole Hippocratic collection. The peculiar attention of the Greek physician is more commonly addressed to the pathogenic effects caused by the individual constitution of patients, and particularly when this constitution, according to the so-called *pangenetic theory*, to which the authors of *OSD* as well as of other Hippocratic writings occasionally refer²⁷, is thought to be transmitted to the offspring together with other acquired traits. In the framework of a physiopathological conception centring mainly on the idea that it is the humours connatural to man that determine the origin of illnesses, a human constitution characterized by the prevalence of a specific humour is considered a presupposition, not at all a guarantee, for the rise of illnesses, which indeed may arise from imbalance between the body moistures or from the impossibility of expelling the humour in excess through the

natural routes. Particularly urgent is the situation in which the out-flow of humours (which are imagined to proceed from the upper to the lower part of the body) concerns the female body; in this connection, the woman (this concept is expressed at the beginning of Book I, *On Diseases of Women*), by her nature, is damper than the man and therefore has a greater need to expel the excess humours²⁸. This happens, in a healthy condition, through menstruation, seen precisely as monthly purification (κάθαρσις).

Thus menstruation is considered the prime vehicle through which pathogenic humours are expelled from the female body, and the appearance and consistency of the menstruation are indicative of the type of humour involved in the pathogenic process. A blackish flow, a “bright black” (μελανέα λαμπρά), indicates that the humour involved is “bile” (χολή); a “whitish” flow (υπόλευκα), on whose surface something “like cobwebs” seem to stretch (οἱ καὶ ὥσπερ ἀράχνια διατείνεται), indicates that so-called phlegm is responsible for the gynaecological pathology. At the origin of this pathological state there is the combination of at least two factors: the woman’s bad health conditions (ἦν δὲ γυνὴ τὸ σῶμα φλαύρως ἔχη), and her natural tendency towards humoral excess, respectively bilious and phlegmatic²⁹. In all the analogous cases described in the opening chapters of Book I of *On Diseases of Women*, in which the female genital apparatus is invoked, together with the patient’s constitution, in the rise of some gynaecological affections³⁰, the physician is concerned to stress that recovery is possible, “unless (the patient) is left untreated and time goes by” (e. g. chapter 8, 5 Grensemann: ἦν δὲ μὴ θεραπεύηται καὶ ὁ χρόνος προίη). Other important recommendations are added: the patient recovers on condition that she is suitably treated (chapter 9, 17 Grens.: ὑγιῆς δὲ γίνεται μελαδανθεῖσα κατὰ τρόπον)³¹ and follows a correct regimen of life (chapter 10, 6 Grens.: ἦν ... μηδὲ ἐπιτηδεῖη διαίτη χρέηται ἢ ἀνθροπος).

In the frame of mainly aetiologically oriented writings such as those quoted so far, it is no wonder if therapeutic treatments remain general or without further indications: in all these cases it may be argued that the therapy to be adopted is already known to the healer³². Thus, the treatise *On Nature of Women*, in the case of “white flux” (λευκὸς ῥόος) prescribes treatment suited to opposing the state of humoral imbalance caused by the patient’s phlegmatic constitution and by the presence of a bile flow that does not find an outlet; the recommended therapy is divided into two phases: a) as long as the flow persists, a dry and cold diet, b) as soon as the flow stops, “a medication to drink by which she will be cleaned upward...”³³.

As against medical theory that, regarding the aetiology of the illness, does not usually distinguish the patient’s gender, some writings in the Hippocratic Corpus seem to confer a particular value on gender difference in the definition of the pathogenic elements. For our issue this takes on particular importance, since certain gynaecological disorders are treated, in the imagination of physicians attentive to gender difference, *sub specie hereditaria*.

In the words of the author of the treatise *On the Nature of the Child* (chapter 30 Giorgianni), insufficient menstrual flux provokes various disorders in a woman, but above all, because of the close connection assumed between quantity of menstruation and nourishment of the embryo, it causes the premature birth of the offspring; the ancient physician links this condition to the specific physiology of some women: “for they are too dry (ξηρότεροι) and have too dense flesh” (πυκνοσαρκότεραί εἰσι). In his great interest in the aetiological aspect, the Hippocratic author affirms that “if this (viz. pathological condition) occurs regularly, it is due to the woman’s nature and maternal inheritance” (τοῦτο δ’ ἦν ἀεὶ γίνηται, ἐν φύσει καὶ ἐν γένει μητρῶόν σφίν ἔστιν)³⁴. Once more the term that indicates human nature, *physis*, recurs together with the terminology of the familial factor/heredity, but to this there is specifically added the idea that

the inherited trait has a gender component: here the constitutional defect is transmitted from mother to daughter. Such an affirmation is entirely consistent with the conception of a parentage that is the product of the mixture of the male seed and the female seed, but even more specifically, of the paternal seed and the maternal seed. It therefore appears quite natural that the effects of maternal heredity should be manifested in the more strictly female sphere of the new generations³⁵.

The modelling power of regimen

From what has been expounded so far, there emerges the attention, not always peculiar, of the Hippocratic physician to illnesses of hereditary/congenital origin, and hence the difficulty of specifically defining their therapy. Besides, it has been said that the physician has to understand the hereditary character of the illness and to act immediately, so that the illness will not become *chronic*, which means a *habitus* (ἔθος) for the patient, from which it is not possible to free him or her for the rest of his or her life³⁶. Among the remedies which were most appropriately available to the Greek physician, even more important than pharmacology was so-called dietetics³⁷. The call for a correct lifestyle is present in all ancient physicians, and in particular regimen has an important function in control of the practices of the daily life and, it could be said, of society in general³⁸. With his dietary prescriptions, the physician intervenes deeply in the conception of what man is and must be like in Greek society³⁹.

In relation to the shaping of hereditary or congenital illness as illness that it is difficult to treat effectively, especially if its onset comes late, the *dietary regimen* (in Greek δίαίτια) is an opportunity for the physician to act on the individual constitution of the patient, or even to determine it a priori. For the author of the *Hippocratic Regimen* (Book I, chapter 27), the formation of embryos of male or female sex depends on the type of regimen that both parents choose to adopt:

“Females grow more from water and from what it is cold, damp and soft, whether foods, drinks or activities; males, instead, from fire, that is to say from dry and warm foods and from the corresponding regimen.” Hence: “If one wants to beget a female, it is necessary to use a basic regimen of water; by contrast, if a male is desired, a fire diet must be chosen”, and it is not sufficient for the father only to follow this regimen of life, because the seed of the mother also contributes to generation (καὶ οὐ μόνον τὸν ἄνδρα δεῖ τοῦτο διαπρήσσεσθαι, ἀλλὰ καὶ τὴν γυναῖκα), so both the partners will have to adapt their regimen of life for the common procreative goals⁴⁰.

There is something else: as a consequence of the possible combinations of the seeds of the parents, there are “three stocks of males” (τρεῖς γενέσεις τῶν ἀνδρῶν), which are distinguished by being more or less masculine “according to the different proportion of the parts of water and of fire that make them up, according to the foodstuff, the forms of upbringing and customs”⁴¹. For women too there is a triple taxonomy of human stocks: it goes from the most perfect combination of seeds, that in which from both parents a female seed is entirely originated, to more hybrid combinations, those for example in which the masculine part of the female partner prevails or, vice versa, the female part of the male (*Regimen*, Book I, chapter 29 Joly). In any case, it is always possible that a human stock will *degenerate* from perfection because of the regimen of life adopted in the course of life (*ibid.*, chapter 28: ... ἢν μὴ ὑπὸ τῆς διαίτης βλαφθῶσι τῆς ἔπειτα).

The life regimen can therefore be considered to all intents and purposes as a therapeutic tool, capable of maintaining or restoring the health condition challenged by illness, but also, if used improperly, to cause degeneration of the original nature. In the specific case of the legislation of some Greek political communities, it also constitutes a modality of social control, and therefore appears to be en-

dowed with a performative capacity in relation to *physis*: this is particularly evident, for example, in the case of the *Spartan constitution* of Lycurgus, which, according to our sources, seems to recognize the reproductive role of women and aims, through the regimen of life, to strengthen and harden their bodies, literally “freeing them of all softness and effeminacy” (ἀφελῶν δὲ θρύψιν ... καὶ θηλύτητα πᾶσαν)⁴², so as to allow particularly strong children to be born of parents that are both strong (νομίζων ἐξ ἀμφοτέρων ἰσχυρῶν καὶ τὰ ἔκγονα ἐρρωμενέστερα γίγνεσθαι)⁴³.

In this sense, “therapeutic” action becomes a true eugenic tool, able to act at the root of the very process of formation of the human being, so that through *selection of the genetic material* of the parents a stock will be produced that is as suitable as possible to the biopolitical challenges of Greek society⁴⁴.

The possibility of success of the performative action of the medical art is all the more possible if it is exerted during the first phases of formation of the human being, or immediately after birth, when the infant’s body, like a tender offshoot, is still easily mouldable. This explains the reasons for the interest of the author of the Hippocratic treatise *Airs, Waters, Places* (chapter 14 Jouanna), an upholder of the importance of environmental and ethno-anthropological factors in the consideration of the physician, in the hereditary aspects of the morphological characteristic of a distant Scythian population, the so-called Longheads. Because of the social prestige that the people with long heads seem to have enjoyed with this population in an indefinite past, the Macrocephalous people seem to have constrained with bandages the natural features of the heads of their newborn babies with such perseverance and effectiveness that their *nomos*, their social custom, appears to have engraved a change of *physis*, determining the hereditary macrocephalous character with time. In a complex osmosis of innate and acquired features, of nature and culture⁴⁵, the Hippocratic author affirms that *physis*, after

initially undergoing the violence of *nomos*, in the course of time appears to have had a role, together with social custom, in determining the morphology of the head of the Macrocephalous people (νῦν δὲ καὶ ἡ φύσις ξυμβάλλεται τῷ νόμῳ). The impulse of the specific *nomos* wore out, thanks to “contact” (ὀμίλη) with other populations. At that point *physis* appears to have gone its way again, and the Longheads to have only preserved their name as an indication of their original conformation⁴⁶.

Conclusions

Summing up what has been expounded in these pages, in Greek thought in the period examined the issue of biological heredity, though not in a systematic way, was considered as a complex phenomenon, including in the first place the role of nature and human generation, meaning both species and individual, but also fully including the most anthropologically varied range of habits, social rules, education of single people and single political communities. Man is formed, grows, falls ill, dies or recovers through a complex system of factors, going from so-called τροφή to παιδεία, from the first nourishment of the embryo to the forms of culture, which is also food for the body as for the soul in Greek thought. Therapeutic treatments of hereditary or congenital illnesses, in themselves not always easily inferable from the sources⁴⁷, are mainly referable to the cathartic sphere (pharmacological) and the dietary one, and are characterized by relative effectiveness, especially if related to the very limited possibilities for the Greek healer to act, correct or alter *genetic processes*⁴⁸. Hence on one side they are an expression of a substantial epistemological difficulty about exerting a direct influence on ontogenetic processes, and on the other they represent the aspiration of Greek thought to mould the human being like a plant, from its formation in the soil to its growth in the pot.

BIBLIOGRAPHY AND NOTES

1. The study, entitled *Curare il ghenos. Forme della terapia del male ereditario nella Grecia antica*, will be published as part of the volume *Cause, diagnosi e terapie delle malattie ereditarie tra Antico e Moderno* (Bologna, il Mulino) together with other five short essays on the mentioned matters presented by the colleagues of the FIRB Research group.
2. As already exemplified by the Homeric *Odyssey* II, 276-277, von der Muehll παῦροι γάρ τοι παῖδες ὁμοῖοι πατρὶ πέλονται, / οἱ πλέονες κακίους, παῦροι δέ τε πατρὸς ἀρείους (translated by MURRAY A. T., *Few sons indeed are like their fathers; most are / worse, few better than their fathers*).
3. Cf. LASKARIS J., *The art is long. On the Sacred Disease and the Scientific Tradition*. Leiden-Boston-Köln, Brill, 2002, p. 148.
4. To the relation between the religious and mythical concept of pollution (*miasma*) as a cause of human misdoing on the one side, and the medical aetiology of hereditary diseases on the other side, there is devoted the article by PROVENZA A., *From Myth to Science. A Short Survey on Heredity and Its Causes in Ancient Greece*. included in the present volume.
5. GRMEK M., *Ideas on Heredity in Greek and Roman Antiquity*. *Physis* 1991; 28(1): 11-34, quotation p. 13.
6. As concerns the origins of genetics with a look back to the ancient thought cf. in the present volume the article by BOUDON – MILLOT V.
7. Under this point of view, matters of heredity as well as more specifically familial transmission of illnesses are considered until the end of the 18th century as not separated “*from the contingencies of conception, pregnancy, embryonic development, parturition, and even lactation*”, cf. MÜLLER-WILLE S. and RHEINBERGER H. J., *Heredity: The Formation of an Epistemic Space*. In: MÜLLER-WILLE S., and RHEINBERGER H. J. (eds.), Cambridge (MA)-London, MIT Press, 2007, pp. 3-35, quotation p. 3.
8. Hippocrates, *On Generation* 8, 1 Giorgianni Καὶ ἐν αὐτῆσφι ἡ γονὴ ἔρχεται καὶ τῆς γυναικὸς καὶ τοῦ ἀνδρὸς ἀπὸ παντὸς τοῦ σώματος, καὶ ἀπὸ τῶν ἀσθενέων ἀσθενῆς καὶ ἀπὸ τῶν ἰσχυρῶν ἰσχυρῆ· καὶ τῷ τέκνῳ οὕτως ἐστὶν ἀνάγκη ἀποδίδοσθαι: (...), translated by P. Potter: *In the uterus the seed of both the woman and the man comes from their whole body – weak from the weak parts and strong from the strong parts – so that the child must be formed accordingly (...)*.
9. Hippocrates, *On Generation* 8, 1 Giorgianni, transl. by Potter P. (*It is not possible for a child to look like its mother in all its features and like its father*

in none, nor the opposite of this, nor to look like neither parent in anything; rather there is a necessity to look like both parents in something, if sperm passes into the child from both of their bodies).

10. The relevance of aetiology in the intellectual discourse of the ancient physician and physiologist is shown by LASKARIS J., ref. 3, p. 149 ff.
11. This is already observed by BOUDON – MILLOT V., op. cit. (ref. 6), and more specifically by LASKARIS J., ref. 3, pp. 146-148, who points out the aetiological differences in the use by the Hippocratic author of *On the Sacred Disease* of the traditional terms of familiarity (κατὰ γένος) on the one hand, and of more technical terms (φύσει γίνεται) on the other.
12. In modern terms, familiarity includes to a certain extent the concept of innateness; conversely, for us it is a matter of fact that not every congenital illness is necessarily inherited. As concerns the Hippocratic Corpus, the already mentioned treatise *On Generation* 11 possibly shows some distinction between transmission of hereditary characters and congenital factors. Here it is stated that “crippled” (πεπηρωμένα) parents do not necessarily have crippled children, but mostly healthy ones. They only have crippled children if during gestation an illness occurs (ἐπὶν <δέ> τί οἱ νόσημα προσπέση). So it is not only stated that impairment is usually not inherited, but also that it is the fruit of a disease that at the moment of conception affects the body or the already impaired specific part of the bodies of the parents. The Hippocratic author seems here to take into account a set of different causes for the explanation of the anomaly, cf. BIEN CH. G., *Erklärungen zur Entstehung von Mißbildungen im physiologischen und medizinischen Schrifttum der Antike*. Stuttgart, Franz Steiner, 1997, pp. 47-53.
13. Hippocrates, *On the Sacred Disease* 2, 1-2 Jouanna Τὸ δὲ νόσημα τοῦτο οὐδέν τί μοι δοκεῖ θεϊότερον εἶναι τῶν λοιπῶν, ἀλλὰ φύσιν μὲν ἔχειν καὶ τὰλλα νοσήματα ὅθεν ἕκαστα γίνεται, φύσιν δὲ τοῦτο καὶ πρόφασιν, (...). Ἄρχεται δὲ ὡσπερ καὶ τὰλλα νοσήματα κατὰ γένος.
14. LASKARIS J., ref. 3, who translates (p. 146) the expression “*in the family*”, underlines that the ancient author’s argument “*veers dangerously close to the traditional view of the god-sent disease*” (quotation from p. 148).
15. Hippocrates, *On the Sacred Disease* 2, 2 Jouanna Εἰ γὰρ ἐκ τοῦ φλεγματώδους φλεγματώδης, καὶ ἐκ χολώδους χολώδης γίνεται καὶ ἐκ φθινώδους φθινώδης καὶ ἐκ σπληνώδους σπληνίης, τί κωλύει, ὅπου πατὴρ ἢ μήτηρ εἶχετο τούτῳ τῷ νοσήματι, τούτῳ καὶ τῶν ἐκγόνων ἔχουσθαί τινα; The above mentioned translation of the Hippocratic passage is mine.

16. According to the opinion expressed by WITT M., *Die "Zwillinge", des Hippokrates. Ein antikes Zeugnis von erblich disponierter Erkrankung (Augustinus, De civitate dei V, 2), seine mögliche Quelle und Rezeption*. In: PERILLI L., BROCKMANN CHR., FISCHER K. D., and ROSELLI A. (eds.), *Officina Hippocratica. Beiträge zu Ehren von Anargyros Anastassiou und Dieter Irmer*. Berlin-Boston, de Gruyter, 2011, 271-328, p. 286 ff., in Greco-Roman medicine only the predisposition for diseases was thought to be inherited, not the illness in and of itself. Actually, the impression that the reasoning of OSD 2, 2 rests on the possibility, and not the necessity of the hereditary transmission of the pathogenic disposition is stressed, if we choose, instead of Jouanna's emendation ὅπου, with the principal Hippocratic mss. the reading ὄπου (*Marcianus Gr. 269 : ὄπου Vindobonensis med. Gr. 4*) πατήρ ἢ μήτηρ... Thus, the physiopathological trait may affect, if at all, either the children or also the grandchildren of the sick person, cf. JOUANNA J. (ed.), *Hippocrate. La maladie sacrée*. Paris, Les Belles Lettres, 2003, p. 67 f.
17. Cf. LITTRÉ É. (ed.), *Oeuvres complètes d'Hippocrate*. Vol. 6, Paris, Baillière, 1849, reprint 1979, p. 364, 15 ("par hérédité"); JOUANNA J. (ed.), ref. 16, p. 10 and n. 2 ("dans l'hérédité"); KÜHN J. H., FLEISCHER U. et al. (eds.), *Index Hippocraticus*. Göttingen, Vandenhoeck & Ruprecht, 1986-1989, s. v. γένος ("a parentibus proficiscitur"); ROSELLI A. (ed.), *Ippocrate. La malattia sacra*. Venezia, Marsilio, 1996, p. 59 ("per ereditarietà"); JONES W. H. S. (ed.), *Hippocrates, Volume II*. London, William Heinemann, and Cambridge (MA), Harvard University Press, reprint 1943, p. 151 ("in heredity"); LASKARIS J., (ref. 3), p. 146 ("in the family"); WITT M., (ref. 16), p. 287 ("wie auch die anderen Erbkrankheiten").
18. According to ROSELLI A., (ref. 17), p. 17 f., the expression has a congenital as well as a hereditary meaning. See also GOUREVITCH D., [*Hippocrate*], *De l'art médical*. Paris, Librairie général française, 1994, p. 130 n. 1 ("par naissance"), correcting the French translation proposed by É. Littré; LASKARIS J., (ref. 3), quoted above (ref. 14).
19. Hippocrates, *On the Sacred Disease* 5, 1-3 Jouanna Ἄρχεται δὲ φύεσθαι ἐπὶ τοῦ ἐμβρύου ἐν τῇ μήτρῃ ἐόντος. Καθαίρεται γὰρ καὶ ἀνθεὶ ὥσπερ τὰ ἄλλα μέλεα πρὶν ἢ γενέσθαι καὶ ὁ ἐγκέφαλος. (...) Ἦν δὲ κάθαρσις μὴ ἐπυγνήται, (...), in the translation by W. H. S. Jones: *Its birth begins in the embryo while it is in the womb, for like the other parts, the brain too is purged and has its impurities expelled before birth. (...) Should the purging not take place, (...)*.
20. OSD 7, 1 and 5 Jouanna.

21. *OSD* 13, 1 Jouanna.
22. Indeed, if the disease has become chronic, it cannot be cured, cf. LASKARIS J., (ref. 3), p. 135 ff.
23. *OSD* 11, 1 Jouanna Ὡς δὲ ἀπὸ παιδίου συνήϋξεται καὶ συντέθραπται, ἔθος πεποιήται ἐν τῆσι μεταβολῆσι τῶν πνευμάτων τοῦτο πάσχειν καὶ ἐπίληπτον γίνεσθαι ὡς τὰ πολλά, καὶ μάλιστα τοῖσι νοτίοισιν, ἢ τε ἀπάλλαξις χαλεπὴ γίνεται· (transl. by W. H. S. Jones: *But when the disease dates from infancy and has grown and been nourished with the body, the habit has been formed of the flux occurring at the changes of the winds, and the patient generally has an attack then, especially if the wind be in the south. Recovery proves difficult.*).
24. *OSD* 18, 3 Jouanna.
25. With regard to the multi-cause set used by the Hippocratic author to explain the disease, see LASKARIS J., (ref. 3), pp. 120 and 152 f.
26. Particularly *OSD* 18 does deal with the dietetic skills required by the healer whose treatment has the hope of ending up successfully.
27. Among the few references to the pangenetic theory by Hippocratic authors, particularly interesting for our issues are those in which the physician claims a relation between constituent elements of the human being and hereditary transmission of affections, as is the case of *On Generation* 3 (Τὴν δὲ γονὴν φημι ἀποκρίνεσθαι ἀπὸ παντὸς τοῦ σώματος, καὶ ἀπὸ τῶν στερεῶν καὶ ἀπὸ τῶν μαλθακῶν καὶ ἀπὸ τοῦ ὑγροῦ παντός. εἰσὶ δὲ τέσσαρες ιδέαι τοῦ ὑγροῦ· αἷμά τε καὶ χολή καὶ ὕδωρ καὶ φλέγμα· τοσαύτας γὰρ ιδέας ἔχει συμφυέας ὁ ἄνθρωπος ἐν ἑωυτῷ, καὶ ἀπὸ τουτέων αἱ νοῦσοι γίνονται) and *Diseases*, Book IV, 32 (Τοῦ ἀνθρώπου ἐς τὴν γένεσιν ἀπὸ πάντων τῶν μελέων τοῦ ἀνδρὸς καὶ τῆς γυναικὸς ἐλθὼν τὸ σπέρμα (...) χρόνου δὲ γενομένου φύσις ἀνθρωποειδῆς ἐγένετο ἐξ αὐτοῦ (...) καὶ ἐπειδὴ τὸ ζῶον ἐγένετο, κατὰ τοὺς τοκῆας τοσαύτας ιδέας ὑγροῦ ὑγιεροῦ τε καὶ νοσεροῦ ἔχει ἐν ἑωυτῷ), transmission of resemblances or morphological anomalies between parents and children, as in *On Generation* 8 (... ἡ γονὴ ἔρχεται καὶ τῆς γυναικὸς καὶ τοῦ ἀνδρὸς ἀπὸ παντὸς τοῦ σώματος, καὶ ἀπὸ ἀσθενέων ἀσθενῆς καὶ ἀπὸ τῶν ἰσχυρῶν ἰσχυρῆ· καὶ τῷ τέκνῳ οὕτως ἐστὶν ἀνάγκη ἀποδίδοσθαι; cf. *On Generation* 11: αἱ τοῦ ὑγροῦ αὐτῷ (...) τέσσαρες ιδέαι ἐοῦσαι, ὁκόσαι ἐν φύσει ὑπῆρξαν, τὴν γονὴν οὐχ ὅλην παρέχουσιν, ἀσθενέστερον δὲ τὸ κατὰ τὸ πεπρωμένον· οὐ θαῦμα δέ μοι δοκεῖ εἶναι καὶ πηρωθῆναι καθάπερ ὁ τοκεύς) and *Airs, Waters, Places* 14 Jouanna (Ὁ γὰρ γόνος πανταχόθεν ἔρχεται τοῦ σώματος, ἀπὸ τε τῶν ὑγιερῶν ὑγιερὸς ἀπὸ τε

τῶν νοσερῶν νοσερός· εἰ οὖν γίνονται ἔκ τε τῶν φαλακρῶν φαλακροὶ καὶ ἔκ γλαυκῶν γλαυκοὶ καὶ ἔκ διεστραμμένων στρεβλοὶ ὡς ἐπὶ τὸ πλῆθος καὶ περὶ τῆς ἄλλης μορφῆς ὁ αὐτὸς λόγος, τί κωλύει καὶ ἔκ μακροκεφάλου μακροκέφαλον γίνεσθαι;).

28. In general, the lack of specific attention in the Hippocratic medicine, at the nosological as well as at the therapeutic level, to the female body's constitution has been underlined by DEAN JONES L. A., *Women's Bodies in Classical Greek Science*. Oxford, Clarendon, 1994, p. 112 ff., cf. particularly p. 120 f., according to whom the only female constitution to which specific attention is drawn is the humid one as well as the corresponding body humour, viz. the so-called *hydrops*.
29. Cf. *On Diseases of Women* I, 8-9 Grensemann (chapter 8, 1: "Ἦν δὲ γυνὴ τὸ σῶμα φλαύρωσ ἔχη καὶ ἦν χολώδεα τὰ καταμήνια, γνωστά ἐστι τῷδε μέλανά ἐστι κάρτα, ἐστι δ' ὅτε μελανέα λαμπρά, (...); ch. 9, 1: "Ἦν δὲ γυνὴ τὸ σῶμα φλαύρωσ ἔχη καὶ φλεγματώδης ἦ, τὰ καταμήνια χωρήσει οἱ φλεγματώδεα. γνωστὸν δὲ ἐστίν, ἦν χωρῆ φλεγματώδεα· ὑμένωδεα γὰρ φαίνεται οἱ καὶ ὡσπερ ἀράχνια διατείνεται, καὶ ὑπόλευκά ἐστι.).
30. The case of the gynaecological affections described in Book I of *On Diseases of Women* (chapters 8-11 Grensemann) is one in which a body humour imbalance ("Dyskrasie") is evoked as a primary pathogenic factor which then causes an organic specifically gynaecological affection, cf. GRENSEMANN H., *Hippokratische Gynäkologie. Die gynäkologischen Texte des Autors C nach den pseudohippokratischen Schriften De muliebribus I, II und De sterilibus*. Wiesbaden, Franz Steiner, 1982, p. 5. Generally, the difficulty for the healer to individuate the underlying female constitution in the frame of the Hippocratic nosology is discussed by DEAN JONES L. A., (ref. 28), p. 122 f.
31. Cf. regarding the woman affected by hydropic menstruation the similar expression in chapter 10, 9 Grens.: καὶ ἦν μελεδαίνηται ὡς χροῖ, ὑγιῆς ἔσται.
32. With respect to the parts of Books I-II of *On Diseases of Women* and of *Barrenness* which he has edited, cf. GRENSEMANN H., (ref. 30), p. 37 f.
33. Cf. chapter 15 Potter Ὀκόταν δὲ λευκὸς ῥόος ἐγγένηται, (...). ἡ δὲ νοῦσος γίνεται ἦν φύσει εὐόσα φλεγματώδης πυρεταίνη καὶ χολῆ κινηθεῖσα μὴ καθαρῆ· ἦν μὲν οὖν ἡ κοιλίη ἦ ὀξείη, διάρροιαί γίνονται· ἦν δ' ἐς τὰς ὑστέρας τράπηται, ῥόος ἐγγίνεται. (...) καὶ ὡς ἤμισα λουέσθωσιτίοισι δὲ χρήσθω ὡς ξηροτάτοις καὶ ψυχροῖσιν. ἐπιὴν δὲ παύσηται τὸ ῥεῦμα, φάρμακον πῖσαι ὑφ' οὗ ἄνω καθάρα, (...), in the transl. by P. Potter. Supplementary advice about therapy, symptoms and prognosis of the

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- “white flux” is listed in Book II of *On Diseases of Women* 116 Countouris (vol. 8, 250-252 Littré).
34. Hippocrates, *On the Nature of the Child* 30, 6 Giorgianni (in the translation by P. Potter).
 35. On this passage see the commentary by LONIE I. M., *The Hippocratic Treatises “On Generation”, “On the Nature of the Child”, “Diseases IV”*. A Commentary. Berlin-New York, de Gruyter, 1981, p. 249 f., who translates “the condition is constitutional, being inherited from her mother”.
 36. Cf. Hippocrates, *OSD* 11, 1 Jouanna quoted above (ref. 23); with regard to the difficult treatment for the Hippocratic healer or even the incurability of illnesses such as congenital or hereditary ones see VON STADEN H., *Incurability and Hopelessness: the Hippocratic Corpus*. In: POTTER P., MALONEY G., and DESAUTELS J. (eds.), *La maladie et les maladies dans la Collection hippocratique*. Actes du VI^e Colloque international Hippocratique (Québec, du 28 septembre au 3 octobre 1987), Québec, Les Éditions du Sphinx, 1990, pp. 75-112, particularly pp. 94-95.
 37. On the importance of regimen as the commonest method of therapeutic treatment see LONGRIGG J., *Presocratic Philosophy and Hippocratic Dietetic Therapy*. In: GAROFALO I., LAMI A., MANETTI D., and ROSELLI A. (eds.), *Aspetti della terapia nel Corpus Hippocraticum*. Atti del IX^e Colloque International Hippocratique, Pisa 25-29 settembre 1996, Firenze, Olschki, 1999, pp. 43-50, particularly p. 49, «The favourite method of treatment for the Hippocratic doctor, then, was by means of regimen, which entailed for him not just our modern conception of diet but rather a whole life-style, how one slept, exercised and, generally, interacted with one’s environment».
 38. It is worthy of note that dietetics as a regimen for healthy and unhealthy people was conceived by Greek physicians down to Diocles of Carystus as an individual self-controlling measure and that in the Hellenistic period it became more and more prescriptive, whereby in Galen’s work it aims to control all aspects of the patient’s life, cf. GRIMAUDO S., *Difendere la salute. Igiene e disciplina del soggetto nel De sanitate tuenda di Galeno*. Napoli, Bibliopolis, 2008, p. 173 ff.
 39. The shaping value of the Hippocratic dietetics in so-called “anthropopoeitic” terms is pointed out by CALAME C., *Prometeo genetista. Profitti delle tecniche e metafore della scienza*. Palermo, Sellerio, 2016 (Paris, Les Belles Lettres, 2010), pp. 70-72.
 40. Hippocrates, *Regimen* I, 27 Joly (CMG) Τὰ δὲ θήλεια πρὸς ὕδατος μᾶλλον ἀπὸ τῶν ψυχρῶν καὶ ὑγρῶν καὶ μαλθακῶν αὔξεται καὶ σίτων καὶ ποτῶν

καὶ ἐπιτηδευμάτων· τὰ δὲ ἄρσενα πρὸς πυρὸς μᾶλλον, ἀπὸ τῶν ξηρῶν καὶ θερμῶν καὶ σίτων καὶ διαίτης. εἰ μὲν οὖν θῆλυ τεκεῖν βούλοιο, τῇ πρὸς ὕδατος διαίτη χρηστέον· εἰ δὲ ἄρσεν, τῇ πρὸς πυρὸς ἐπιτηδεύσει διακτέον. καὶ οὐ μόνον τὸν ἄνδρα δεῖ τοῦτο διαπρήσσεσθαι, ἀλλὰ καὶ τὴν γυναῖκα (the translation quoted in the text is mine).

41. *Regimen I*, 28 Joly Τρεῖς μὲν οὖν αὐταὶ γενέσεις τῶν ἀνδρῶν, διάφοροι δὲ πρὸς τὸ μᾶλλον καὶ ἥσσον τὸ τοιοῦτον εἶναι διὰ τὴν σύγκρησιν τοῦ ὕδατος <καὶ τοῦ πυρὸς> τῶν μερέων καὶ τροφᾶς καὶ παιδεύσεως καὶ συνηθείας.
42. Plutarch, *Life of Lycurgus* 14, 4 Manfredini/Piccirilli (trans. by B. Perrin): (Ὁ Λυκούργος) ἀφελῶν δὲ θρύψιν καὶ σκιατροφίαν καὶ θηλύτητα πᾶσαν, (...).
43. Xenophon, *Constitution of the Lacedaemonians* 1, 4, 1 Marchant ... νομίζων ἐξ ἀμφοτέρων ἰσχυρῶν καὶ τὰ ἔκγονα ἐρρωμενέστερα γίνεσθαι (trans. by E. C. Marchant ... *believing that if both parents are strong they produce more vigorous offspring.*); see also the related commentary by LIPKA M., Berlin-New York, de Gruyter, 2002, p. 102. The importance of dietetics in Greek political theorizing literature is pointed out by WÖHRLE G., *Studien zur Theorie der antiken Gesundheitslehre*. Stuttgart, Franz Steiner, 1990, pp. 140-149.
44. It is not by chance that the term εὐγονία is attested for the first time in Xenophon, *Spartan Constitution* 1, 6, 3, and then in Plato, *Republic* 546 A, in the framework of a description of ideal political systems or ones considered such by the ancient author. On the eugenic measures at Sparta and the underlying embryological theories see in the present volume the paper by GAZZANIGA V., and CILIONE M., *Maschile e femminile nella trasmissione dei caratteri ereditari: da Atene a Sparta*.
45. On this issue regarding particularly the case of the Macrocephalous people in *Airs, Waters, Places* see PIGEAUD J., *Remarques sur l'inné et l'acquis dans le Corpus hippocratique*. In: LASSERRE F., and MUDRY PH. (eds.), *Formes de pensée dans la Collection hippocratique*. Actes du IV^e Colloque International Hippocratique (Lausanne 21-26 septembre 1981), Genève, Drosz, 1983, pp. 41-55, particularly p. 42 ff.
46. Hippocrates, *Airs, Waters, Places* 14 Jouanna τὴν μὲν γὰρ ἀρχὴν ὁ νόμος αἰτιώτατος ἐγένετο τοῦ μήκεος τῆς κεφαλῆς, νῦν δὲ καὶ ἡ φύσις ξυμβάλλεται τῷ νόμῳ. Τοὺς γὰρ μακροτάτην ἔχοντας τὴν κεφαλὴν γενναιοτάτους ἡγέονται. Ἔχει δὲ περὶ νόμου ὧδε· τὸ παιδίον ὀκόταν γένηται τάχιστα, τὴν κεφαλὴν αὐτοῦ ἔτι ἀπαλὴν εἶουσαν μαλακοῦ

έόντος ἀναπλήσσουσι τῆσι χερσὶ καὶ ἀναγκάζουσιν ἐς τὸ μῆκος αὔξασθαι δεσμά τε προσφέροντες καὶ τεχνήματα ἐπιτήδεια, ὑφ' ὧν τὸ μὲν σφαιροειδὲς τῆς κεφαλῆς κακοῦται, τὸ δὲ μῆκος αὔξεται. Οὕτω τὴν ἀρχὴν ὁ νόμος κατειργάσατο, ὥστε ὑπὸ βίης τοιαύτην τὴν φύσιν γενέσθαι. Τοῦ δὲ χρόνου προϊόντος ἐν φύσει ἐγένετο, ὥστε τὸν νόμον μηκέτι ἀναγκάζειν. (...) Νῦν δ' ὁμοίως οὐκέτι γίνονται ἢ πρότερον· ὁ γὰρ νόμος οὐκέτι ἰσχύει διὰ τὴν ὁμιλίην τῶν ἀνθρώπων. Transl. by W. H. S. Jones: *Originally custom was chiefly responsible for the length of the head, but now custom is reinforced by nature. Those that have the longest heads they consider the noblest, and their custom is as follows. As soon as a child is born they remodel its head with their hands, while it is still soft and the body tender, and force it to increase in length by applying bandages and suitable appliances, which spoil the roundness of the head and increase its length. Custom originally so acted that through force such a nature came into being; but as time went on the process became natural, so that custom no longer exercised compulsion. (...) At the present time long-headedness is less common than it was, for owing to intercourse with other men the custom is less prevalent.*

47. In Book II of the Hippocratic *Prorrhetic* (at chapter 5) there is a list of illnesses marked by a hereditary character: in addition to epilepsy, they are gout, phthisis/consumption and dropsy.
48. On the last perspectives of contemporary *gene therapy*, which prescribes a more and more “*proactive approach*” see in this volume the paper presented by COSTA R., *From chemical to genetic individuality. Evolving concepts and therapeutic approaches.*

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