

Embryo, Body and Generation

---- A Comparative Study of Embryological Thought in Ancient Greece and Early China

Qiaosheng Dong

Jesus College, University of Cambridge

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DECLARATION

This dissertation is the result of my own work and includes nothing which is the outcome of work done in collaboration except as declared in the Preface and specified in the text.

It is not substantially the same as any that I have submitted, or, is being concurrently submitted for a degree or diploma or other qualification at the University of Cambridge or any other University or similar institution except as declared in the Preface and specified in the text. I further state that no substantial part of my dissertation has already been submitted, or, is being concurrently submitted for any such degree, diploma or other qualification at the University of Cambridge or any other University or similar institution except as declared in the Preface and specified in the text

It does not exceed the prescribed word limit for the relevant Degree Committee.

Summary

Embryological thought across different cultures is a field that has rarely been investigated by historians of science. The goal of this dissertation is to reveal the similarities and differences of understandings of the body, sex and embryo through a comparative study of embryological thought in ancient Greece and early China. The used materials are mainly focused on, but not limited to, the classical medical or biological writings. Close readings and contextualization will be main techniques used in the research. This study shows that there was a great deal of various theories on abnormalities of fetuses, the formation of body parts, the sex of fetuses, the way to cultivate fetuses, the process of childbirth, the treatment of dead fetuses, etc. However, all the investigated Greek and Chinese authors gave important roles to both women and men regarding the matter of generation.

The dissertation is composed of six chapters, each of them dealing with separate topics. Chapter 1 explains authenticity problems, edition problems, date problems, and authorship problems of selected texts and it also explains the different motivations and tasks of selected texts. Chapter 2 makes an investigation into the process of conception, the mechanism of embryonic formation, the long period of gestation and the final stage of childbirth. Chapter 3 deals with the different understandings of the male and female bodies and it reveals the complexity of sex differences through quantitative difference and qualitative differences. Chapter 4 makes an investigation into the role of women in generation. Chapter 5 looks into the intellectual contexts and explore some specific embryological ideas influenced by contemporary philosophical concepts and social contexts. Chapter 6 addresses the way of thinking, including the issues of analogical reasoning, macrocosm and microcosm, and beliefs of numbers. These ideas play an important role in the formation of embryological knowledge in both ancient Greece and early China.

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Abbreviations

CMG *Corpus Medicorum Graecorum* (Leipzig: Teubner; Berlin: Akademie-Verlag, 1908-)

DK Diels, H. and Kranz, W. (1952) *Die Fragmente der Vorsokratiker* (Berlin: Weidmann)

Li Littré, E. (ed.) (1839-61) *Oeuvres complètes d'Hippocrate*, 10 Vols (Paris: Bailliere)

Loeb Jones, W.H.S., Potter, P. and Smith, W.D. et. al. (trans.) (1923-2010) *Hippocrates: Works*, 9 vols (Loeb Classical Library) (Cambridge, Mass. and London: Harvard University Press)

SK *Siku Quanshu* 四庫全書 (*Complete Library of the Four Branches*)

MWD *Mawangdui Manuscripts* 馬王堆文獻

Hippocratic Writings

[*Aer.*] Airs, Waters, Places

[*Nat. Mul.*] Nature of Woman

[*Ali.*] Nutriment

[*Nat. Puer.*] Nature of the Child

[*Aph.*] Aphorisms

[*Oct.*] Eight Months' Child

[*Carn.*] Fleshes

[*Oss.*] Nature of Bones

[*Epid.*] Epidemics

[*Prorrh.*] Prorrhetic

[*Foet. Exsect.*] Excision of the foetus

[*Septim.*] Seven Months' Child

[*Genit.*] Generation

[*Steril.*] Barren Women

[*Gland.*] Glands

[*Superf.*] Superfetation

[*Loc. Hom.*] Places in Man

[*VM*] Ancient Medicine

[*Morb. Sacr.*] Sacred Disease

[*Vict.*] Regimen

[*Mul.*] Diseases of Women

[*Virg.*] Diseases of Young Girls

Aristotle's Writings

[*GA*] Generation of Animals

[*Metaph.*] Metaphysics

[*HA*] History of Animals

[*Pr.*] Problems

[*PA*] Parts of Animals

[*Mete.*] Meteorologica

[*IA*] Progression of Animals

[*Cael.*] On the Heavens

[*MA*] On the Motion of Animals

[*Pol.*] Politics

[*Ph.*] Physics

[*Rhet.*] Rhetoric

Introduction

My thesis takes a comparative approach to embryological thought in ancient Greece and early China. I adopt a broad understanding of what counts as ‘embryological thought’, including all sorts of speculations, explanations and beliefs concerning the beginning of a new life. Embryology only became a distinct modern medical specialism and biological sub-discipline after the eighteenth century, but some related fundamental terms and concepts were established in both ancient Greece and early China. There were special vocabularies whereby to speak of ‘embryo’, referring to the developing offspring at the very early stages from conception to birth. In Greek texts, the term *κνήμα* is frequently used to refer to ‘embryo’, even though other terms might be used. In Chinese texts, the term ‘*pei* 胚’ and ‘*tai* 胎’ are usually used to refer to ‘embryo’, while sometimes ‘*pei* 胚’ indicates an earlier stage than ‘*tai* 胎’, but in most cases there is no clear distinction. In my thesis, I will widely bring together writings from classical Greece (roughly from the fifth to the third centuries B.C.E.) and early China (roughly from the fifth to the second centuries B.C.E.) to compare and contrast, analyse and explain their ideas on this topic.

My work builds on previous scholarship on the history of generation in ancient Greece and China, as well as previous scholarship in the field of comparative history more broadly. It is, however, the first to focus on ancient embryology in a comparative frame, despite the importance of the subject, in both conceptual and practical ways, to the societies concerned. The aim is therefore to contribute both to our understanding of key aspects of generation in classical Greece and China, through their elucidation in dialogue with each other, and to discussions about the uses of comparisons, about what this kind of historical undertaking can offer, more particularly, to the study of the past.

Embryology

Speculation as to how humans reproduce is one of the ultimate questions concerning human beings, and those beings are always concerned with their own existence and continuity in more practical ways too. Great efforts were made to regulate fertility and manage births since antiquity.¹

¹ Flemming, R. (2013).

‘Generation’ was a term used before the modern concept of ‘reproduction’, literally ‘producing again’, which was only established in the middle eighteenth century, while modern concepts of eggs and sperm, genes and population were only established after the eighteenth century.² In my thesis, however, ‘generation’ and ‘reproduction’ will be used alternatively without too much distinction.

The history of reproduction is such a broad field that it could involve almost all disciplines of humanities and social sciences. Despite the importance of family, society and population, my thesis will have a central focus on the history of medical and biological ideas in relation to reproduction. More specifically, I mean the speculations, explanations and beliefs in antiquity which refer to (1) the nature of ‘seeds’, by which I mean the part that was thought to be the essential contribution from parents in generation; (2) the formation of embryos, by which I mean the earliest phases of foetal formation in a loosely manner; (3) the differentiation of the bodily parts of the embryo/foetus, while ancient Greek and Chinese texts do not systematically distinguish embryo and foetus in the modern way; (4) the differentiation of sex, the processes through which embryos/foetuses are made male or female; (5) nourishment and growth of the embryo/foetus, and (6) abnormalities in childbirth. That is to say that they focus on what is formed inside the woman’s body in generation not on the reproductive woman herself, which is why I use the term ‘embryology’. All these ideas will be defined as ‘embryological thought’ for analysis and comparison in my thesis. I will also examine some related gynaecological discussions which cover many related issues but with a focus on the mother, such as what diseases are particularly related to women’s reproductive functions, what preparations should be made for a successful conception, how healthy pregnancies could be supported, how births could be managed, etc.

Pioneering research on ancient Greek embryological thought was done by the Austrian medical historian Erna Lesky. In 1951, Lesky published *Die Zeugungs- und Vererbungslehren der Antike und ihr Nachwirken*, which summarized and analysed a set of ideas on generation in the ancient world, including notions of foetal development etc.³ Later, rival ancient conception theories were examined again by scholars like Anthony Preus, Sarah George, Michael Boylan, Sophia

2 Hopwood, N., Flemming, R. and Kassell, L. (2018), 4.

3 Lesky, E. (1951).

Connell and Devin Henry.⁴ An increasing interest in questions around the position of women in ancient Greek medicine inspired by second wave feminism also led to some further scholarship on classical embryology alongside a greater focus on gynaecology. For example, apart from works on Hippocratic gynaecology, Ann Ellis Hanson also wrote several articles on Hippocratic embryology.⁵ Lesley Dean-Jones demonstrated the central role of menstruation in defining the female physiology and pathology and in explaining the female's role in reproduction.⁶ More recently, Hynek Bartoš made a detailed investigation into the concept of the 'seed' and the theory of palingenesis in the Hippocratic treatise *On Regimen*.⁷ Much more attention was paid to Aristotle's embryological writings (especially his *Generation of Animals*), which were well studied by those interested in the role of women in ancient science,⁸ and also by those interested in the place of biology in Aristotle's overall philosophy.⁹

On the ancient Chinese side, there has been more focus on theological and cosmological approaches to embryology than on medical discussions. For example, Chen Ming explored the possible influence and transmission of the Buddhist knowledge on foetal development.¹⁰ The book *Imagining the Fetus: The Unborn in Myth, Religion, and Culture* explored the Buddhist views the foetal symbolism.¹¹ There were also plenty of research on the Taoist views on the human generation, the symbolism of gestation, the internal Alchemy (*Neidan* 内丹) and its practice of conceiving the Embryo of immortality.¹² My thesis will not look into the Buddhist and Daoist views, but I will demonstrate that there were even earlier sources on the beliefs of self-cultivation and immortality patterned on human embryological development or procreative imagery. Indeed, some articles have discussed more medical materials. For example, Sabine Wilms explored the transmission of medical knowledge on foetal cultivation in early China.¹³ Jessey Choo examined the negative attitudes towards the foetus and the foetal development under the concepts and practices of 'filial piety'

4 Preus, A. (1975b, 1977), George, S. (1982), Boylan, M. (1984), Connell, S. (1999), Henry, D. (2005).

5 Hanson (1987), (1992), (2008).

6 Dean-Jones, L. (1994).

7 Bartoš, H. (2009).

8 e.g. Freeland (2000), Taylor (2003), Gelber (2010, 2018), Karbowski (2012, 2014), Yates (2015), Deretic (2015), Gelber, J. (2018).

9 e.g. Hilton (2006), Matthen (2011), Gotthelf (2012), Carraro (2017), Lennox (2018), Gabbe (2019).

10 Chen, M. (2004).

11 Law, J.M. and Sasson, V.R. (2008).

12 e.g. Espesset, G. (2016), Mollier, C. (2016), Steavu, D. (2016), Despeux, C. (2016), Pregadio, D. (2016).

13 Wilms, S. (2005).

before the eleventh century C.E.¹⁴ Zhang Hanmo investigated the descriptions of the ten-month pregnancy (in lunar months) in the background of early Chinese thinking and writings on techniques and numbers.¹⁵ There were also some publications on childbirth with a focus on the medical materials. For example, Charlotte Furth studied the evolution of ancient Chinese understandings of fertility, menstruation, gestation and childbirth.¹⁶ Lee Jen-der explored the duties of wet nurses and the applications of herbal medicine, delivery charts, ritual techniques and manual manipulations in childbirth.¹⁷ Wu Yili investigated the material and ideological issues around childbirth and attitudes towards women's reproductive diseases.¹⁸

The key debates discussed in the existing academic research on the Chinese texts involved the origin of 'gynaecology' and sexual prejudices in imperial China, which were somehow related to my topic but not the central one on 'embryology'. Moreover, most works in the existing academic research were studying materials of much later periods rather than the chosen period for comparison, but I am not going to compare the Greek materials with Chinese materials from the Tang dynasty or the Qing dynasty. One basic fact is that there were much less materials available in the early period than the late period. Even for these available materials, the fragmented manner increased the difficulty for research. Strictly speaking, there was very little research purely focused on embryological thought in the period of early China, apart from some translations to related texts. My research aims to fill this research gap, which is the reason why my focus is on embryology.

Ancient Greece and Early China

Throughout history, how new beings were made, the different processes and phases involved, have been discussed and debated in almost every culture in the world. Regardless of the circumstances, the beginning of life was a common subject for ancient Greeks and Chinese thinkers to consider in both theoretical and practical ways. They had the common ambition of understanding, explaining, and predicting what is happening in the process of reproduction. There were plenty of observations, speculations, imaginations and arguments. The two traditions are worth examining on

14 Choo, J. (2012).

15 Zhang, H. M. (2017).

16 Furth, C. (1995, 1998).

17 Lee, Jen-der (2002, 2005).

18 Wu, Yi-li (2010).

this score, not only for their long-standing and fundamental influences in the western and the eastern traditions, but also for the abundant ancient writings on human origins and human generation that have survived from both cultures, the basic stuff of research.

The scope of my research will cover a wide range of writings from medical to philosophical. Due to the limitation of words, my thesis must be selective and must have a focus on the most representative ones. For the Greek side, embryological discussions can be found in a rather systematic way in the Hippocratic writings and Aristotle's works. For the Chinese side, embryological discussions can be found in a rather scattered way. I will have a focus on the manuscripts of Mawangdui 馬王堆 (MWD) and the *Huangdi Neijing* 黃帝內經 (*the Inner Canon of the Yellow Emperor*), but some other texts will be used for supplements, including the bamboo strips of the Warring States preserved at Tsinghua University 清華大學藏戰國竹簡, *Guanzi* 管子 (*Writing of Master Guan*), *Huainanzi* 淮南子 (*the Masters of Huainan*), *Chunqiu Fanlu* 春秋繁露 (*the Luxuriant Dew of the Spring and Autumn Annals*), and some other traditional texts passed down. Previous scholarship has made great research on each side separately, but there is no research to bring them all together for a big picture. It is necessary to point out that these embryological discussions, no matter in ancient Greece or China, were only a part of a wide discourse in antiquity.

In the last thirty years, the western scholarship had made great efforts in doing translations and making notes of ancient Chinese texts. Three books of such a kind are most important for my research. In 1998, Donald Harper published *Early Chinese Medical Literature: The Mawangdui Medical Manuscripts*, which is the most important research on the early Chinese medical manuscripts so far. It also provides the full English translation and detailed notes on the medical writings among the Mawangdui manuscripts.¹⁹ In 2010, John S. Major, Sarah A. Queen, Andrew Seth Meyer, and Harold D. Roth jointly published *The Huainanzi: A Guide to the Theory and Practice of Government in Early Han China*. It is a remarkable translation and a path-breaking volume for the research of early Chinese thought.²⁰ In 2011, Paul Unschuld and Hermann Tessenow published *Huang Di Nei Jing Su Wen: An Annotated Translation of Huang Di's Inner Classic* –

19 Harper, D. (1998).

20 Major, J. S. etc. (2010).

Basic Questions, which provides the full English translation and detailed notes on the most important medical collections in early China.²¹ I will follow these books for some translations, but generally all translations are my own, unless I have otherwise indicated. I will provide the original texts for my own translation.

For the Greek side, I will mainly follow the translations in the Loeb Classical Library for ancient Greek texts, unless I have otherwise indicated. Apart from modern translations, there has been much more academic research on Hippocratic writings and Aristotle's works. The research covers a wide range of topics related to the authenticity, the transmission and the reception of the texts, the social and intellectual contexts, the interactions between medicine and philosophy, etc.²² There was also an increasing interest in the role of women in these texts.²³ Different scholars had different interpretations which led to intensive debates. I want to engage with previous debates and deal with the following three key issues which are highly related to the topic of ancient embryological thought.

First, were theories of reproduction bound to emphasize the importance of the male component over the female? There is no doubt that the female sex had an inferior status to the male in the ancient world. Moreover, the ancient materials that we have were most exclusively written by males and indicated a strong male orientation of interest.²⁴ If so, would the role of women in reproduction be devalued in the writings of male doctors? For the Hippocratic writings, Ann Ellis Hanson criticized the doctor's concern to manipulate gestation in order to assert the primacy of the male.²⁵ She argued that Hippocratic authors assumed an active baby and a passive uterus in the birth process.²⁶ Helen King also argued that women's role in childbirth was pictured as essentially passive in the Hippocratic writings.²⁷ In my thesis, however, I will give a challenge to the model of an active baby and a passive uterus. I will argue that gestation was commonly regarded as a mutual, interactive and dynamic process.

21 Unschuld, P. and Tessenow, H. (2011).

22 e.g. van de Eijk, P. (2005a/b), Pormann, P. E. (2018), Henry, D. and Nielsen, K. M. (2015), Lennox, J. and Bolton, R. (2015).

23 e.g. King, H. (1998), Mayhew, R. (2004), Connell, S. (2016).

24 Manuli (1980), (1983).

25 Hanson, A. (2008), 97-98.

26 Hanson, A. (1985), 6-7; (1990), 318; (1991), 88, 94; (1992), 54; (2008), 101.

27 King (1998), 124, 179.

For Aristotle, there were more debates on his sexism. It was charged by many scholars that Aristotle's biological theories were not entirely based on value-neutral observations, but strongly influenced, no matter consciously or unconsciously, by the social ideological biases (or the common sexual prejudice of the society) in an inevitable manner.²⁸ Some scholars argued that Aristotle viewed women as mere containers in his biological theory.²⁹ It was even further argued that Aristotle's sexist biology, in return, made a justification and reinforcement for political subordination of women to men, in which way he legitimized and rationalized the Greek patriarchal system.³⁰ However, some other scholars tried to defend Aristotle by arguing that his biological theories were constructed as a result of his own metaphysical requirements along with good empirical evidence, not out of any ideological influence or any sexist motivation. For example, Robert Mayhew tried to save Aristotle from the common criticism of sexism in his book *The Female in Aristotle's Biology*. Robert Mayhew argued that Aristotle's biological theories, which were irrelevant to his ethical and political claims, did not imply an absolutely passive and inferior role of women as some feminists interpreted and did not attempt to secure the suppression of women.³¹ Similarly, Sophia Connell tried to provide a rather positive treatment of Aristotle's account of female nature in her book *Aristotle on Female Animals*.³² In my thesis, I will call more attention to the positive role played by the female in Aristotle, as well as in other ancient embryological writings. Indeed, there is no reason to deny that there was a common reflection of sexual hierarchy in embryological theories, especially in the Greek ones. However, there is also a complementary relationship between male and female. In both cultures, there was a common recognition of the female's indispensable and positive role in generation. The female can do many things that the male cannot do.

Second, did the female make any essential contribution of the 'seed' (referring to the seminal fluid which forms the mixture of the embryo) in generation? Or, in other words, was the womb pictured as no more than a passive container which houses the foetus as it grows? This question is

28 e.g. Witt, C. (1998).

29 e.g. Keuls, E. (1993), 145.

30 e.g. Horowitz, M.C. (1976).

31 Mayhew, R. (2004), 35.

32 Connell, S. (2016), 378.

highly related to the understanding of inheritances and lineages. The Hippocratic theory was normally labelled as the ‘two-seed theory’ for admitting the female seed. Lloyd thought that the ‘two-seed theory’ represented a challenge to aspects of the dominant ideology.³³ Rousselle thought that the ‘two-seed theory’ indicated the origin of reproductive knowledge from a female oral tradition in representing the voices of females.³⁴ By contrast, Aristotle’s theory was normally labelled as the ‘one-seed theory’ for denying the female seed.³⁵ However, some other scholars argued that Aristotle was willing to attribute seed to both male and female.³⁶ In my thesis, I want to argue that Aristotle’s theory should be labelled neither as ‘the one-seed theory’ nor ‘the two-seed theory’. Aristotle had a special theory of his own. For Aristotle, the female contribution (I call it ‘the secondary seed’) is still a sort of essential contribution, but it is different from the male contribution (I call it ‘the primary seed’). In fact, there was a common understanding of the female’s essential contribution of certain ‘seed’ in both Greek and Chinese cultures. The female contribution was generally acknowledged in almost all the investigated embryological writings. It was generally admitted that some essential parts of the embryo came from the mother’s side, which was used to explain the phenomenon of maternal resemblance. Women were not simply regarded as containers or suppliers of nourishments.

Third, should female be regarded a failure of nature in Aristotle? In his paper ‘How Sexist is Aristotle’s Developmental Biology?’, Devin Henry proposed his interpretation that the process of sex determination is not aimed at producing males but results purely from non-teleological ‘necessity’ (τὸ ἀναγκαῖον).³⁷ However, in her paper ‘The Private Parts of Animals: Aristotle on the Teleology of Sexual Difference’, Karen M. Nielsen defended the traditional interpretation that the female represents a failure of nature to reach its ‘telos’ (τοῦ τέλους) because Aristotle conceived the process of generation as teleologically directed towards the production of male rather than female animals.³⁸ In my thesis, I will support Devin Henry’s view from another perspective. I will argue

33 Lloyd (1983), 61.

34 Rousselle (1988), 27-29.

35 e.g. Horowitz, M.C. (1976), 186, 188, 192; Pellegrin, P. (1986), 66-67.

36 e.g. Lennox, J. G. (1985), 319; Balme, D. M. (1985), 193-4; (1990), 22; Henry, D. (2007), 256; Nielsen, K.M. (2008), 381; Kosman, A. (2010), 161.

37 Henry, D. (2007), 259.

38 Nielsen, K.M. (2008), 374, 384. Balme (1987), 253.

that the producing of females does not present a failure of nature to reach its general goal. At the universal level, it is 'for the better purpose' that the male and the female are separated from each other. At the individual level, it is a 'coincidence' that an individual acquires sexual characteristics in respect of the particular part, while it is a 'necessity' that an individual must come to be either a male or a female in respect of the particular '*dynamis*'. I will also argue that sex determination is something incidental in Aristotle. It is incidental for the embryo to be a male or to be a female. It means that, in a sense, the sex of the child is unpredictable.

Comparison

The comparison of ancient Greece and China, or the Sino-Hellenic Studies, is an emerging, fast-developing and stimulating disciplinary sub-field within both Classics and Sinology. There are various comparative works on different aspects of philosophy, literature, historiography, religion, law, art, music, language, logic, ethics, cultural history and so on. Among them, Lisa Raphals and Zhou Yiqun made relevant comparative discussions of gender.³⁹ Jeremy Tanner and Walter Scheidel provided rather comprehensive reviews of the publications of the field and demonstrated how such studies could illuminate aspects of the Classical world in fundamentally new ways which would be impossible without the benefit of a comparative perspective.⁴⁰

There are different ways to approach comparative studies of Greek and Chinese science. In 1999, Shigehisa Kuriyama published *The Expressiveness of the Body and the Divergence of Greek and Chinese Medicine*, which revealed how the human body came to be conceived in radically different ways in the two cultures and how the Greek and Chinese doctors came to a divergence of understandings and practices.⁴¹ Kuriyama emphasized the cultural constructions of bodily experience and he gave the examples of the pulse, the muscle, the bloodlettings, the breaths, etc. He demonstrated that the experience of the biological body is not universal and it largely depends on culture. In 2002, Geoffrey Lloyd and Nathan Sivin published *The Way and the Word: Science and Medicine in Early China and Greece*. This book investigated the motivations, the livelihoods, the audiences and many other social-cultural backgrounds of ancient authors in their pursuit of

39 Raphals, L. (1992), (1998), (2018); Zhou, Y. (2010, 2018).

40 Tanner, J. (2009); Scheidel, W. (2018).

41 Kuriyama, S. (1999).

knowledge.⁴² In addition, Lloyd published many other comparative works on science and medicine in representing a leading strand of this developing field.⁴³ In general, Lloyd much emphasized the social-political context and structure. He pointed out the importance of exploring the production of knowledge, the purpose of inquiry, the activities of the inquirers, the social institutions, and political conditions.

Indeed, cross-cultural comparisons have been adopted by philosophers, anthropologists, political scientists and sociologists since the nineteenth century to identify, analyse, and explain similarities and differences across cultures. However, there are still great difficulties for the acceptance of comparative works and the development of Sino-Hellenic studies. Everyone in the field knows that comparative scholarship is just in the beginning and much work lies ahead, as it is indicated in the most recent published book, *Ancient Greece and China Compared*.⁴⁴ Many scholars are still reluctant to accept comparative works, as Jeremy Tanner pointed out, partly for ideological reasons related to the incomparability of ‘the Classical’, partly because of the often-problematic basis and limited illumination afforded by such efforts as have been made.⁴⁵ Walter Scheidel thought that comparison should be best defined as a perspective or an approach rather than a formal method because it is not well conceptualized or formalized, let alone theorized.⁴⁶ A comparative work can easily encounter pitfalls and get a bad reputation of an arbitrary juxtaposition, of anachronism, of the application of inappropriate conceptual categories, and of over-generalization, etc. In Nathan Sivin’s words, you can compare an apple and an orange, and, in principle, anything can be compared with anything else. When you find much in common, it is easy to conclude with mere coincidence.⁴⁷ Hence, there are always risks to take a comparative approach.

However, I am not choosing a comparative project in random. I choose ancient embryological thought for comparison because there are common subjects, common available materials, and many other common grounds. Moreover, comparative research of ancient embryological thought has never been systematically carried out, even if much of this existing work could enable, if not suggest,

42 Lloyd, G. and Sivin, N. (2002).

43 Lloyd, G. (2004, 2005, 2006, 2015).

44 Lloyd, G. and Zhao, J. ed. (2018).

45 Tanner, J. (2009), 89.

46 Scheidel, W. (2018), 43.

47 Sivin, N. (2018), 33.

such an approach. I strongly believe that it is worthy of doing so. A comparative approach can be used to achieve various goals. The best advantage of a comparative approach is that it is able to find out what is common to all cultures and what is particular to a certain culture. It can help to find out whether shared phenomena can be explained by similar reasons. It can provide an analytical tool for examining and explaining similarities and differences. Only through a comparative approach can the distinctive features and commonalities between these two civilisations [i.e., Greece and China] be identified. Through a comparative research of ancient embryological thought, we can possibly (1) identify problems and questions that would not be clear without comparison; (2) gain a better understanding of ancient embryological thought; and (3) enrich and deepen our understanding of the Classical world.

Close readings and contextualization will be main techniques used in my research. I will try to learn from Shigehisa Kuriyama and Geoffrey Lloyd at the same time. My thesis, with a focus on embryological thought, will give a support to Kuriyama's argument from another perspective. I will look into the cultural construction of embryological knowledge and reveal how the embryo and its development came to be conceived in very different ways in different cultures. This is one aspect. On the other aspect, Kuriyama's work took the great focus on differences, while my thesis will pay more attention to similarities. I will also look into the social-political context and structure following a similar approach to that of Geoffrey Lloyd. I will also explore the production of knowledge and the purpose of inquiry. I am not only trying to identify the similarities and differences of embryological thought in ancient Greece and early China, but also trying to find out how these ideas might have arisen and taken the particular shapes they did.

Conceptual Frameworks

For a better comparison, it is necessary to consider the general picture, despite that the great diversity of ideas must be acknowledged at the same time. It is a basic fact that different authors could have very different theories and explanations of the same matter. In many cases, there was no consensus at all among the Hippocratic authors, nor among the authors of the *Huangdi Neijing*. We can produce an endless list to compare the differences in detail, but it is meaningless to make an arbitrary juxtaposition of everything. In a general sense, what are the most distinctive features and how might one explain the essential differences of embryological thought between the two cultures?

I want to argue that different conceptual and philosophical frameworks offer the most important reason for the differences in embryological understandings. The conceptual and philosophical frameworks must be first introduced in order to have a better understanding of the background. Now, I will set out the basic conceptual frameworks which make a general distinction between embryological thought in ancient Greece and early China.

For the Greek side, the most distinctive feature was represented by Aristotle's philosophy of teleology and hylomorphism. In Hippocratic writings, we can find great influences from some basic concepts like the four elements (fire, water, air, and earth), the four qualities (hot, cold, dry and wet), the four humours (blood, phlegm, yellow bile and black bile), etc. In Aristotle's works, there is a strong philosophical framework that has been systematically applied in almost all aspects of his biology. In Aristotle's philosophy, everything in existence must be explained in one of the four causes: (1) the final cause (τὸ ἔνεκα); (2) the motive cause (τὸ κινῆσαν); (3) the formal cause (τὸ εἶδος); and (4) the material cause (τὴν ὕλην). The final cause is 'for the sake of which'. Teleology is set up as the fundamental principle in *History of Animals*, *Parts of Animals*, and *Generation of Animals*. In his doctrine of teleology, everything must have its own purpose or *telos* (τοῦ τέλους) because Nature does nothing in vain. If something exists, it must be either 'for a purpose' (ἔνεκα) or 'of necessity' (ἀνάγκης). 'Nature never creates anything without a purpose.'⁴⁸ For example, Aristotle thought that the testicles are not necessary for generation, but have a purpose nonetheless: it is better if there are testicles because they 'make the movement of the seminal residue steadier.'⁴⁹ The motive cause is also the efficient cause. It is the principal movement. The formal cause is also the form or the logos. It is the process to follow. The material cause is also the matter. It is 'out of which'. In his doctrine of hylomorphism, everything must have its form and its matter.⁵⁰ The form is predetermined and unchangeable and there are several levels of form. The form of 'animal' can be present in both 'human' and 'horse.' The form of 'human' can be present in 'Socrates' and 'Coriscus.'⁵¹ Human is generated by human. It is impossible for a human to be generated from a horse because they are very different in form. The form of 'human' would not be influenced and

48 *IA* 704b15-17; *GA* 744a36-38.

49 *GA* 717a 17-31.

50 Gotthelf, A. (2012).

51 *Metaph.* 1038b17-19.

changed by external factors. For this reason, it is possible for mutilated parents to produce healthy offspring.⁵² These concepts are fundamental for Aristotle's embryology and they are essential reasons to make Aristotle's embryological theories distinct from others.

For the Chinese side, most early writings were largely influenced by the philosophy of *yin-yang* 陰陽 and the five phases. Even if the embryological discussions were scattered in a rather fragmented manner in different texts, we can find that the conceptual framework of *yin-yang* 陰陽 and the five phases was generally shared by almost all authors. In early China, the concepts of *yin-yang* 陰陽 and the five phases were influential in almost all aspects of intellectual life, especially among the men of recipes and techniques. As Michael Loewe wrote, they were major principles for Chinese views of the order of nature by the Qin and Han periods.⁵³

The concepts of *yin* 陰 and *yang* 陽 originally meant 'dark' and 'light', but they were later used to describe two dynamic and complementary forces in the universe. The whole philosophy of *yin-yang* 陰陽 is one that advocates both *yin* and *yang* as necessary and significant in generation. Everything in the universe is generated from the interaction of the two dynamic forces that are contrary, but complementary to each other. The best result for the interaction of the two forces is to achieve a balance (or a harmony), which is necessary for the stability of the universe, the state and the body. On the one hand, everything contains two contrary aspects at the same time; on the other hand, things can be divided into two 'categories' in relation to each other, such as Heaven and Earth, the sun and the moon, the day and the night, the light and the dark, the high and the low, the south and the north, the left and the right, the hot and the cold, the fire and the water, and the summer and the winter. This dichotomy also applies to society; thus, there are the lord and the minister, the husband and the wife, the father and the son, etc. In such a dichotomy, the male is associated with *yang*, while the female is associated with *yin*. In ancient China, certain words were usually used to define the male, e.g. *yang* (the male in general), *nan* 男 (the male human), *xiong* 雄 (the male bird) and *mu* 牡 (the male animal), while other words were used to define the female, e.g. *yin* (the female in general), *nü* 女 (the female human), *ci* 雌 (the female bird) and *pin* 牝 (the female

⁵² GA 724a4-8.

⁵³ Loewe, M. (1982): 38. Graham, A.C. (1986); Nylan, M. (2010).

animal). The male and the female were not totally defined according to generative powers or anatomic features.

The concept of the five phases originally came from the term *wuxing* 五行, which were abstractions from water (*shui* 水), fire (*huo* 火), metal (*jin* 金), wood (*mu* 木) and earth (*tu* 土). They were established as philosophical concepts to regulate the cycles of growth, change and decay as early as in the sixth century B.C.E. In this tradition, the five phases had the meaning of ‘five activities’ and were defined by their different functions. They were broadly applied to explain interactions of various phenomena from cosmic cycles to bodily functions. Myriad of things were classified into fivefold categories according to ‘the five phases’, like five flavours, five colours, five modes of music, five animals, five grain, five internal organs, etc, despite the inconsistency of classification from one text to another. Unlike Aristotle’s irreducible and unchangeable elements, the five phases were dynamic, interactive, and interchangeable. They had a relationship of mutual conquest and mutual production.

Another important Chinese concept is *qi* 氣. The concept of *qi* originally meant ‘giving grain to guests as a gift’, and also contains the character of grain 米 as its main part. After the word *qi* was used to replace the older word *qi* 气, which meant air and breath, the word *xi* 餼 was created to carry its basic meaning of ‘giving grain to guests as a gift’. In early Chinese thought, *qi* was regarded as the vital energy for life, not simply the breath or the air. The imbalance of *qi* would cause all sorts of problems for health. It was an important notion for ancient Chinese embryology. In many aspects, the notion of *qi* was quite analogous to the Greek notion of *pneuma* (πνεῦμα), which played an important role in later Greek/Roman embryology.

Content of the Thesis

My comparison of embryological thought in ancient Greece and China will proceed in six chapters. Each chapter contains both the Greek and Chinese materials and discussions. It might bring some troubles for reading if someone is not familiar with or not interested in another culture, but it is worthy of putting them together for a better comparison rather than to put them separately and make the same topic repeated again.

The first chapter will introduce the texts and the contexts. This chapter will give a detailed

explanation about the authenticity, authorship, edition, and date of selected texts. This chapter will also explore the motivations, the tasks and the audiences of these texts.

The second chapter will set out some key aspects of embryological knowledge presented in selected texts. How were the ‘seeds’ (the essential contribution from parents in generation) produced? How might one achieve a successful conception and what is the reason for failure? What determines the formation of boys and girls at the beginning of life? How are the bodily parts of a new life formed and developed and what can be observed in the process? When does the birth happen? This chapter will focus on embryological theories and explanations.

The third chapter will examine the understandings of procreative male and female bodies, a subject which is highly related to generation. What were the key factors defining sex differences? Was there any record of gender-specific diseases for which cases male and female patients should be treated differently? This chapter will address to the highly debated question on whether the female body is anatomically, physiologically and pathologically different from the male body in ancient science.

The fourth chapter will look into the relationship between sex and generation reflected in selected texts. Can we find the existence of sexual hierarchy in ancient embryological discussions? Was there any recognition of the female contribution to generation? Is it true that women played entirely passive roles in producing children? Is it true that the outcome of a female baby was regarded as a failure of Nature? This chapter will address the highly debated question of how much ancient science was influenced by prejudices towards women.

The fifth chapter will look into the intellectual contexts from which ancient embryological thought were produced. This chapter will outline and identify some interesting ideas in one culture, which can hardly find a counterpart in the other. This chapter will also explore how these unique concepts could bring influences to different explanations of life phenomena.

The sixth chapter will investigate ‘the way of thinking’, or in other words, how ancient people gave proofs to proposed embryological theories. Three kinds of interesting beliefs will be mainly discussed: analogical reasoning, macrocosm and microcosm, and powerful numbers. This chapter will explain how these beliefs bring great influences to the formation of ancient embryological

thought.

Due to the limitation of words, my thesis will not be able to discuss all materials related to ancient embryological thought. Apart from the Greek and Chinese traditions, there was also ancient Indian tradition, which also contained many interesting theories and explanations of the beginning of human life. There were also Buddhist, Christian and many other religious beliefs. There are left for further studies.

Chapter 1 Texts and Materials

This chapter will give a brief explanation of the problems relating to authenticity, authorship, edition and date of the texts and materials that will be used in my research. Thanks to the abundance of surviving texts, there is an opportunity to explore how the ancient Greeks and Chinese thought similarly or differently about the origin of life. I will use a variety of textual sources, which will not be limited to medical, biological or philosophical texts. Due to the limitation of words, my thesis, inevitably, is highly selective. Main works to be covered will be from the Hippocratic Corpus and Aristotle's works for the Greek side, and the manuscripts of Mawangdui and the *Huangdi Neijing* for the Chinese side, with the supplement of some other contemporary texts. These texts will be discussed separately and together, their coverage of the same subject providing good grounds for comparison.

The Hippocratic Corpus is a compilation of approximately sixty treatises about a variety of medical topics and containing many different doctrines written in the Ionic Greek dialect by many different authors, but eventually compiled under the name of the famous physician, Hippocrates of Cos. Scholars are generally agreed that none of these works can be reliably attributed to the historical Hippocrates.⁵⁴ Surprisingly little is clear about the authorship and the date of each individual treatise. Some scholars believed that most of the treatises were likely composed around the later fifth century and the early fourth century B.C.E., roughly corresponding to lifetime of the historical Hippocrates, and he might have participated, even taken a lead role in, the various developments in medicine, and this led to the first influx of ancient Greek medical writing.⁵⁵ However, more scholars argued that the Corpus was first assembled, commented and published in Alexandria in the third century B.C.E..⁵⁶ The most extensive edition of the Hippocratic Corpus in 10 volumes was produced by Emile Littré (1801-1881) in the nineteenth century, which is still used as the standard citation by many scholars, even if it has its own weakness of not including some

54 This skeptical view of Edelstein (1939) and Lloyd (1975) is widely accepted by modern scholars except W. D. Smith, who argues that the Hippocratic treatise *Regimen* can be ascribed to Hippocrates himself. See Smith (1979): 44–52. For convenience, I will still call them 'Hippocratic authors' in this paper.

55 Craik (2014, 2018). See also Jones (1923), xxix; Diller (1959); Joly (1983), 43-44; Mansfield (1983), 61-64; Nutton (2013): 60; van de Eijk (2016).

56 Fraser (1972), 364-369; Nutton (2013), p61; Roselli (2000), 175-178; Roselli (2001), 63-64; Smith (1979), 199-202; von Staden (1989), 453-456; Vallance (2000); Nutton (2013), 61; Totelin (2009), 5.

new manuscripts.⁵⁷

‘Hippocratic embryology’ is a field that has not been well studied by modern scholars, even if the ‘embryo’ (κῶμα) is one of main subjects in the Hippocratic Corpus. The term ‘embryo’ (κῶμα) here refers to what was thought to be formed at the beginning of life. When I use the term ‘Hippocratic embryology’, I refer to all sorts of different theories and interpretations in the collection concerning the ‘embryo’. Six treatises of the Corpus are concerned specifically with embryological matters: *Generation (Genit.) / Nature of the Child (Nat. Puer.)*, *Seven Months’ Child (Sep.)*, *Eight Months’ Child (Oct.)*, *Superfetation (Sup.)*, *Excision of the Foetus (Ex. Foet.)*. In Littré’s edition, it is thought that *Generation* and *Nature of the Child* are the writings of the same author and used to be part of the same work. *Diseases IV (Morb. IV)* was probably written by the same author because of various similarities and connections to *Generation* and *Nature of the Child*. As to *Seven Months’ Child* and *Eight Months’ Child*, there is no general agreement on the arrangement. Littré’s edition treats them separately, making ch.1-9 under the title of *Seven Months’ Child* (Li XII 436-452) and ch.10-13 under the title of *Eight Months’ Child* (Li XII 452-460). R. Joly’s edition take ch.1-13 as a whole work under the title of *Eight Months’ Child*, while H. Grensemann’s edition has Littré’s ch.9-13 first and then ch.1-8 under the title of *Eight Months’ Child*, and another short text under the title of *Seven Months’ Child*.⁵⁸ For the purpose of consistency, I will still follow Littré’s edition. As to *Superfetation*, it is a loosely organized collection. It does not provide a coherent argument on a particular subject, but presents some embryological and gynecological ideas in fragments. Many similar paragraphs appear in some other texts, such as *Diseases of Women I*, *Nature of Woman*, and most notably *Barren Women*, from which most ideas may be borrowed.⁵⁹ *Excision of the Foetus* is a short obstetrical text which has never been specifically researched, but main ideas are indicated in other texts as well. In previous scholarship, E. Lesky and S. George have produced two rather comprehensive works on embryological thought

57 New manuscripts of some individual works are included in the Corpus Medicorum Graecorum (CMG). For later pseudepigrapha, see Smith (1990). The purpose of Littré’s edition, in his words, was to improve medical practice by making Hippocrates’ works available to his fellow medical men in their own language. Littré regarded *Epidemics* 1 and 3, *Prognostic*, *Airs Waters Places*, *Regimen in Acute Diseases* as the genuine works of Hippocrates. He thought that the corpus was first assembled in Alexandria in the third century B.C.E.. c.f. Smith (1979), 31-34. It is true that Littré’s edition remains very important, but the Belles Lettres and Loeb editions are now catching up.

58 Joly (1970), 164-178; Grensemann (1968), 78-96, 122-124.

59 Lienau (1973), 37-42, 45-48.

in Hippocratic writings, but each has its own limitations in analysis.⁶⁰

Embryological ideas are also contained in several ‘gynecological treatises’, *Diseases of Women I* (Morb. Mul. I), *Barren Women* (Steril.), and *Nature of Woman* (Nat. Mul.), and some other treatises, for example, *the Sacred Disease* (Morb. Sacr.), *Aphorisms* (Aph.), *Epidemics II* (Epid.), *Fleshes* (Carn.), and most importantly, *Regimen* (Vict.).⁶¹ *Diseases of Women I* is devoted particularly to the problems of women in the process of reproduction: menstrual blood (ch.1-9), conception (ch.10-24), pregnancy (ch.25-34), and birth (ch.35-73). *Barren Women* is also named *Diseases of Women III*. It deals extensively with the causes of women’s failure in conception. *Nature of Woman* contains some similar ideas and recipes as that in *Diseases of Women*. Trapp considered *Nature of Woman* as an extract from *Diseases of Women*,⁶² but more scholars argued that they are separate works coming from common sources.⁶³ *Regimen* is a unique treatise which provides many different perspectives on common embryological problems. It is quite philosophical and theoretical. In many ways, I think this treatise is comparable with the specific embryological treatise *Generation / Nature of the Child*. These embryological writings have very different tasks. Some of them are more philosophical, which come to reveal universal principles through the topic of generation, for example, *Regimen*. Some of them are more medical, which come to solve particular problems related to childbirth, for example, *Superfetation*, *Excision of the Foetus*. Some of them contain both aspects, for example, *Generation / Nature of the Child*. In previous scholarship, much work has been done concerning these ‘gynecological treatises’ in the Hippocratic writings, e.g., A. E. Hanson, L. Dean-Jones, H. King, and L.M.V. Totelin.⁶⁴

It is unavoidable to discuss Aristotle for his great significance in Greek thought. First of all, it is necessary to mention that Aristotle is writing about all animals, of which humans are just one type. Aristotle’s works deal primarily with human generation, but these works also include generation of all sorts of other living beings, for example, ‘spontaneous generation’ of some lower species. Why

60 E. Lesky (1951); S. George (1982).

61 Jouanna (1999), Appendix 3, 373-416.

62 Trapp (1967), 39.

63 Ilberg (1925), 21-24, Jouanna (1974), 152-160; Grensemann (1975), 56; Totelin (2009), 13.

64 A.E. Hanson (1971, 1975, 1987, 1990, 1991, 1992, 1995a, 1995b); L. Dean-Jones (1994); H. King (1998); L.M.V. Totelin (2007, 2009).

could the generation of animals (and even insects) be mentioned together with the generation of human beings without too much distinction? In Aristotle's view, the principle of generation is the same for all living beings. The principle is that everything must have its form (εἶδος) and its matter (ὕλη), so it is necessary to obtain both the form and the matter to becoming a new life. For human beings, the form comes from the father, while the matter comes from the mother. This is Aristotle's basic doctrine of 'hylomorphism', which cannot find a counterpart in ancient Chinese thought.

In recent years, more scholars became enthusiastic in the research of Aristotle's biological works. For example, J. G. Lennox produced a lot of articles and monographs on this subject.⁶⁵ Many young scholars joined the research of Aristotle's biology, for example, Devin Henry.⁶⁶ S. Connell had also produced an important monograph on this subject as well.⁶⁷ It is well known that Aristotle wrote a lot of biological works, many related to sex and generation, such as the *Generation of Animals*, *History of Animals*, *Parts of Animals*, etc. Even if all works were attributed to Aristotle, there were always disputations on their authenticity. For example the tenth volume of *History of Animals* (HA X) is often regarded as a pseudograph at least in part because it seems to support the existence of the female seed.⁶⁸ As Pierre Pellegrin argued, 'Female does not emit semen, contrary to HA 10, which is doubtless the most solid proof of its inauthenticity.'⁶⁹ Lesley Dean-Jones argued that HA X is a work written by an anonymous Greek doctor rather than Aristotle.⁷⁰ Later she modified her idea a little bit, arguing that HA X contains a treatise called 'On Failure to Reproduction (OFR)' by a doctor and the last two chapters are commentaries by Aristotle or his followers.⁷¹ Some, however, argued that HA X is nevertheless a genuine work. David M. Balme argued that the female seed is not clearly indicated in HA X, but clarified and refined as the menstrual discharge later in GA.⁷² Philip van de Eijk argued that it belongs to one of the several 'medical' works by Aristotle.⁷³ The central debate about the authenticity of HA X comes from the

65 Lennox, J. G. (1980, 1985, 2001, 2006, 2014, 2018).

66 Henry, D. (2005, 2006a, 2006b, 2007, 2013, 2014, 2015, 2018, 2019).

67 Connell, S. (2016).

68 e.g. Ross, W.D. (1923), 10.

69 Pellegrin, P. (1986), 66-67.

70 Dean-Jones, L. (1994), 14-15.

71 Dean-Jones (2012), 180.

72 Balme, D. (1991), 487-489.

73 van de Eijk, P. J. (1999a), 502.

fact that it seems to argue for the female seed,⁷⁴ and more problematically that the womb must draw up the emitted female seed for conception.⁷⁵

Modern scholars have also debated the inconsistency of the fourth chapter of *Generation of Animals* (GA IV 3), even if it is still believed to be written by Aristotle himself. When Aristotle came to the challenging phenomenon of maternal resemblance in GA IV 3 (767a36-769a7), he appeared to support the inheritance of a female principle of movements (a formal contribution from the mother), which seemed to be, as many scholars argued, an inconsistency with his initial hypothesis of hylomorphism.⁷⁶ In earlier books of GA (Book I-III), as well as in *Physics* and *Metaphysics*, it is repeated again and again that the male provides the ‘form’ and the ‘principle of the movement’, while the female only provides the material. If we insist on the traditional interpretation of the form-matter theory, then we must admit that there is an inconsistency in GA IV 3. Thus, many scholars tried to save Aristotle from the embarrassment of this inconsistency. It seems to be a good strategy to regard his explanation of family resemblances in GA IV 3 as an *ad hoc* to his earlier form-matter theory.⁷⁷ There is a strong tendency among scholars to admit that Aristotle made some modifications in GA IV 3 but still adhered to his original framework. These modifications were compatible with his previous writings. In the modified new theory, as many scholars argued, the female is also an originator or source of movement, which is in potential but will come to dominate when the male principle of movements fails.⁷⁸ Even so, some scholars still insisted that the principle of movements for embryonic development is transmitted only from the male in the strict sense of hylomorphism.⁷⁹ No matter what, the authenticity and inconsistency problems in HA and GA are related to the topic of generation, but they will not be a focus of my thesis.

Now, we come to the Chinese side. The genres of surviving Chinese texts are quite different from the Greek ones.⁸⁰ Most early Chinese texts cannot be easily classified in western categories

74 HA X 636b15-24; 637a36-37; 637b18-20; 637b31-33.

75 HA X 634b6-8; 634b29-635a2; 635a26-28; 635b1-4; 636a6-9; 637b33-34; 638a6-8.

76 e.g. Preus, A. (1970), 4-5; (1975a), 56; Morsink, J. (1982), 141; Furth, M. (1988), 129-145; Tress, M. (1992), 310; Sissa, G. (1992), 69-77; Coles, A. (1995), 84; Elliott (1997), 3;

77 e.g. Morsink, J. (1982), 138, p171; Furth, M. (1988), 141;

78 e.g. Balme, D.M. (1980), 3; Witt, C. (1985), 55-56; Coles, A. (1995), 82-83; Elliott (1997), 72; Mayhew (2004), 47; Henry, D. (2006b), 262; Nielsen, K.M. (2008), 403.

79 e.g. Bolton (1987), 163; Dean-Jones (1994), 195; Gotthelf, A. (1989), 181-182; Sissa, G. (1992), 70.

31 Birch (1974).

as philosophical, historical, medical, or biological, etc. They are usually collections by different authors. For this reason, inconsistent and conflicting statements can easily be found in one work. It is notoriously difficult to identify authorship and authenticity, but this is not main concern of my research.

The development of archeological discoveries provides more and more available materials for research on early Chinese medicine. The silk and bamboo slips unearthed from the No. 3 Mawangdui archaeological site have long produced invaluable source materials. These manuscripts cover a wide range of topics, including philosophy, history, geography, military, astrology, divination, sexology and, most importantly, medicine. Because there is a clear record of the burial date, 24 February 168 B.C.E., it is suggested that most of the medical treatises were probably transcribed around the period of the fourth century to the second century B.C.E., while the original writing date should be even earlier. The owner of the tomb cannot be clearly identified, but he is thought to be an important member in the family of Li Cang 利蒼, a local governor in the Kingdom of Changsha 長沙, who held the aristocratic rank of Lord.⁸¹ The manuscripts were clearly not written by a single author. They were collections of various topics without being systematically organized. There were also several copies of Confucian texts and Daoist texts. It seems that the owner had broad interests.

Many manuscripts from the No. 3 Mawangdui archaeological site have medical contents, which shed much new light on the history of early Chinese medicine.⁸² Among these manuscripts, there is a special text for seeking a child, which is titled as *Taichanshu* 胎產書 (*Book of Reproduction*). In the current western scholarship, the best translation and interpretation of this text can be found in Donald Harper's book.⁸³ The text of *Taichanshu* is worthy of a special attention for many reasons. One of the reasons, obviously, is that it is dealing with the embryo, one of the most difficult subjects in natural explorations because of its formlessness, invisibility and inaccessibility. It is striking to find that the text describes in detail how the embryo gradually develops. There is no doubt that *Taichanshu* is one of the most important sources for the history of embryology and

81 Fu, J.Y. (1983).

82 Riegel (1975):10-15. Harper (1976), 68-69; Riegel (1976), 69-72.

83 Harper, D. (1998).

gynaecology in early China.

The text of *Taichanshu* was normally edited and commented altogether with other medical writings from the Mawangdui tombs in previous research. The whole text was first edited and published in 1985.⁸⁴ One edition was published by Zhou Yimou 周一謀 and Xiao Zuotao 蕭佐桃 in 1988,⁸⁵ another edition by Wei Qipeng 魏啟鵬 and Hu Xianghua 胡翔驊 in 1992,⁸⁶ and another edition by Ma Jixing 馬繼興 in 1992.⁸⁷ A complete English translation and commentary of the text was published by Donald Harper in 1998.⁸⁸ The most updated edition was published by the research group of Qiu Xigui 裘錫圭 in 2014.⁸⁹ My research will be based on the most updated edition and previous research for a further exploration of *Taichanshu*. Philological and etymological discussions are still very important, but they will not be the focus of my research.

Yijing 醫經	Zubi shiyi maijiu jing 足臂十一脈灸經 Yinyang shiyi maijiu jing 陰陽十一脈灸經 Maifa 脈法 Yinyang maisi hou 陰陽脈死侯	Fangzhong 房中	Shiwen 十問 He yinyang 合陰陽 Tianxia zhidao tan 天下至道談 Zaliao fang 雜療方	Tianwen 天文	Wuxing zhan 五星占
	Jingfang 經方		Shenxian 神仙 Quegu shiqi 卻穀食氣 Daoyin tu 導引圖 Yangsheng fang 養生方	Lipu 曆譜	
				Wuxing 五行	Yinyang wuxing A 陰陽五行 A Yinyang wuxing B 陰陽五行 B
				Shigui 蓍龜	Chuxing zhan 出行占 Muren zhan 木人占
				Zazhan 雜占	Tianwen qixiang zazhan 天文氣象雜占
				Xingfa 形法	Xiangmajing 相馬經

fangji 方技

shushu 數術

Figure: *Fangshu* Texts Found in the Mawangdui Tomb No.3

Many early Chinese writings came from a group of people, described as ‘men of recipes and techniques’ (*fangshu zhishi* 方術之士).⁹⁰ ‘Men of recipes and techniques’ were a large mixed group of men in early China who had specific skills, including diviners, astronomers,

84 MWD (4 vols., 1985). vol. 4: 134-138.

85 Zhou Yimou and Xiao Zuotao ed. (1988), 344-364.

86 Wei, Q. and Hu, X.ed., 2 vols, (1992), vol. 2: 80-92.

87 Ma, J. (1992), 779-821.

88 Harper, D. (1998), 372-384.

89 Qiu, X. (2014). vol.6: 93-102.

90 Chen, P. (1948):7-57; Li, Ling (1993).

mathematicians, physicians, sexologists, etc. *Fangshu* 方術 (recipes and techniques) could be regarded as a broad term for ‘physical knowledge’ in early China, which contained two parts, *fangji* 方技 (recipes, related to knowledge of life) and *shushu* 數術 (techniques, related to knowledge of the universe). They were further divided into several sub-categories in a bibliographic list provided by the famous historian Ban Gu 班固 (32-92 C.E.).⁹¹ Knowledge contained in these texts is usually useful and practical. The text of *Taichanshu* is not included in Ban Gu’s list, but it could easily fit the category of *jingfang* 經方. It is very likely that the author of *Taichanshu* was one of the ‘men of recipes and techniques’.

Huangdi Neijing 黃帝內經 (*Inner Canon of the Yellow Emperor*), the most important work among the Chinese medical classics, was also likely to be written by ‘men of recipes and techniques’. The reason is that doctors were generally included in this heterogeneous group together with diviners and other skillful people in early China. It can explain why the *Huangdi Neijing* appears not purely medical and it includes so many other sophisticated elements. The current edition of *Huangdi Neijing* contains two sister books, *Su Wen* 素問 (*Basic Questions*) and *Ling Shu* 靈樞 (*Divine Pivot*). Each book contains 81 chapters (*juan* 卷) of its own. The whole collection is attributed to the Legendary Lord Huangdi 黃帝, but in fact it covers a range of medical topics and doctrines by different authors. The current edition of *Huangdi Neijing* is not the same one as mentioned by Ban Gu 班固 in his record of early Chinese medical writings.⁹² According to Ban Gu’s records, there were many medical texts in early China, including the *Huangdi waijing* 黃帝外經 (*The External Canon of the Yellow Emperor*). He listed three types of medical text: *yijing* 醫經 (*Medical Canons*) (7 *jia*, 216 *juan*),⁹³ *jingfang* 經方 (*Canons of Recipes*) (11 *jia*, 274 *juan*) and *fan zhong* 房中 (*Art of Bedchamber*) (8 *jia*, 186 *juan*). The *Huangdi Neijing* was classified under the category of *yijing* 醫經. However, almost all of these original texts are lost, including one gynecological and pediatric book, *Furen Yinger Fang* 婦人嬰兒方 (*Recipes for Women and Babies*). When I refer to *Huangdi Neijing*, it is only the current edition. In current western scholarship, the best translation and interpretation of the *Huangdi Neijing* was produced by P.

91 *Hanshu* 30-10:1763-1780 (藝文志). Raphals, L. (2008):45-47.

92 *Hanshu* 30-10:1776-1778 (藝文志).

93 *Jia* 家 is usually translated as ‘school’, but it does not exactly mean so. It only indicates different sayings, not necessarily different groups of ‘school’. *Juan* 卷 is a term for the book scroll.

It is certain that the current edition of *Huangdi Neijing* was not written by a single author because of the diversity of theories and sometimes even opposite and controversial theories, but there are some common ideas shared by all of the contributing authors. For example, it is advocated that the divine knowledge of medicine was passed down from the great ancestor Huangdi 黃帝 (the Yellow Emperor). The content of *Huangdi Neijing* is in the form of a dialogue between Huangdi 黃帝 and his advisors, e.g. Qibo 岐伯. The date problem and the authorship problem are still highly debated and answers are difficult to know. Though debates remain, most scholars have concluded that *Huangdi Neijing* was probably written over several centuries, with the earliest text dating from the third century B.C.E. and the compilation coming together in the first century C.E.⁹⁵ Some contents of *Su Wen*, namely the seven treatises (66, 67, 68, 69, 70, 71 and 74) on the doctrine of *wu yun* 五運 (*Five Periods*) and *liu qi* 六氣 (*Six Qi*), were added by commentator Wang Bing 王冰 (710–804 C.E.) in the eighth century C.E., for which reason they were clearly distinctive from others. Even so, most parts of *Su Wen* 素問 and *Ling Shu* 靈樞 are based on early Chinese cosmology and philosophy of the Qin–Han period, so they still can be used as research material. Due to its collective nature, the *Huangdi Neijing* contains both theoretical and practical aspects. There is also an attempt to sort out a coherent philosophical *yin-yang* theory throughout the context. The general task of *Huangdi Neijing* is to reveal the universal principles concerning health and diseases, the balance and imbalance of *yin* and *yang*, the dynamic changes of the four seasons and the five phases, etc.

The embryological discussions in the manuscripts of Mawangdui and the *Huangdi Neijing* are very limited and it is very difficult to understand these discussions alone. For a better understanding, it is necessary to borrow some other supportive and complementary texts in the Han period and even earlier periods. These works could help identify why some particular embryological thoughts emerged in a certain intellectual background. Apart from the Mawangdui texts, some other early medical manuscripts also became available through archaeological excavations from other period,

94 Unschuld, P. and Tessenow, H. (2011). See also Unschuld, P. (2003).

95 e.g. Yamada, K. (1979); Sivin (1987): 5; Liao (1988); Keegan (1988); Unschuld (2003); Zhang, C.J. (2005).

the bamboo strips of the Qin Tomb from Shuihudi 睡虎地秦墓竹簡, the medical manuscripts of the Han dynasty from Wuwei 武威漢代醫簡, the Chu bamboo slips of the Warring Period preserved in the Shanghai Museum 上海博物館藏戰國楚竹書, and so on.⁹⁶ One important resource comes from the bamboo strips of the Warring States preserved at Tsinghua University 清華大學藏戰國竹簡, which includes a special text on embryological development, namely *Tang zai Chimen* 湯在啻門 (Tang in Chimen). These bamboo strips were dated as early as the fourth-century B.C.E.⁹⁷ Moreover, I will use some other early Chinese medical texts as well. *Nanjing* 難經 (*the Classic of Difficult Issues*) was a medical text of the late Han dynasty. Even though it has an unclear authorship, it gives the earliest explanations to the most difficult questions of the *Huangdi Neijing*.⁹⁸

Many other texts are not specifically biological or medical, but they are very important sources of early Chinese thought, especially the intellectual environment of the Han period. If we want to look for the contemporary intellectual contents of the manuscripts of Mawangdui and *Huangdi Neijing*, then it is necessary to have a consideration of these complicated texts. *Guanzi* 管子 (*Writing of Master Guan*) is a complicated and mixed collection that contains Daoist, Confucianist, Legalist and many other theories of the time. It was attributed to Guanzhong 管仲, but actually a compilation around the fourth century B.C.E.⁹⁹ *Huainanzi* 淮南子 (*the Masters of Huainan*) is of a similar nature but even more important for my research. It provides many useful explanations to the concepts of *yin-yang* and the five phases. It was very likely that ‘men of recipes and techniques’ were involved in writing this book under the support of Liu An 劉安, the King of Huainan.¹⁰⁰ *Chunqiu Fanlu* 春秋繁露 (*the Luxuriant Dew of the Spring and Autumn Annals*) also gives explanations of the five phases, particularly the implications of the five phases in politics. The book was normally attributed to Dong Zhongshu 董仲舒, but there might be some other authors. Even though the authorship problem is still highly debatable, the book of *Chunqiu Fanlu* retains a valuable compendium of early and mid-Han thought.¹⁰¹ *Wenzi* 文子 was a philosophical text

96 Anonymous (1975, 2001); Ma, Chengyuan (2008).

97 Li Xuqin (2015).

98 Unschuld, P. (1986).

99 Loewe, M. (1993), 244–251.

100 Major, J.S. (2010); Queen, S.A. and Puett, M.J. ed. (2014).

101 Loewe, M. (2011).

attributed to Laozi 老子 and there were different versions of the texts. An early version of the text dates to the Western Han period.¹⁰²

It is well-known that medical knowledge can also be found in historical books. *Shiji* 史記 (*Records of the Grand Historian*), the work of great historian Sima Qian 司馬遷, provides remarkable stories of early Chinese doctors as well as valuable medical knowledge. We can learn a lot about pulse diagnosis from the *Memoir of Chunyu Yi* 淳於意.¹⁰³ Similarly, we can get more information about early Chinese medicine from the records of other famous doctors like Guo Yu 郭玉 in *Hanshu* 漢書 (*Book of Han*). I will treat these texts as a whole to study and reconstruct a broad picture of embryological thought in early China. This broad picture will inevitably contain considerable variety. In addition, *Lunheng* 論衡 (*Discourse on Balance*) gives various explanations to natural phenomena and their implications or causes. The authorship is less debatable and it is normally thought to be written by Wang Chong 王充. The book has great value and it can be regarded as ‘an encyclopaedic collection of the claims and beliefs of Chinese religion, thought and folklore’.¹⁰⁴ *Liexianzhuan* 列仙傳 (*Biographies of Immortals*), a work edited by the Han dynasty scholar Liu Xiang 劉向, offer various mythological stories. It can make a good reflection on the ideas of immortals in the Han period, while some important notions were largely influenced by the ideas of immortals.¹⁰⁵ *Lienü Zhuan* 列女傳 (*Biography of Women*), another work edited by the Han dynasty scholar Liu Xiang 劉向, contains various legendary stories about women in ancient world.¹⁰⁶ *Shuowen Jiezi* 說文解字 (*Explaining and Analyzing Characters*), written and edited by a Han dynasty scholar Xu Shen 許慎, gives detailed explanations of the structure of ancient Chinese characters. *Guangya* 廣雅 (*Expanded*) is a dictionary of a similar kind in the late Han dynasty. These texts would be very helpful as well.

In summary, this chapter has explained some basic facts related to the edition problems, the authenticity problems, the date problems and the authorship problems of selected embryological texts. Some texts are more philosophical and theoretical, which aim to reveal some universal

102 van Els (2018), 38.

103 Hsu, E. (2010).

104 Loewe, M. (1993), 313.

105 Penny, B. (2008).

106 Raphals, L. (1998).

principles. Some texts are more medical and practical, which aim to solve some specific problems.

Chapter 2 Seeds and Embryos

This chapter will discuss the general process of generation in ancient embryological writings at four stages: (1) the initial preparation stage, in which the seed is generated; (2) the conception stage, in which the embryo is formed and a new life is created; (3) the gestation stage, in which the bodily parts of the new life are differentiated and developed; (4) the birth stage, in which the new life comes into light. It can be easily understood that there must be a great diversity of ideas, so I will mainly explore the common knowledge that could be possibly shared in the ancient worlds. I want to argue that ancient Greeks and Chinese actually reached quite a lot of general understandings and similar ideas in the pursuit of ‘embryological knowledge’.

2.1 Origin of Seed

Even though there was a great diversity of ideas concerning the origin of seed, we can still find some common knowledge. I want to point out two observations. Firstly, we can find the idea that the seed is the best residue of nutriment and it is somehow related to regimens in both cultures. Secondly, we can find the idea that the seed is somehow associated with the brain substance and the spinal marrow in both cultures. Now, I will give detailed explanations.

There were rich vocabularies whereby to speak of ‘seed’, referring to the seminal fluid which forms the mixture of the embryo. In the Greek contexts, when we encounter the term γονή and the term σπέρμα, they normally refer to the seminal fluid (‘the seed’), even though there are quite a lot of debates which need to be further explained. In the Chinese contexts, when we encounter the term ‘*jing*’ 精, it may refer to the seminal fluid, but it may also refer to other things. It is indicated from a dictionary that the term *jing* can cover 24 different meanings in different contexts.¹⁰⁷ In *Huangdi Neijing*, there was no strict definition of the term. The term *jing* could mean (1) the pupils of the eyes, (2) clarity, (3) the fine air, (4) the nutritive fluid, (5) the essence, (6) the spirit, (7) the vitality of life, (8) the seminal fluid, etc.¹⁰⁸ The *jing*, as matter, can exist in air-like form, fluid form, solid form and non-physical form. It is very hard to find one term to translate *jing* properly, though it is

¹⁰⁷ Xu, Z.S. (2010): 3150–3151.

¹⁰⁸ Links between the eyes and genital fluids also exist in Greek thought, see Laskaris (2021).

usually translated as ‘essence’. In my thesis, when *jing* is mentioned, I refer to the contribution of the male or female parent in generation, particularly the essential part that forms an embryo. Sometimes the term ‘yuzhong 玉種’ is used to refer to ‘seed’. Moreover, there were also rich vocabularies whereby to speak of ‘menstrual blood’, referring to the female discharge. In Greek texts, the term καταμήνια is normally used to refer to ‘menstrual blood’. In Chinese texts, the term ‘yueshi 月事’ is normally used to refer to ‘menstrual blood’. It is commonly indicated in both cultures that the menstrual blood is something related to monthly affairs.

Concerning the origin of the seed, there were several views among early Greek natural philosophers: (1) the seed comes from the concocted blood, e.g. Diogenes;¹⁰⁹ (2) the seed comes from the spinal marrow as a kind of brain substance, e.g. Alcmaeon and Hippon (the so-called ‘encephalo-myelogenic theory’);¹¹⁰ (3) the seed comes from all parts of the body, e.g. Democritus (the so-called ‘pangenes theory’).¹¹¹ It is possible that Plato also held the encephalo-myelogenic theory of seed, though he placed particular emphasis on the soul being the true seed.¹¹² Many Hippocratic authors had a combined theory that the seed is a sort of brain substance and is generated from all parts of the body. In *Generation and Nature of the Child*, on the one hand, it is said that the seed ‘comes from all the moisture in the body’;¹¹³ on the other hand, it is said that the moisture is ‘diffused from the brain into the loins and the whole body, but in particular into the spinal marrow’.¹¹⁴ In *Airs Waters Places*, it is stated that veins behind the ears are the most important passages for seed, implying that seed is probably stored in the brain;¹¹⁵ at the same time, it is also stated that the seed ‘comes from all parts of the body, sound from the sound parts, and unhealthy from the unhealthy parts’.¹¹⁶ In *Sacred Disease*, it is claimed that diseases can be caused by excessive phlegm in the brain, indicating that extra humours of the body are collected in the brain; on the other hand, it also says that the seed ‘comes from every part of the body, healthy seed from

109 DK 64B6.

110 DK24A13; DK 38A3, A12. Lesky (1951):1237ff. In Plato’s *Timaeus*, the marrow is directly called ‘seed’ (σπέρμα) and the brain is considered the container of the seed, cf. Plato. *Timaeus* 73c, 74a, 86c, 91b.

111 DK 68A141. Lesky (1951):23.

112 Wilberding, J. (2015): 150.

113 *Genit.* 1.1, Li VII 470; 3.1, Li VII 474; 8.1, Li VII 480; *Nat. Puer.* 11.1, Li VII 484; 17.1, Li VII 496.

114 *Genit.* 1.2, Li VII 470.

115 *Aer.* 22, Li II 78.

116 *Aer.* 14, Li II 60.

the healthy parts, and diseased seed from the diseased parts'.¹¹⁷ In *Nature of Bones*, on the one hand, it is indicated that there are vessels that collect seed from the whole body; on the other hand, it is indicated that the largest amount is 'collected from the marrow'.¹¹⁸ This evidence suggests that the Hippocratic writings should not be simply labelled with 'the pangenesis theory'.¹¹⁹

For Aristotle, the seed is concocted from blood, which is originally from nourishment. Aristotle rejected the view that the seed comes from the whole body and favours the view that the seed comes from the concocted blood.¹²⁰ According to Aristotle, the seed is 'a residue from that nourishment which is in the form of blood'. It has the same nature as the blood, being composed of earth, water and air.¹²¹ It is transformed from the ultimate residues (περίττωμα), explicitly blood, through the process of concoction, while the process of concoction is controlled by natural heat.¹²² In Aristotle, there are strong connections between the normal blood, the menstrual blood and the semen, which might be regarded as three stages of concoction. Since women have less heat, they are unable to concoct the blood into its perfection. If it is not concocted (ἄπεπτον) due to 'a deficiency in natural heat', the seed will be blood-like.¹²³ It is small in size but provides much nourishment, thus it can be used to support the growth of animals and plants. Each of the parts of the body is directly formed from the seed.¹²⁴ If the residues are used for other purposes, such as to produce fat in fat people, then fewer seeds will be produced. This principle applies to both male and female.¹²⁵ The actual semen is only a small part of the male's emission. When other substances in the emission are morbid, it causes sterility.¹²⁶ The semen is thick, white and foam-like because a substantial amount of hot pneuma (πνεῦμα) is contained in the tiniest bubbles, owing to the internal heat of the animal. However, when the hot pneuma is lost through evaporation, it becomes dark.¹²⁷ Herodotus was criticized as 'the fable-teller' (μυθολόγος) for his report that black Indians have black semen.¹²⁸ It

117 *Morb. Sacr.* 2, Li VI 364-365.

118 *Oss.* Li IX 188-190.

119 Lesky (1951): 9-23, 72.

120 *GA.* 712b 13-35; 722a3-10. Rashed, M. (2018).

121 *GA* 726b10-13; *Mete.* 389a19-20.

122 *GA* 725a3-4, 725a17-21, 726b10-13, 726a26-27, 727a34-727b2, 766b8-14, 766b19, *PA* 651b13-18; 689a9-10; *Pr.* 3.33, 876a8-9; *Mete.* 379b33-35.

123 *GA* 726b8, 766b22-23; *Mete.* 380a6-8.

124 *GA* 725a11-13; 725a21-24; 726b8, 766b22-23; *Mete.* 380a6-8.

125 e.g. *GA* 726a3-7; 727a34-b2; 771a28-33; *PA* 651b13-18.

126 *GA* 725b13-15. Groisard (2018).

127 *GA* 735b31-38; 736a1-18.

128 *GA* 736a10-13, 756b7, *HA* III 523a18-19.

seems that Aristotle was also influenced by the view that the seed is connected with the brain substance. He believed that the seed has a nature similar to that of the brain.¹²⁹ Sometimes, he even indicated that ‘the seed moves from the brain through the spine’.¹³⁰ However, according to Aristotle, the seed and the brain substance are not of the same nature. In Aristotle’s biology, the brain is the coldest part of the body, thus it has a nature opposite of that of the seed, whose nature is hot.¹³¹

We can find that the Chinese concept of *jing* also has a close relationship with nourishment and the brain substance. The term *jing* originally means ‘refined grain’, so it contains the character of grain 米 as its main part. In the manuscripts of Mawangdui, the *jing* appears to be the best nutriment of the body. The ordinary nutriment comes from grain; better nutriment comes from the *qi* of grain; the best nutriment comes from the finest part of *qi*, which is also called *jing*. There was great emphasis on the importance of preserving *jing*. It was believed that *jing* could return to the brain and nourish life if it could be preserved through suppressing ejaculation. In such a way, the authors believed they could achieve longevity—and even immortality. This is the technique of ‘returning the *jing* to nourish the brain’ (*huanjing bunao* 還精補腦), which is later called ‘the Yellow River flowing backwards’ (*huanghe niliu* 黃河逆流).¹³²

In *Huangdi Neijing*, the acquired essence is said to be refined from water and grains. When water and grains are taken into the body, they will be first transformed into *jing* and *qi* by the *six palaces* (*liufu* 六腑).¹³³ The *six palaces* include the large intestine system, small intestine system, stomach system, bladder system, *sanjiao* 三焦 system and gallbladder system.¹³⁴ Then, *jing* and *qi* will be transmitted and stored in the *five depots* (*wuzang* 五藏), namely the cardiac system, pulmonary system, hepatic system, renal system and splenic system.¹³⁵ The *five depots* can store *jing* and *qi*, but do not discharge them; the *six palaces* transform and transmit *jing* and *qi*, but do not store them.¹³⁶ The stored *qi* will be named differently according to its location, such as ‘the *qi* of the heart’ (*xinqi* 心氣), ‘the *qi* of the lung’ (*fei qi* 肺氣), ‘the *qi* of the kidneys’ (*shenqi* 腎氣), ‘the

129 GA 747a13-14.

130 Pr. 10.57, 897b23-28.

131 PA II 652a25-652b7.

132 Li, L. and McMahon, K. (1992).

133 *Lingshu* 52:313 (衛氣).

134 The *Sanjiao* system is a created concept which has no counterpart in western medicine.

135 *Suwen* 4:29–33 (金匱真言).

136 *Suwen* 11:89–90 (五藏別論).

qi of the liver’ (*ganqi* 肝氣) and ‘the *qi* of the spleen’ (*piqi* 脾氣).¹³⁷ The acquired *jing* are closely connected with the brain and the marrow. In *Huangdi Neijing*, it is said that the kidney, which is the depot for the storage of *jing*, controls the marrow.¹³⁸ The brain is called ‘the sea of marrow’ because all marrow is collected in the brain.¹³⁹ Therefore, when the best *qi* of water and grain come out of the stomach, it goes in one of two directions: up to the brain or down to the genitals.¹⁴⁰

2.2 Success of Conception

I want to point out two observations for the success and failure of conception. Firstly, there was a common understanding in both cultures that the success of conception relies on both the male and the female, even though the female was more frequently blamed for the failures of conception. Secondly, there was a common awareness of the age factor in fertility in both cultures. Now, I will give detailed explanations.

In Hippocratic writings, the success of conception depends not only on the male’s efforts, but also on the womb’s attraction and secretion of the female seed. According to *Regimen*, the two seeds can commingle together only if they are emitted together in one place and ‘achieve a correct attunement’.¹⁴¹ The female seed must be present in the process of conception or the fire of the male seed alone will ‘be quenched by the onrushing flood’ and the embryo will not grow.¹⁴² The two seeds can be fused together into one because ‘the soul is the same in all living creatures’.¹⁴³ That is to say, the soul of the female seed is just the same as the soul in the male seed. The function of the womb is to draw into itself the male seed and mix it with the female seed for conception. Many active verbs are used to mean ‘to conceive’, such as κατέχω, ἄπτω, εἰσδέχομαι, δέχομαι.¹⁴⁴ In *Generation*, it is also said, ‘If she is going to conceive, the seed is not expelled, but remains in the

137 *Suwen* 44:316–317 (痿論).

138 *Suwen* 44:316 (痿論).

139 *Suwen* 10:83 (五藏生成篇); *Lingshu* 47:335 (奇病論).

140 *Lingshu* 36:246 (五癃津液別).

141 *Vict.* 1. 8, Li VI 482.

142 *Vict.* 1.27, Li VI 500.

143 *Vict.* 1.28, Li VI 500.

144 *Nat. Mul.* 13, Li VII 330; 20, Li VII 340; 42, Li VII 386; 45, Li VII 390; 46, Li VII 390; 67, Li VII 402. *Mul. I.* 8, Li VIII 34; 10, Li VIII 40; 11, Li VIII 46; 24, Li VIII 62. *Mul. II.* 132, Li VIII 280; 146, Li VIII 322; 154, Li VIII 330; 162, Li VIII 338; 163, Li VIII 342. *Steril.* 220, Li VIII 424; 222, Li VIII 428.

womb'.¹⁴⁵ In a sense, 'to conceive' is 'to take hold of' (λήψεσθαι) the seed, not to 'expel' the seed.

In the cases of failed conception, there seems to be an obligation for Hippocratic authors to provide some explanations. In *Nature of Woman*, the answers include the following: (a) the uterus gapes open unnaturally; (b) the cotyledons in the uterus are filled with phlegm; (c) the uterus forms a scirrhus of a hard and fibrous clot; (d) the uterus shifts to an oblique position; (e) the uterus becomes inflated; (f) the uterus forms clots; (g) the uterus becomes twisted; (h) the uterus becomes slippery; etc. In *Barrennes*, the answers include the following: (a) the mouth of the uterus turns completely away from her vagina; (d) the uterus is slippery and smooth; (e) the formation of an ulcer in the uterus; (f) some of the menstrual flux is left behind in the uterus; (g) the uterus gapes open more than it should; (h) the mouth of the uterus prolapses out of her vagina; (i) a membrane has been formed in the mouth of the uterus; (j) the uterus withers up and its mouth becomes rough and closed; (k) the mouth of the uterus is pressed by abnormal or excessive fat accumulation; etc. In *Diseases of Woman II*, the answers include the following: (a) the uterus becomes hard; (b) the uterus contains blood clots; (c) the uterus is naturally wide open; (e) the uterus is inflamed; (f) dropsy occurs in the uterus; (g) there is wind in the uterus; (i) the uterus is afflicted etc.

In many cases, the failure of conception lays the blame on women, more specifically, in women's uteruses. Failures in conception are thought to be mainly caused by the uterus being too hard, or too dense, or too cold, or too moist, or too dry, or too hot, or curved too much, or not big enough or pressed by a fat body.¹⁴⁶ Overall, the environment of the uterus is crucial for successful conception. If the uterus is filled with excessive menstrual blood, it will fail to attract seed and seed may be washed away by menstrual blood.¹⁴⁷ Therefore, the most favourable time for conception, as agreed upon by several Hippocratic authors, is after menstrual blood, and the next most favourable time is the beginning of menstrual blood when the flow is not too strong.¹⁴⁸ The process of conception is, in a sense, largely determined and controlled by the uterus, especially its opening and closing and its environment. In most cases, the condition of the mouth of the uterus determines

¹⁴⁵ *Genit.* 5.1, Li VII 476.

¹⁴⁶ *Ap.* 5.54, Li IV 552, 5.46, Li IV 548; 5.62, Li IV 554; *Superf.* 27, Li VIII 490.

¹⁴⁷ *Aph.* 5.62, Li IV 554; *Mul. I.* 10, Li VIII 40-42; 17, Li VIII 56; 71, Li VIII 150.

¹⁴⁸ *Nat. Puer.* 15.4, Li VII 494; *Septim./Oct.* 13, Li VII 458; *Mul. I* 17, Li VIII 56; *Superf.* 31, Li VIII 500.

whether a woman is able to conceive or not.¹⁴⁹ In a normal situation, the mouth of the uterus should open at the beginning to draw in the male seed, though abnormal conditions may prevent its opening.¹⁵⁰ After taking up the male seed, the mouth of the uterus should close to hold the seed tightly,¹⁵¹ otherwise the liquid seed may flow out if the mouth opens too wide or is too smooth.¹⁵² Since most Hippocratic authors agreed that the success of conception largely depends upon the situation of the uterus, Hippocratic gynaecological therapies aim to restore the uterus's ability to open and close.¹⁵³ There is a particular focus on problems of the uterus to promote female fertility.

The condition of menstrual blood is also crucial for successful conception. In *Barrenness*, there are many explanations why a woman might be unable to conceive. In the following conditions, there will be a failure in conception: (1) the menses do not flow where they should; (2) less menses pass than should; (3) more menses pass than should; (4) the menses that pass are not healthy. In return, a successful conception is thought to be helpful to solve all problems of menses. There are various therapies given by Hippocratic authors to provoke menstrual blood, such as vapour baths, pessaries, fomentations, diet and drugs.¹⁵⁴ However, a successful conception is thought to be the best way to restore the regularity of menstrual blood and solve the problems once and for all. Hence, women are encouraged to sleep with their husbands and girls are suggested to get married as early as possible. The best treatment for the 'sacred disease', as it is suggested in *Girls*, is to get pregnant. 'I urge young women suffering from a condition of this kind to cohabit with men as soon as they can: for if they become pregnant, they recover.'¹⁵⁵ The reason diseases of menses can be cured in pregnancy is clarified in *Nature of the Child*. It explains that when a female becomes pregnant, the problem of menstrual blood will immediately disappear because during pregnancy, the excessive blood goes into the uterus to nourish the foetus daily in a small amount, so the female body will not be troubled by the blockage of menses.

149 *Ap.* 5.51, Li IV 550; 5.54, Li IV 552; 5.46, Li IV 548.

150 *Mul. I.* 10, Li VIII 40-42; 12, Li VIII 48; 18, Li VIII 58. *Aph.* 5.54, Li IV 552; 5.46, Li IV 548.

151 *Genit.* 5.1, Li VII 476. *Nat. Puer.* 13, Li VII 190.

152 *Genit.* 4.1, Li VII 474; *Mul. I* 13, Li VIII 50; 12, Li VIII 48; 16, Li VIII 54; 21, Li VIII 60; *Steril.* 213, Li VIII 408-414; 223, Li VIII 432; 241, Li VIII 454.

153 *Steril.* 213, Li VIII 408; 217, Li VIII 418; 223, Li VIII 432; 230, Li VIII 438. See also Hanson (1991):86.

154 *Aph.* 5.28, Li IV 542; *Mul.* 1.3, Li VIII 22; *Nat. Mul.* 18, Li VII 338. See also Dean-Jones (1994): 132; Flemming (2000): 117.

155 *Virg.*, Li VIII 470. Flemming (2000): 117.

*When a woman is pregnant, she is not troubled by the failure of her menses to pass, since her blood is not stirred up as it separates off in a mass each month; rather blood passes into her uterus gently a little at a time without trouble each day, and what is growing in the uterus increases. Blood flows each day and not one time each month because the seed present in the uterus draws continually as much of it from the body as it has the strength to. At first there is a small amount of breath, and little blood flows from the mother; but when the amount of breath becomes greater, it draws more blood and flow down to the uterus increases.*¹⁵⁶

Then, is it right to say that women alone are held to be main cause for all sorts of reproductive failures? Even if women are blamed in most cases, men are also going to take responsibility for reproductive failures. It is believed that a man becomes ‘seedless’ if the seminal vessels behind the ear are destroyed.¹⁵⁷ Moreover, in *Aphorisms*, it is said that a man cannot have a child if his body is extremely rare, or extremely dense, or extremely hot, or extremely cold.¹⁵⁸ In *Airs, Waters, Places*, it is said that Scythian men become infertile because they have a moist bodily constitution and some improper ways of life.¹⁵⁹ In *Regimen*, it is believed that it is the father and the mother’s common responsibility to bring a child into the world, so both parents should also adopt a special regimen in seeking a child. As it is said, ‘Not only must the man do this, but also the woman. For growth belongs, not only to the man’s secretion, but also to that of the woman’.¹⁶⁰ Some other authors also recommended men to take care of their diet and behaviour for a successful conception.¹⁶¹

Sometimes reproductive failures are thought to be caused by external environment. In *Airs, Waters, Places*, it is said that women in a city facing hot winds are usually unable to produce a child because of frequent miscarriages. It is argued that the cause of reproductive failures in such a city is not the nature of women, but rather diseases as a result of being exposed to hot winds.¹⁶² Similarly, women in a city facing cold winds are likely to have difficulties with childbirth.¹⁶³ Quite often, no one is blamed. Neonates have a high risk of death because the birth itself is a risky journey for the child. In *Eight Months’ Child*, the little child is going to experience many changes in a short period of time in childbirth, so severe illnesses and death usually occur as a result.¹⁶⁴ The child may even

156 *Nat. Puer.* 4, Li VII 494.

157 *Aer.* 22, Li II 76-82; *Genit.* 2.1-3, Li VII 472.

158 *Aph.* 5.63, Li IV 556.

159 *Aer.* 21, Li II 74-76.

160 *Vict.* 1.27, Li VI 500:

161 *Mul. I.* 75, Li VIII 164; *Steril.* 218, Li VIII 422; 220, Li VIII 424; *Superf.* 26, Li VIII 490; 30, Li VIII 498; *Septim.* 4, Li VII 458.

162 *Aer.* 3, Li II 16.

163 *Aer.* 4, Li II 22.

164 *Oct.* 10, Li VII 452.

die during the process of struggling its way out, leaving just one leg or one arm outside.¹⁶⁵

In Aristotle's writings, the success of conception 'depends upon whether or not that which is drawn from the man and from the woman stand in the right proportional relation to each other'.¹⁶⁶ In the combination of the male element and the female element, it is necessary to achieve a *harmonia* (συμμετρία) in the mingling of male and female contributions in order for generation to occur. This *harmonia* is much emphasized in *Generation of Animals*.¹⁶⁷ Aristotle explained that some couples cannot produce a child simply because they are unable to achieve such a *harmonia*. It is not the case that the hotter is the better. If there is too much vital heat, the material will be dried up and be destroyed; if there is too little heat, none will be formed.¹⁶⁸ Infertility can become fertility if conditions change. If a couple cannot have a child for many years, it is possible for them to have a child if either of them takes another husband or wife.¹⁶⁹ It shows that failure to conceive comes from the problem of mismatching. Success in conception depends not only upon the male, but also upon the female. Moreover, Aristotle also suggested that couples should have children at a suitable age. Male and female are unable to produce the suitable seminal fluid if they are not at a suitable age. It is difficult to have children if the age is too young or too old.

In the manuscripts of Mawangdui, there is in fact no description of the process of conception. *Taichanshu* does not explain what drives the change from non-being to being. It is only said that life is formed from the 'dark obscurity':

*Thus when human beings are engendered, having entered into obscure darkness and exited from obscure darkness, they first become humans.*¹⁷⁰

In early Chinese texts, the term *mingming* 冥冥 (dark obscurity) is usually used as the opposite of *zhaozhao* 昭昭 (bright clearness). In my view, this is to describe the darkness of the womb in which a new life is formed. The term *mingming* 冥冥 is used in *Huainanzi* as a metaphor for the darkness of the universe when nothing has yet been formed. If we compare the two texts,

165 *Mul. I.* 70, Li VIII 146-148.

166 *GA* 723a28-32.

167 *GA* 723a28-31; 727b11, 729a17, 767a16.

168 *GA* 772a10-18; a28-30.

169 *HA* IX 585b9-13.

170 MWD 4:136. Translated by Harper, D. (1998): 378.

Taichanshu and *Huainanzi*, we can find that the beginning of human life and the beginning of the universe both find origins in the ‘dark obscurity’.¹⁷¹

In *Huainanzi*, the active force for the formation of life comes from the interaction between *yang* (presented by the *qi* of Heaven 天氣) and *yin* (presented by the *qi* of Earth 地氣). Similar explanations can also be found in *Huangdi Neijing*, for instance the statement ‘Now, man receives his life from Earth; his fate depends on heaven. When heaven and earth combine their *qi*, it is called ‘Man’’.¹⁷² Interestingly, the etymology of *ming* 冥 has a close relationship with generation. In the manuscripts of *Mawangdui*, the word *ming* 冥 is written as 𠄎, which shows a hand underneath to pull something out of a container. In early oracle bones, it is presented more vividly as 𠄎 — two hands helping a child to come out of the womb. It is a great breakthrough when researchers found the real meaning of 𠄎 for the interpretation of the oracle bones. Guo Moruo 郭沫若 first proposed that 𠄎 has the meaning of *mian* 娩 (giving birth).¹⁷³ This interpretation was also supported by other scholars. ‘The choice of *ming* was influenced by the shape of the graph and by the Han use of ‘obscure darkness’ (*mingming* 冥冥) to describe the place where humans were conceived and out of which they emerged in birth, an image that was used in early Daoist texts.’¹⁷⁴

In *Huangdi Neijing*, the question of conception is discussed in the very beginning chapter. It is assumed that the success of conception depends upon the existence of *Heavenly Gui* (*tiangui* 天癸). For both women and men, it is impossible to conceive a child at a very young age because the *Heavenly Gui* has not yet formed; nor at a very old age because all the *Heavenly Gui* has been exhausted. Accordingly, a woman cannot conceive a child below the age of 14 or above the age of 49, and a man cannot conceive a child below the age of 16 or above the age of 64.¹⁷⁵ The exact substance of *Heavenly Gui* is unclear, but it is generally supposed to be something that can promote the generation of seminal fluid. The *Heavenly Gui* plays a key role for the functions of some essential matters related to generation, including the *qi* of the kidneys, great thoroughfare vessel,

171 *Huainanzi* 2:44 (椒真訓). Major, J.S. (2010): 84–86.

172 *Suwen* 25, SK 773. 90 (保命全形論).

173 Guo, M.R. (1982): 423–424. See also Peng, B.J. (2008): 174.

174 Cook and Luo 2017: 10.

175 *Suwen* 1:3–4 (上古天真論). See also Unschuld, P. and Tessenow, H. (2011): vol.1, 36–41.

controlling vessel, monthly matter, and *jing* and *qi*. According to the text, even if some old people are able to conceive a child because of the abundance of the *Heavenly Gui*, there is still a limit up to a certain age:

*[Huang] Di: 'It happens that someone who is already old in years nevertheless has children, how can that be?' Qi Bo: 'In this case life span [allotted] by heaven exceeds the norm. The qi passes through the vessels as usual and the qi of the kidneys has a surplus. Although [someone] has children, Males do not exceed the end reached at eight times eight and Females do not exceed the end reached at seven times seven, when the essence qi of heaven and earth are all exhausted.'*¹⁷⁶

For ordinary people, it is impossible to conceive a child at an age over 64. However, the author claimed that there were exceptions. A person following the *Dao* 道 can live one hundred years and can still conceive a child at a very old age.

*[Huang] Di: 'Now, those [who follow] the Way, they all reach a number of one hundred years. Can they have children?' Qi Bo: 'Now, those [who follow] the Way, they can drive away old age and they preserve their physical appearance. Although their body has lived a long life, they are [still] able to produce children.'*¹⁷⁷

In *Huangdi Neijing*, it is clear that the failure of conception can be caused either by the male or by the female. If a couple cannot have a child for many years, it is possible that the inability comes from the husband, who's *Heavenly Gui* is not strong enough and the *qi* of the kidneys is too weak. The wife should not be blamed for the failure of conception in such a case. The pulse diagnosis is a technique widely used in *Huangdi Neijing*. There are three ways to check a successful conception. One way is through the diagnosis of the vessel of the Chi 尺脈. 'When *yin* beats and *yang* branches out, this is called 'to have a son'.'¹⁷⁸ One way is through the diagnosis of the hand minor *yin* vessels. 'When the hand minor *yin* vessels of women have a very [pronounced] movement, that is [a sign of] pregnancy.'¹⁷⁹ One way is through the combination of pulse diagnosis and the observation of body symptoms, such as the suspension of menstrual blood, the nausea, and so on: [Huang] Di: 'Good! How does one know that a pregnant [woman] will soon give birth?' Qibo: 'The

176 *Suwen* 1:4 (上古天真論). Translated by Unschuld, P. and Tessenow, H. (2011): vol.1, 41.

177 *Suwen* 1:4 (上古天真論) Translated by Unschuld, P. and Tessenow, H. (2011): vol. 1, 41-42.

178 *Suwen* 7 (陰陽別論). Translated by Unschuld, P. and Tessenow, H. (2011): vol. 1, 151.

179 *Suwen* 18 (平人氣象論). Translated by Unschuld, P. and Tessenow, H. (2011): vol. 1, 316.

body has a disease, but there is no evil [movement in the] vessels.’¹⁸⁰

2.3 Shaping Male and Female

On the Greek side, there was a highly debated question on what determines the formation of boys and girls at the beginning of life. According to some later doxographers, there were four main theories on sex determination among early natural philosophers: (1) the dichotomy of strong and weak—if it is well-concentrated and strong, then a boy will be born; if it is fluid-like and weak, then a girl will be born;¹⁸¹ (2) the dichotomy of dominating and being dominated—if the seed from the male is more and becomes the dominating seed, then a male will be born; otherwise, a female will be born;¹⁸² (3) the dichotomy of hot and cold—a seed entering a hot uterus becomes a boy; otherwise, it becomes a girl;¹⁸³ (4) the dichotomy of right and left—if the seed is planted on the right side of the womb, the child will be a boy and resemble the father; if it is planted on the left side of the womb, the child will be a girl and resemble the mother.¹⁸⁴ Many of these theories have been summarised and explained by Erna Lesky, so it is not necessary to repeat them.¹⁸⁵

In the Hippocratic writings, there are many different theories on sex determination. The author of *Generation* claimed that the male must be generated from stronger seed since males are much stronger than females.¹⁸⁶ The final sex of the child is determined by which type of seed has ‘the prevalence by quantity’.

*If both partners produce a stronger seed, then a male is the result, whereas if they both produce a weak form, then a female is the result. But if one partner produces one kind of seed, and the other another then the resultant sex is determined by whichever seed prevails in quantity. For suppose that the weak seed is much greater in quantity than the stronger seed: then the stronger seed is overwhelmed and, being mixed with the weak, results in a female. If on the contrary the strong seed is greater in quantity than the weak, and the weak is overwhelmed, it results in a male.*¹⁸⁷

180 *Suwen* 40 (腹中論). Translated by Unschuld, P. and Tessenow, H. (2011): vol. 1, 610.

181. Hippon, DK 38A14, DK 38A14.

182. Alcmaeon, DK 24A14. Democritus, DK 68A143, *GA* 764a6-11. See also Graham (2010):564.

183. Empedocles, DK 31B65, DK 31A81, *GA* 723a24-26, *GA* 764a1-6, *GA* 765a8.

184. Parmenides, DK 28A54. According to Aristotle, Anaxagoras followed the right/left theory and associated males with the right and females with the left; see DK 59A107, *GA* 763b30. For previous discussion on the right/left theory in Greek medicine, see Lloyd (1962), (1966), (1972), (1983), (1996); George (1982):69-89, 109-110; Dean-Jones (1994):166-167.

185. Lesky (1951); Bourbon (2017).

186. *Genit.* 6.1, Li VII 478.

187. *Genit.* 6.1-2, Li VII 478.

Six types of offspring can be produced through different mixtures of the seed. Each embryo contains elements from both parents, but the overall sex is determined by the quantity of each seed. This explains why a boy can more closely resemble his mother and a girl her father.¹⁸⁸

a strong seed (Father) + a strong seed (Mother) → a strong child (Male A)

a strong seed (Father) > a weak seed (Mother) → a strong child (Male B)

a weak seed (Father) < a strong seed (Mother) → a strong child (Male C)

a weak seed (Father) + a weak seed (Mother) → a weak child (Female A')

a strong seed (Father) < a weak seed (Mother) → a weak child (Female B')

a weak seed (Father) > a strong seed (Mother) → a weak child (Female C')

A similar theory of sex differentiation is presented in *Regimen*, but in a more complicated construction. The author of *Regimen* also thought that both parents can produce either a male seed or female seed, while the sex of the child is determined by the predominant seed.

Now if the bodies secreted from both happen to be male, they grow up to the limit of the available matter, and the babies become men brilliant in soul and strong in body, unless they be harmed by their subsequent diet. If the secretion from the man be male and that of the woman female, should the man gain the mastery, the weaker soul combines with the stronger; since there is nothing more congenial present to which it can go. ...And these, while less brilliant than the former, nevertheless, as the male from the man won the mastery, they turn out brave, and have rightly this name. But if male be secreted from the woman but female from the man, and the male get the mastery, it grows just as in the former case, while the female diminishes. These turn out hermaphrodites ('men-women') and are correctly so called. ...In like manner the female also is generated. If the secretion of both parents be female, the offspring prove female and fair, both to the highest degree. But if the woman's secretion be female and the man's male, the female gain the mastery, the girl are bolder than the preceding, but nevertheless they too are modest. But if the man's secretion be female, and woman's male, and the female gain the mastery, growth takes place after the same fashion, but the girls prove more daring than the preceding, and are named 'mannish'.¹⁸⁹

Accordingly, six types of offspring will be produced through different mixtures of the seed. It is important to note that the author does not associate males with strong and females with weak. He divides the types of seed into female/male rather than stronger /weaker. It is a small difference in words, but it maintains less value judgment.

188. *Genit.* 8.2, Li VII 480.

189 *Vict.* 1.29, Li VI 504.

a male seed (Father) + a male seed (Mother) → a male child (A)

a male seed (Father) > a female seed (Mother) → a male child (B)

a female seed (Father) < a male seed (Mother) → a male child (C) (hermaphrodites)

a female seed (Father) + a female seed (Mother) → a female child (A')

a male seed (Father) < a female seed (Mother) → a female Child (B')

a female seed (Father) > a male seed (Mother) → a female Child (C') ('mannish' women)

The author of *Regimen* argued that parents have a great influence on the formation of their children, especially their gender, since females and males are developed from different substances: one from water and one from fire. Females are more inclining to water, growing from a regimen which is cold, moist and gentle; while males are more inclining to fire, growing from a regimen which is dry and warm. Therefore, to seek a female child, both parents should have a regimen incline to water; to seek a male child, both parents should have a regimen incline to fire.¹⁹⁰

The author of *Diseases of Women I* also maintained the theory of 'dominance by quantity', in which the physical features of the child are determined by whichever parents' seed gains mastery: 'if seed (from the mother) is superior, it has an affinity in this way'.¹⁹¹ The texts of *Generation* and *Regimen* reflect two things. First, they provide an alternative understanding of sex. It is possible to have six types of sexes according to the different combinations of seeds. Second, they reflect the social prejudice that women are weak. In the theories, girls are always produced from the weak seed.

Some Hippocratic authors believed that sex is differentiated by its environment at conception because the seed has no sex by itself. For example, in *Superfetation*, it is said that if parents want a boy, they should have intercourse after menstrual blood; if they want a girl, they should have intercourse when menses are heavy because menstrual blood brings more moisture to the seed.¹⁹² This passage indicates that 'what made the female foetus less strong was the fact she was formed from more watery seed'.¹⁹³ The theory of dry and moist agrees with another Hippocratic doctrine

190 *Vict.* 1.27, Li VI 500.

191 *Mul.I* 24, Li VIII 64.

192 *Superf.* 31, Li VIII 500.

193 Hanson (2008):98.

that women are moister than men.

The dichotomy of right and left was most influential in Hippocratic writings. Many Hippocratic authors held the belief that male offspring is always associated with the right side of the body and female offspring with the left, although they had certain disagreements about the detail. It was generally believed that the sex of the child is determined by which side of the womb the seed falls into, or from which side of the testicles it had come.¹⁹⁴ For example, in *Epidemics VI* and *Superfétation*, it is believed that the testicles decide the sex of the child—the right testicle always produces boys and the left produces girls. For this reason, it is suggested to bind up the right or left testicle as a way to produce specifically male or female offspring.¹⁹⁵

*Whichever testicle appears outside; if right, male; if left, female.*¹⁹⁶

When he wishes to beget a female child, ...he should bind up his right testicle as tightly as he can stand.

*When he wishes to beget a male child, bind up the left testicle.*¹⁹⁷

In *Prorrhetic II*, it is indicated that, if the womb has diseases on the right side, the probability of producing a male child will be reduced; if the womb has diseases on the left side, the probability of producing a female child will be reduced.

*If the lesion involves only the left-handed parts, ...there is a greater chance that she will bring forth a male child. But if the lesion involves the right parts, and she becomes pregnant, you must assume that the offspring is more likely to be female.*¹⁹⁸

However, in *Aphorisms* and *Epidemics II*, it is believed that it is the womb that determines the sex of the child—if the seed is implanted in the right side of the womb, a boy will be produced; the left side will produce a girl.

*The male is engendered on the right.*¹⁹⁹

*The male foetus is usually seated on the right, and the female on the left side.*²⁰⁰

No matter whether the testicle or the womb determines the sex of the child, the common belief is that males are always associated with the right and females the left. In *Epidemics VI*, there are

194 Hanson (1992): 44-46; Dean-Jones (1994): 167.

195 *Superf.* 31, Li VIII 500. *Epid.* VI 4.21, Li V 312

196 *Epid.* VI 4.21, Li V 312.

197 *Superf.* 31, Li VIII 500.

198 *Prorrh.* II 24, Li IX 56.

199 *Epid.* II 6.15, Li V 136.

200 *Aph.* 5.48, Li IV 550; 5.37, Li IV 544; 5.38, Li IV 544.

explanations for why the right side of the body is more auspicious than the left: the right side is in a hotter place.

*Because what is on the right is in a hotter place it is darker because of that, and its blood vessels are more external. It congeals more quickly, is composed more quickly, moves, becomes softer and grows more slowly and for a longer time. Because it is solidified it is more bilious and more blooded, to the extent that that is the warmer area in animals.*²⁰¹

The right/left dichotomy is significant in Hippocratic embryology. The superiority of the right side of the body to the left is treated as a biological and anatomical fact in Hippocratic thought. In *Epidemics II*, it is believed that the right breast and the right eye have the greatest force with regard to nature.²⁰² The asymmetry of the body could, therefore, reflect the social hierarchy to a certain degree. The association of males and the right side of the body could mirror the superior position of males in society.

In Aristotle's writings, however, it does not matter whether the seed comes from the right or the left, but the heat or coldness is more important. Aristotle criticized Anaxagoras and 'certain other physiologists' for their theory that the right testicle and the right uterus produce males, while the left testicle and the left uterus produce females.²⁰³ Aristotle rejected the right/left theory of sex differentiation for the following reasons: Firstly, it is observed from dissections in all vivipara, both in the land animals and in fish. He found that male and female twins can be formed together in the same part of the uterus.²⁰⁴ Secondly, it is possible to find a female embryo in the right part of the uterus and a male embryo in the left part of the uterus.²⁰⁵ Thirdly, Aristotle criticized a previous theory that offspring are of the same sex if one testicle of the father is excised and regards this theory as 'a mere piece of guesswork'.²⁰⁶ In Aristotle's view, the testicles have nothing to do with sexual differentiation, because some animals have no testicles at all, such as fish and snakes.²⁰⁷

Even if Aristotle showed his disapproval of the right / left theory of sexual differentiation, he was still influenced by the idea.²⁰⁸ For example, he firmly believed that the right is more honourable

201 *Epid.* VI 2.25, Li V 290.

202 *Epid.* II 6.15, Li V 136.

203 *GA* 763b30-764a1.

204 *GA* 764a30.

205 *GA* 765a20.

206 *GA* 765a25.

207 *GA* 765a30.

208 Lloyd 1962.

than the left.²⁰⁹ The left and the right are not perfectly symmetrical in Aristotle's cosmology. The right is the starting point of all locomotion, for example, the rotation of heaven.²¹⁰ This belief also penetrates his explanations of the organic functions, including the right and left claw.²¹¹ Animals all start the motion from the right side of the body and have right-sided movement.²¹² The right side of the body is said to be hotter and stronger than the left.²¹³ Since man is superior to any other animal, the right side of man is 'most right-sided'.²¹⁴ In a certain way, the relationship of females and males is just like the relationship of the left and the right. Aristotle indeed made such an association by himself.²¹⁵ In *History of Animals*, Aristotle wrote, 'In case of a male foetus, the first movement usually occurs on the right side of the womb and about the fortieth day, but if the foetus be a female then on the left side and about the ninetieth day.'²¹⁶ Both Geoffrey Lloyd and Anthony Preus believed that Aristotle probably had a change in his attitude toward the right / left theory of sex differentiation. When he wrote *Parts or Progression of Animals*, he probably became less critical of this doctrine.²¹⁷ In fact, although Aristotle criticized the right / left theory of sexual differentiation, he said that it contains 'a modicum of reason in it'.²¹⁸ For example, male dogfish are usually produced in the right side and females in the left.²¹⁹ Women who bear a male child usually feel the movement of the child on the right side and with a female child on the left side.²²⁰

It seems that Aristotle must have been influenced by the hot/cold dichotomy as well, which regards temperature as the determinable factor for sexual differentiation. Aristotle believed that male and female differ only in 'a certain ability and inability'.²²¹ The most basic assumption is that 'male animals are hotter than female ones'.²²² With plenty of heat, males are able to 'concoct' (πέψις) the residue of nourishing blood to the purest matter—the semen. Females, however, lack this power

209 *PA* 665a18; 705b20; 706a20; 706b12, *IA* 707a6-7.

210 *Cael.* 253a.

211 *PA* 667b34; 672b22; 705b29; Lloyd 1962.

212 *IA* 7-5b30-33; 706a5-6; a13; a16-17.

213 *PA* II 666b7-9; 670b19-20; 672a23-26; *GA* 765b2-3; *HA* I 493b19-20.

214 *PA* 706a 1-26.

215 *PA* 706a 1-26ff. Carbone (2016).

216 *HA* VII 3, 583b2.

217 Lloyd (1962); Preus (1977).

218 *GA* 765b1.

219 *HA* VI 565b13-15.

220 *HA* IX 583b3-9.

221 *GA* 716a30; 716a15; 732a3; 765b10.

222 *GA* 765b.

because of the coldness of their nature and can only produce the unclear matter—menstrual blood. In other words, menstrual fluid is ‘unconcocted semen’ and women are ‘deformed men’.²²³ Aristotle provided three specific examples of the influence of ‘hot and cold’ in sexual differentiation: First, if parents are too young or too old, they are more likely to produce a female child, because the heat of young people is unperfected, while the heat of older people is declining. Second, parents who are fluid of body and feminine tend to produce females, because the body will have less heat if it contains too much fluid. Third, when the wind is in the north, male offspring tend to be produced more than when it is in the south. This occurs when the south wind comes, then the fluid in the body increases.²²⁴ Aristotle explained that females are produced due to ‘a deficiency of natural heat’.

On the Chinese side, we learn that Chinese had a long concern with the question of boys and girls dating back to the earliest historical records. The earliest Chinese records were found on the oracle bones that could be dated to at least the eleventh century B.C.E. The prediction of sex differentiation is one of the most frequently discussed topics in these oracle bones. Because the gods determine everything, it is believed that the sex of the foetus could be revealed through divination.²²⁵

In *Taichanshu*, the most important embryological text in the manuscripts of Mawangdui, there is a detailed description on how to seek a male or female child through rituals. These rituals included what to eat and drink and what to do before conception and after birth. There is little description of the process and mechanism of sex determination. It is simply advised that sexual activities should happen during the three days immediately after the menstrual period to produce a child. For those seeking a boy or for those seeking a girl, it is necessary to calculate the days. Choosing proper days is much emphasized for conception:

*Yu asks Youth Multiplier, “I wish to propagate people and engender children. How is it that this occurs?” Youth Multiplier replied, “After menstruation is finished and the fluid [], have intercourse with her over the next three days and there will be a child. If on the first day, it is a boy; if on the second day, a girl.”*²²⁶

The menstrual blood here is a translation from the Chinese term ‘yueshuo 月朔’, following Donald Harper’s interpretation. In early Chinese texts, *shuo* 朔 usually means ‘the beginning’ and

223 GA 726b30; 728a20; 750b20; 765b15; 774a1; 775a15; PA 661b26; HA 608a21.

224 GA 765b30.

225 Peng, B.J. (2008).

226 MWD 4:136 (*taichanshu*). Translated by Harper, D. (1998): 378.

the first day of a month is called *shuori* 朔日. It is true that ancient Chinese frequently related menstrual blood to the phenomena of the moon. In early medical texts, such as *Huangdi Neijing*, the term for menstrual fluid is ‘monthly matter’ (*yueshi* 月事).

In *Taichanshu*, we find the idea that the sex of the foetus depends on the day of intercourse after menstrual blood: odd days for boys and even days for girls. This idea spread widely in later Chinese medical texts. In addition, the time of the day was also potent in terms of producing a male or a female baby. For example, in the third-century B.C.E. *rishu* 日書 (*book of days*) from Fangmatan 放馬灘, sixteen sections of the day alternated the possibilities of producing a male or female.

*The time when the sun just reached the horizon produced a female, but at actual sunrise a male; at breakfast time a female, but at dinner time a male; at noon a female, but just past noon a male; in the afternoon a female, but deeper into the afternoon a male; just before sunset a female, but a sunset a male; at dusk a female, but at night a male; just before midnight a female, but at midnight a male; and, after midnight a female, but when the cock crows a male.*²²⁷

In early Chinese medical texts, in fact, we can hardly find a comprehensive theory on sex determination, but there are some ideas for related issues. *Nanjing* 難經 contains a passage on the difference between male and female fetuses, saying:

*It is like this. A male child is born in a yin [month]; a yin [month is associated with the phase of] wood, and that is yang. A female child is born in a shen [month]; a shen [month is associated with the phase of] metal, and that is yin. Hence, in males [a strong movement in] the vessels appears above the gate; in females [a strong movement in the] vessels appears below the gate.*²²⁸

A later commentary gives us some explanation on this passage:

此推本生物之初而言，男女陰陽也。紀氏曰，生物之初，其本原皆始於子。子者，萬物之所以始也。自子推之，男左旋三十而至於巳，女右旋二十而至於巳，是男女昏嫁之(數)也。自己而懷娠，男左旋十月而生於寅，寅為木，陽也，女右旋十月而生於申，申為金，陰也。

This is an investigation of the beginning of living beings which is clad in a discussion of male and female, of yin and yang. Mr. Chi [T'ien-hsi] had said, 'All living beings originate in the Zi [Year]'. The Zi [Year] is the beginning of all things. From the Zi [Year] is carried on for males to the left for thirty [years] in the [calendar] cycle, until it reaches the Si [Year]. For females it is carried on to the right for twenty [years] until it too reaches the Si [Year]. That is the number [of years]

227 cf. Cook and Luo 2017: 57-58.

228 *Nanjing* 19:456, SK733 (十九難). Translated by Unschuld (1986): 259.

at which male and female marry. When pregnancy [begins] in a Si [month], for males it takes ten months in the cycle to the left; birth occurs in the Yin [month]. The Yin [month is associated with the phase of] wood and with yang. For females, [pregnancy] takes ten months in the cycle to the right. Birth occurs in the Shen [month]. The Shen[month is associated with the phase of] metal and with yin.²²⁹

This commentary can be confirmed by some other texts. In the earliest Chinese glossary *Shuowen Jiezi* 說文解字, the term 𡇗 has significant embryological and cosmological meaning. The Chinese word for the womb, *Bao* 𡇗, has an interesting etymology. It contains two parts: 𡇗 means a part of the human body, and 𡇗 indicates a child 𡇗 inside a container 𡇗:

𡇗：象人裹妊，𡇗在中，象子未成形也。元氣起於子。子，人所生也。男左行三十，女右行二十，俱立於巳，為夫婦。裹妊於巳，巳為子，十月而生。男起巳至寅，女起巳至申。故男年始寅，女年始申也。

The womb, representing a pregnant woman with a child. It has Si inside, like a child still in its formation. The essential qi starts with Zi. Zi, literally a child, is what human born. Male goes leftwards for thirty [years], and female goes rightwards for twenty [years]. They meet at the point of Si. Si gives birth to another Zi in ten months. For the male embryo, it moves from Si to Yin. For the female embryo, it moves from Si to Shen. Therefore, a male child starts life from Yin and a female child starts life from Shen.²³⁰

The basic idea is that, following the way of Heaven, humans have life cycles and embryonic cycles. Females and males move towards different cosmological cyclical directions in life cycles and embryonic cycles: females go rightwards anti-clockwise, while males go leftwards clock-wise. For life cycle, a woman moves rightwards for 20 ‘chronograms’ (here refer to ‘cosmological cyclical directions’) from the beginning of life to the proper time for marriage, while a man moves leftwards for 30 chronograms from the beginning of life to the proper time for marriage. This is why, according to many early Chinese texts, men should marry at the age of 30 and women at the age of 20.²³¹ For the embryonic cycle, a female foetus moves rightwards for 10 chronograms from the time of conception to the proper time of birth, while a male foetus moves leftwards for 10 chronograms from the time of conception to the proper time of birth. This is why both male and female babies are born in 10 months but one belongs to *yin* and another belongs to *yang*.

The relationship of male and female is just like the relationship of Heaven and Earth. Males

229 *Nanjing Benyi* 難經本義: SK 733–466. My translation.

230 *Shuowen Jiezi* 9:434 (包部). My translation.

231 See Lü, S.M. (2009): 123–145.

are formed by the way of Heaven, while females are formed by the way of Earth. Because the left is the way of Heaven, it means that males are created by the way of the left and females by the way of the right. In the Han dynasty, this principle was followed not only in life, but also in afterlife. In the Han Tombs, if a couple were buried together, the male would always rest on the left side and the female on the right side.²³²

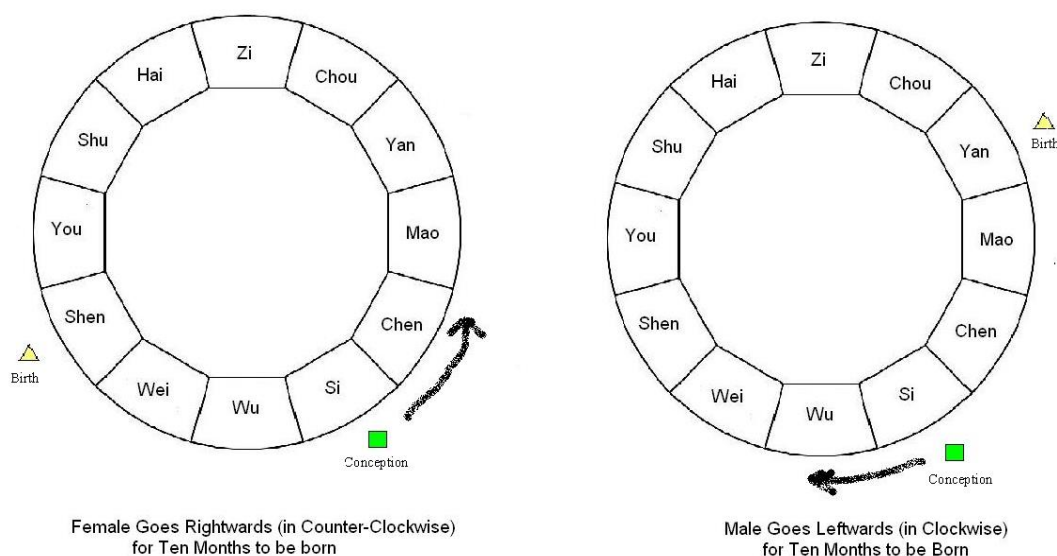


Figure: Female and Male, Moving Towards Different Cosmological Cyclical Directions

There is a hierarchy of superior and inferior between the left and right, Heaven and Earth, and the parts of the body. It is articulated in discussions of body asymmetry. Because the left is honoured in the way of Heaven, the left side of the upper head is superior to the right side; because the right is honoured in the way of Earth, the left side of the lower body is inferior to the right side:

*Heaven is not sufficiently present in the North-West. Hence the North-West is yin, and the ears and the eyes of man on the right are not as clear as on the left. The earth is incomplete in the South-East. Hence the South-East is yang, and the hands and feet of man on the left are not as strong as on the right.*²³³

In conclusion, we can find a great diversity of theories on sex determination in ancient Greece and early China. I have argued that almost all these theories are somehow influenced by the common thought of dichotomy, which distinguished and classified things into male and female, right and left,

²³² See Liu, Z.G. (2009): 87–134.

²³³ *Suwen* 5 (陰陽應象大論). Translated by Unschuld, P. and Tessenow, H. (2011), vol. 1, 116.

yin and *yang*, hot and cold, strong and weak, dry and moist, etc. In Hippocratic texts, the sex of the embryo might be determined by many different factors. A body might be determined by whether a stronger seed prevails, whether the womb is dry enough, whether the seed comes from the right testicle, whether the embryo is planted on the right side of the womb, etc. In Aristotle's works, we can find evidence that he was influenced by previous theories on sex determination. In *Taichanshu*, there are many rituals for seeking a male or female child. In addition to these rituals, there are medicines and theories on choosing the right days. Whether the child will be a boy or a girl depends on odd or even days of conception.

I have also argued that there was a similar idea which associated sex determination with the right / left dichotomy, but the correlation is on the opposite in ancient Greece and early China. In Greek texts, the right/left dichotomy is usually associated with the right/left testicle or the right/left womb. The right and left are more about the positional directions in space. In Chinese texts, the right/left dichotomy is associated with the right/left movements of the embryo. The right and left are more about the embryonic or cosmological cyclical directions. It is worthy of making some further investigation on the deep reasons for this interesting phenomenon, but it could be something associated with social customs. In different cultures, right and left could have different hierarchies of superiority and inferiority. In ancient Greek culture, the right is normally more auspicious than the left; in early Chinese culture, however, the right is normally less auspicious than the left.

2.4 Growth of the Embryo

Concerning the growth of the embryo, I want to emphasize two points. Firstly, we can find a common idea in ancient Greece and early China that a sequence is generally supposed for the formation of bodily parts. There are certain principles to guide the sequence. The more important parts are normally supposed to be formed earlier than others. Secondly, there were records of aborted embryo in both Greek and Chinese tradition, which presented the rare opportunities for direct observations of the development of the embryos. Now, I will give detailed explanations.

In Hippocratic writings, it seems that most authors agreed to a sequential development of the embryo in which some parts are formed after one another. There is considerable interest, therefore, in what part comes first, and the order in which the parts form. Iain Lonie praised *Nature of the*

Child highly for providing ‘the first coherent theory in Western science of the development of the embryo’.²³⁴ In *Nature of the Child*, it is said that the umbilicus is what first forms in the embryo.²³⁵ The umbilicus is located in the middle of the embryo and plays a significant role in transmitting nutrition. From the umbilicus extends the membranes, which form some cavities around the embryo. These pockets, namely the ‘chorion’ (χόριον), receive the useless material that is left over by the embryo.²³⁶ Then parts of the body begin to be differentiated. The process of differentiation is governed by a principle of ‘like-to-like’ (τὸ ὅμοιον ὡς τὸ ὅμοιον)—the dense to the dense, the rare to the rare, and the fluid to the fluid, each going to its appropriate place according to its nature.²³⁷ The bones are ‘solidified’ (πηγνύμενα) by the heat and ‘branch out like a tree’. Following this, different parts of the body appear clearly in separation: the head, the arms, the legs, the sinews, the mouth, the nose, the ears, the eyes, the genitals, etc.²³⁸

There is no agreement on the time needed for differentiation, which varies from seven days to three or four months. In *Fleshes*, it is said that a seven-day embryo already contains everything—‘the orbits of the eyes, the ears and the limbs; the fingers, the legs, the feet, the toes, and the genital parts, and all the rest of the body are distinct’.²³⁹ However, in *Epidemics II*, it is said that all parts of the embryo are completely differentiated in three months: ‘The three-month child shows everything, and the mother has milk then’.²⁴⁰ In *Regimen*, it is thought that there is a certain variety. An embryo can grow quicker if it contains more fiery elements and receives more nourishment. A quicker embryo needs only 40 days to make ‘everything visible’, but a slower one may need two months, three months and even four months.²⁴¹ In *Nutriments*, it is said that for differentiation, some need 35 days, some need 40 days, some need 45 days and some need 50 days.²⁴²

In Aristotle’s works, the form-matter principle is very important for the formation of the embryo. According to his theory, all parts of animals are present potentially in the ‘material’

234 Lonie (1981): 176.

235 *Nat. Puer.* 15.1, Li VII 492.

236 *Nat. Puer.* 16.1, Li VII 496.

237 *Nat. Puer.* 17.1, Li VII 496. For Greek history of the principle of ‘like-to-like’, see Müller (1965).

238 *Nat. Puer.* 17.2-4, Li VII 492-498. Lonie (1981): 9.

239 *Carn.* 19, Li VIII 610.

240 *Epid.* 2.6, 17, Li V 136.

241 *Vict.* 1.26, Li VI 498.

242 *Ali.* 42, Li IX 112-114. Hanson (1987): 593.

provided by the mother, but the potentiality needs to be realized. There must be a driving force to shape the parts of the embryo, in the same way that wood must be worked upon by a carpenter. Indeed, the driving force comes from the ‘form’ provided by the father. There is a set mechanism by which the ‘form’ works upon the ‘material’.²⁴³ Once the principle of movement has been supplied, the embryo will develop entirely by itself, just as ‘miraculous automatic puppets’.²⁴⁴ Following the mechanism, some parts are formed earlier, while other parts are formed later, but one part is formed ‘after’ not ‘by’ another part.²⁴⁵ The formation is may be ‘quicker’ or ‘slower’.

*And it is possible that A should move B, and B move C, and that the process should be like that of the ‘miraculous’ automatic puppets : the parts of these automatons, even while at rest, have in them somehow or other a potentiality, and when some external agency sets the first part in movement, then immediately the adjacent part comes to be in actuality.*²⁴⁶

According to Aristotle, the semen provides the principle of movement for the developing embryo, just as an external agent provides a start for the automatic puppets. Automatic puppets have a mechanism of self-movement. Once it is triggered by an external agent, the movements can be passed from one to another by a series of physical gears.²⁴⁷ Sometimes, Aristotle also applied the analogy of the automata to explain animal motions.²⁴⁸ He compared the tendons and the bones of the body to the iron and the cables of automatic puppets. The complex structure of the tendons and the bones builds a system of internal parts in the human body. There is a chain of causes and effects.

Similarly, Aristotle supposed that there should be a system of internal gears inside the embryo so that the internal movements can continue automatically when the father is no longer in direct contact with the material. In Aristotle’s model, semen provides the cause of movements in one way and drives the continuity of movements in the embryo in another way.²⁴⁹ However, there is a problem. As Devin Henry pointed out, Aristotle should compare the father to the engineer who constructs the device rather than the operator who triggers its motion, because the father needs to be responsible for the mechanism that generates its internal motion.²⁵⁰ The embryo’s development

243 GA 734b14-19; 740b19-21, 762b2-4.

244 GA 741b7-9.

245 GA 734a28-30.

246 GA 734b9-14.

247 Berryman (2003):245; Henry (2005): 4.

248 MA 701b1-IO.

249 Berryman (2003): 249; Henry (2005): 31.

250 Henry, D. (2005): 34.

does not follow the same pattern of automatic puppets, which move in an uninterrupted sequence. Devin Henry suggested that none of the devices available at the time provided an accurate analogy to suit Aristotle's purposes because what Aristotle actually needed for his analogy is 'a pre-programmed automaton in the modern sense (one that owes its movements to the execution of a computer programme).'²⁵¹ Even if this conclusion is still applicable, it is clear that the use of the analogy is limited to the level of technological development of the time. Aristotle could only borrow the image of automatic puppets for his purpose at a time when computers are far from being invented. When Aristotle made the analogy of the automata, he must assume that some Greeks could understand what automatic puppets were. It is well known that some Greeks, such as Hero of Alexandria, invented complex mechanical automatic devices.

In Aristotle's theory, more important bodily parts are formed before less important parts. If bodily parts are formed successively, then it is necessary to understand which parts are actually formed first. Aristotle believed that the heart or the equivalent of the heart is formed first. All animals with blood must have the heart because all blood vessels originate from the heart. Some animals may not have hearts, but they must have a equivalent of the heart which can supply the principle. The heart must be formed first because it is the most important part of the body, even more important than the brain. This is also the reason the heart can be seen moving before any of the other parts.²⁵² Moreover, the heart is the last part that the body loses. If the heart fails, it means the end of life.

*The heart is the place where life fails last of all; and we find universally that what is the last to be formed is the first to fail, and the first to be formed is the last to fail. It is as though Nature were a runner, covering a double course there and back, and retracing her steps towards the starting-point whence she set out.*²⁵³

In a sense, the formation of the heart marks the beginning of a new life, which is separate and independent from both the parents. In Aristotle's words, it is 'just like a son who has set up a house of his own independent of his father.'²⁵⁴ The heart contains the first principle. Thus, it is able to supply the principle for the formation of subsequent parts. After the formation of the heart, the upper portion of the body is formed. The upper portion of the body is more important than the lower

251 Henry, D. (2005): 39-40.

252 *PA* II 666a20-13.

253 *GA* 741b19-24.

254 *GA* 740a6-9.

portions, so it is formed quicker than the lower portions.²⁵⁵ In the upper portion, the blood vessels start from the heart and extend all over the body, just as skeleton models, which are ‘traced out on the walls of buildings’. Then the sinews and bones are solidified by the agency of the internal heat.²⁵⁶ The brain is formed immediately after the heart. The blood vessels terminate above in the brain. The brain is cold, which produces a balance to the heat of the heart.²⁵⁷

Aristotle believed that the eyes are the last part to be formed in the upper portion. The formation of the eyes is much slower than other parts. The eyes, which need the greatest power for movement, are close to the cold brain and far from the hot heart. As a result, the eyes need the longest time for completion.²⁵⁸ Moreover, different parts of the body are made from different parts of the material. The flesh, the bodily organs and the sense organs are most important, so they are made from the purest part of the material and are formed quicker. The bones, sinews, nails and hair are less important, so they are made from the residue and are formed slower.²⁵⁹

In *Huangdi Neijing*, the formation of the foetus is a sequential process in which one follows another. *Jing* is the most essential matter that should be first formed. Then, it is followed by the brain and marrow, which are the most important internal parts. The importance of the brain and marrow is emphasized throughout the whole writing of *Huangdi Neijing*. Here, it shows the importance of the brain and marrow again in embryology.

黃帝曰：人始生，先成精，精成而腦髓生，骨為幹，脈為營，筋為剛，肉為牆，皮膚堅而毛髮長，穀入于胃，脈道以通，血氣乃行。

[Huang] Di: ‘At the beginning of life, the jing is first formed. When the jing is formed, the brain and marrow is generated. Then the bone acts like a trunk, the vessels acts like branches, the tendons acts like supporting material, and the flesh acts like the wall. The skin is solidified and the hair begins to grow. Grain comes into the stomach, vessels begin to have function, and blood and qi start to circulate.’²⁶⁰

In the manuscripts of Mawangdui, we can also find a sequence for the formation process. The

255 GA 742b13-18, 743b18-19.

256 GA 743a1-18.

257 GA 743b25-33.

258 GA 744a22-24.

259 GA 744b12-39, 745a1-4.

260 *Lingshu* 3-10, SK733.340 (經脈). My translation.

text of *Taichanshu* is quite focused on the subject of the embryo itself. The author of *Taichanshu* described the first month of the embryo as 留刑, which should be read as *Liuxing* 留(=溜/流)刑(=形/型) (flowing into the form).²⁶¹ *Xing* 刑 is something essential for the coming-to-be. As it says in another text of Mawangdui, *Cheng* 稱, ‘If one thing is coming-to-be, its form goes first.’²⁶² Literally, *xing* 刑 is about a knife 刀 making a certain shape 形 on something. In *Shuowen Jiezi* 說文解字, *xing* 型 means a process of casting a mould so that one thing can be made into a certain shape.²⁶³

It is clear that the author of *Taichanshu* had a great interest in the question of coming-to-be, but he did not produce a systematic theory. He did not give a clear definition of *Xing* and did not explain what drives the process of flowing into *Xing*. There is nothing like the Aristotelian form, which must be combined with matter, even if *Xing* is a sort of form or a certain shape. *Shuowen Jiezi* 說文解字 defines the embryo (*Pei* 胚) as the status of the first month and the foetus (*Tai* 胎) as the status of the third month.²⁶⁴ It makes a perfect match with the theory of *Taichanshu*.

According to *Taichanshu*, the *xing* is gradually fixed after the third month. Parts of the body, like blood, bones and skin, are gradually formed in the following months. The embryo gradually changes into a foetus and then a completed child, following a specific sequence. The author described the embryonic formation in a chronological manner. It also shows a clear influence from the concept of the five phases.

In the first month it is called ‘flowing into the form’....

In the second month it first becomes lard....

In the third month it first becomes suet, and has the appearance of a gourd....

In the fourth month Water is bestowed on it, and blood first forms....

In the fifth month Fire is bestowed on it, and vapor first forms....

In the sixth month Metal is bestowed on it, and muscle first forms....

In the seventh month Wood is bestowed on it, and [bone] first forms....

In the eighth month Earth is bestowed on it, and [skin and hide] first form....

In the ninth month [Stone] is bestowed on it, and filament hairs first form....

261 MWD 4:136. Harper (1998): 378.

262 MWD 1:81.

263 *Shuowen Jiezi* 13:688 (土部).

264 *Shuowen Jiezi* 5: 167 (肉部).

*In the tenth month the vapor spreads [2] to form [?].*²⁶⁵

A similar description of the formation process can be found in another text in the unearthed early bamboo strips of the Warring States preserved at Tsinghua University 清華大學藏戰國竹簡, namely *Tang zai Chimen* 湯在啻門 (Tang in Chimen). The text describes the generation process and a ten-month pregnancy (in lunar months).

*In the first month, it (the foetus) begins to beat (come alive);
in the second month, then it forms the amniotic sac;
in the third month, it forms a shape;
in the fourth month the bones are formed (it solidifies?);
in the fifth month, it receives (the influences of the Five Flavours?);
in the sixth month, it fleshes out;
in the seventh month, it develops skin;
in the eighth month, it obtains the correct form (gender differentiation?);
in the ninth month, it becomes fully manifest;
in the tenth month then it is complete, and that is when people are born.*²⁶⁶

In the early Chinese dictionary *Guangya* 廣雅, it is explained that the embryo follows a sequence to grow up and make gradual changes in each month. Since this discussion appeared in a dictionary, it shows descriptions of pregnancy as characterized by slow transformation over months was well known at the time.

人一月而膏，
二月而脂，
三月而胎，
四月而胞，
五月而筋，
六月而骨，
七月而成，
八月而動，
九月而躁，
十月而生。

*Human in the first month, it starts to become lard-like;
in the second month, it starts to become suet-like;
in the third month, implantation happens;
in the fourth month, the placenta appears;
in the fifth month, tendons appear;*

265 MWD 4:136. Translated by Harper (1998): 378–381. Some texts between the lines are omitted in purpose because they are very long but not necessary to be mentioned here.

266 Li Xueqin (2015): 142. Translated by Cook and Luo (2017): 49.

*in the sixth month, bones appear;
in the seventh month, the formation is complete;
in the eighth month, the foetus begins to move;
in the ninth month, the foetus moves violently;
in the tenth month, the birth happens.*²⁶⁷

We can also find similar descriptions of monthly changes of the embryo in many other early Chinese texts, for example, *Guanzi*, *Wenzi*, *Huainanzi*, which will be further explained. Indeed, there are great differences in each text on how the embryo changes in each month.²⁶⁸ Even so, a sequence of development is the commonly shared idea for all these texts.

How could ancient people get knowledge on the development of the embryo? In some rare occasions, there might be opportunities for direct observations of an aborted embryo. One story was told by the Hippocratic author of *Nature of the Child* about once having observed a sixth-day embryo expelled from a slave girl through an artificial abortion. The purpose of the abortion is to save her as a valuable singer, a value that she would lose if she became pregnant. The method of abortion is simple: the doctor asked the girl to jump up and down seven times, after which the ‘seed’ came out with a noise, surprising the girl.

*A kinswoman of mine owns a very valuable singer, who used to go with men. It is important that this girl should not become pregnant and thereby lose her value. Now this girl has heard the sort of thing women say to each other – that when a woman is going to conceive, the seed remains inside her and does not fall out. She digested this information, and kept a watch. One day she notices that the seed has not come out again. She tells her mistress and the story comes to me. When I hear it, I tell her to jump up and down, touching her buttocks when her heels at each leap. After she has done this no more than seven times, there is a noise, the seed fell out on the ground, and the girl looks at it in great surprise.*²⁶⁹

The author claimed that ‘it is upon its nature, as I observed it then, that I base the rest of my inferences’. He borrowed chicken eggs as a model to present what a human embryo should look like at its early stage.²⁷⁰ He described the aborted sixth-day embryo ‘as if someone had removed the external shell of a raw egg’. Most important of all, the umbilicus is already formed in the middle,

267 Wang, Niansun.(2000), 202. My translation.

268 Zhang Hanmo (2017): 173-212.

269 *Nat. Puer.* 13.1-2, Li VII 490.

270 Lonie (1981): 7, 166.

through which the embryo took its breath.²⁷¹ This story was quite influential. Galen was deeply impressed by it and he cited the story again and again in his books.²⁷² How could the author know that it is a seventh-day embryo? The author of *Nature of the Child* adapt women's testimonies as a proof. In most cases, however, women were faulted by Hippocratic authors for their miscalculation of the days since conception.²⁷³

In order to further demonstrate his argument, the author of *Nature of the Child* created a famous test of chicken eggs. It was believed that the development process must be the same in chicken eggs and in the human embryo. As the author said, all the things concerning the growth of children can be found 'in the eggs of birds from the beginning to the end'.²⁷⁴

*If you take twenty or more eggs, and place them to hatch under two or more fowls, and on each day, starting from the second right up until the day on which the egg is hatched, you take one egg, break it open, and examine it, you will find that everything is as I have described – making allowance of course for the degree to which one can compare the growth of a chicken to that of a human being.*²⁷⁵

There was also a Chinese story about an aborted embryo. It was recorded in a legal document excavated from the Qin tomb of *Shuihudi* 睡虎地. This type of record might have possibly been kept in an archive by the local government. Sometimes, such records might be used as teaching materials for new officers. In the record, a pregnant woman was with child for six months. She brought an accusation against another woman for having caused the miscarriage. An officer and his assistant carefully examined the sex, the hair, and the shape of the aborted child. They also checked the blood and wrote down details about the miscarriage.

爰書：某里士五（伍）妻甲告曰：「甲懷子六月矣，自晝與同里大女子丙，甲與丙相梓，丙債甲。里人公士丁救，別丙、甲。甲到室即病復（腹）痛，自宵子變出。今甲裹把子來詣自告，告丙。」即令令史某往執丙。即診嬰兒男女、生髮及保之狀。有（又）令隸妾數字者，診甲前血出及癰狀。有（又）訊甲室人甲到室居處及復（腹）痛子出狀。丞乙爰書：令令史某、隸臣某診甲所詣子，已前以布巾裹，如（𧈧）血狀，大如手，不可智（知）子。即置盎水中搖（搖）之，𧈧（𧈧）血子（也）。其頭、身、臂、手指、

271 *Nat. Puer.* 13.3-4, Li VII 490.

272 *De Facult. Natur.* 2.3, K II 86.6-12; *De Sem.* 1.4, K IV 524.18-526.6; *De Foet. Form.* 1, K IV 653.14-655.5; *Adv. Lyc.* 7.3, K XVIII A 236.5-15. The story is also cited by other writers, e.g. Iamblichus, Aristaenetus. cf. Lonie (1981): 161-162.

273 Lloyd (1983):76-78; Hanson (1987): 596.

274 *Nat. Puer.* 29.3, Li VII 530.

275 *Nat. Puer.* 29.2, Li VII 530.

股以下到足、足指類人，而不可智（知）目、耳、鼻、男女。出水中有（又）𩺰（𩺰）血狀。其一式曰：令隸妾數字者某某診甲，皆言甲前旁有乾血，今尚血出而少，非朔事（也）。某賞（嘗）懷子而變，其前及血出如甲□。

Legal records: A wife (Party A) of a soldier in a street brought an accusation. She had been pregnant for six months. She (conflicted with) a large woman (Party C) from the same street. The two people grabbed the hairs of each other. Party C overturned Party A into the ground. Another person of the street (Party D) came to help and separated Party C and Party A. When back home, Party A felt pain in the abdomen. The child was aborted in the evening. Now, Party A brought an accusation with the child, against Party C. Officer Shi was immediately ordered to take Party C. The sex of the foetus was checked, and also its hair and its protection situation. The concubinages were asked for the previous situation of the blood and symptoms. Some other people were asked for the situation when Party A came back home and how did the abdomen pain happen. Legal records: Order officer Shi and his assistant to examine the aborted child of Party A. At the beginning, the child is warped in cloth like a clot of blood in the size of a hand. At that time, they do not know that it was a child. When they put it into water and agitated it, they find that the blood clot is actually a child. The head, body, arms, fingers, legs and toes are already in the shape of a human, while the eyes, ears and nostril are still unable to identify. The sex [of the foetus] is unclear. Another legal record: when the concubinages were asked to check Party A, they all reported that there was dried blood. Since it is a discharge of blood but in a very small amount, it must not be menstrual blood. It should be a miscarriage. The situation is just like what Party A described.²⁷⁶

This material has valuable meaning. The involved officer might have been a medical expert. He knew how to judge menstrual blood from the amount of the blood stains. He also put the aborted embryo in water to make the examination. He also relied on the woman's testimonies as a proof that it was a child of six months' gestation. Many similarities can be found in the two stories.

Therefore, we can see that there might be some rare opportunities for ancient people to make a direct observation of an aborted embryo. However, what can be obtained is limited from such an observation. The majority of ancient embryological knowledge must be obtained through other ways, which I will explain in the following chapters.

2.5 Normal Births

I will take one discussion concerning births. Even if there were different understandings, it was normally regarded as a common sense that the birth should happen at the tenth month. Now, I will

276 Shuihudi Qinmu Zhujian (1990):161-162 (封診式). My translation.

take detailed explanations of this matter. In early Chinese texts, it has been widely acknowledged that births should happen in the tenth month. There was not much disagreement on this point. As it is indicated in *Taichanshu*, the *qi* 氣 is completed in the tenth month. The months were counted according to lunar calendars, which were very important throughout Chinese history for agriculture, politics and also childbirth.²⁷⁷

In the Hippocratic writings, most authors agreed that a pregnancy should last between seven months and ten months. In *Nature of the Child*, it is said that the completion of embryonic formation usually needs ten months.²⁷⁸ In *Regimen*, it is said that different embryos will be completed at different times, for ‘those that grew quicker are fully formed in seven months, those that grew more slowly in nine months’.²⁷⁹ In *Epidemics II*, it is said that ‘children are nurtured in the seventh month, or the ninth, or tenth’.²⁸⁰ At least seven months are needed for all parts to be formed: ‘What moves in seventy (days), is completed in three times (seventy)’.²⁸¹ In *Nutrient*, it is said that for the completion some need 210 days, some 240 days, some 270 days, and some 300 days.²⁸² A pregnancy more than ten months is generally regarded as the result of miscalculating the time of conception.²⁸³ It seems that Hippocratic doctors always suspected women’s ability in calculations. Aristotle thought that the majority of births happen at ten months, but sometimes it could be seven months, eight months, nine months or eleven months. Those more than eleven months must be false reports.²⁸⁴ Moreover, Aristotle had an interesting idea that the gestation period is associated with life span. He thought that these animals with a longer life-span must take a longer time in the womb.²⁸⁵ However, there are some other factors. The horse has a longer gestation period, but lives shorter than humans. According to Aristotle, the reason is that the horse’s womb is very hard, so it needs more time for gestation.²⁸⁶ The size of animals must also be taken into consideration. Animals of a larger size usually need a longer time to reach perfection. Hence horses need a longer time of

277 For calendar and timekeeping system in early China, see Cullen, C. (2017).

278 *Nat. Puer.* 30, Li VII 532; *Oct.* 13, Li VII 460.

279 *Vict* 1.26, Li VI 498.

280 *Epid.* 2.6, 4, Li V 134.

281 *Epid.* 2.3, 17, Li V 116.

282 *Ali.* 42, Li IX 112-114. See also Hanson (1987), p593.

283 *Nat. Puer.* 30, Li VII 532. See also *Oct.* 13, Li VII 460.

284 *HA* IX 584b19-22.

285 *GA* 777a31-35.

286 *Pr.* 10.9, 891b25-33.

gestation than men. For the same reason, elephants need almost two years for gestation owing to their excessive size.²⁸⁷

In summary, this chapter has made an investigation on the process of embryonic development from the formation of seed to childbirth. I have made separate arguments based on comparison of selected embryological texts in ancient Greece and early China. I have argued that there was plenty of common knowledge across the two cultures, despite the great diversity of ideas. On the nature of seed, there were common ideas that (1) the seminal fluids have origins from nourishments and (2) the seminal fluids are somehow related to the brain substance and spinal marrow. On the success and failure of conception, there were common ideas that (1) the success of conception depends upon both the male and the female and (2) it is difficult to produce a child beyond certain ages. On the process of gestation, there was a common idea that the embryonic development follows a sequence and there were similar records on the rare opportunities of observing aborted embryos. On the final stage of childbirth, there was a common idea that births should happen in the tenth month.

287 *GA* 777b9-17.

Chapter 3 Male and Female Bodies

The procreative bodies, male and female, are essential topics in the discussion of generation or reproduction. In general, both Greek and Chinese thinkers showed a great interest in what is contributed by the father and the mother separately in producing a child. What structures and functions of the body are related to generation in male and female? If a woman is unable to get pregnant, is it her own problem or a problem from her husband? What is the role of women in the whole process of reproduction? What is the contribution of men? Why men and women have different roles in producing a child? All of these lead to one question: is there any difference between a male body and a female body?

The subject of sex differences, of the differences between men and women, is one which relates to the topic of this thesis in at least two ways. The first is in relation to the whole business of generation itself, to the process of making offspring, in which both men and women are implicated, but differentially so. This is a point which can be more or less elaborated, explicitly theoretically developed, or more minimally described and noted, variously taken for granted, in different historical and discursive contexts. The second is in relation to offspring made, which need to be made male and female, and how that process is explained and understood. The two are clearly interrelated and, it is to be expected that ideas and arguments will overlap, but they will be treated in separate chapters here, beginning with the first: the more global relations between sex difference and generation.

This chapter will outline and analyze discussions of the differences between men and women, and between male and female bodies more particularly, across a range of ancient Greek and Chinese medical and philosophical texts. I want to make two arguments in this chapter. First, it was mostly the roles of male and female in generation that were held to define sexual difference, even though ancient Greeks and Chinese had very different understandings of how the generative functions could be conducted through vessels, blood, semen, menstrual blood, uterus and kidneys etc. Second, there was also a common awareness of gender-specific diseases in both cultures, while most of the gender-specific diseases were closely related to generative organs or generative functions.

In 1990, Thomas Laqueur published *Making Sex: Body and Gender from the Greeks to Freud*,

which introduced the concepts of ‘one-sex body’ and ‘two-sex body’. In his definition, ‘the one-sex body’ is a kind of ‘one flesh’ — a ‘single-sexed body’, as it were — in which ‘the boundaries between male and female are of degree but not of kind’, while ‘the two-sex body’ is the opposite. In ‘the two-sex body’, men and women are understood as being radically divergent, different in kind from each other.²⁸⁸ Laqueur’s main argument was that there were no biological boundaries in the ancient world.²⁸⁹ This argument had received much criticism from historians of medicine. In 2013, Helen King published another book, *The One-Sex Body on the Trial: The Classical and Early Modern Evidence*, in which she showed that the understanding of sexual difference was far beyond the one-sex model.²⁹⁰ My thesis will revisit the problem of sex differences. I will argue that the most essential sex difference is linked to reproductive functions in Hippocratic and Aristotle’s theories, as well as in ancient Chinese medical theories.

Historians of medicine have also considered Chinese materials in the study of procreative bodies. In 1999, Charlotte Furth published *A Flourishing Yin: Gender in China's Medical History*, in which she extended the western debates of Thomas Laqueur’s one-sex hypothesis into the discussion of gender and sex in early Chinese medicine. Furth defined ‘the Yellow Emperor’s body’ as a dominating idea about sex differentiation, in which males and females are two correlative and flexible aspects of one identical, homologous, and androgynous body. Furth argued that “Unlike the Galenic human ‘one-sex’ patterned on a male norm, the Yellow Emperor’s human body is more truly androgynous, balancing yin and yang functions in everyone”.²⁹¹ Furth’s work provided a test of the one-sex hypothesis in a very different cultural background. It showed that the one-sex model might not work for the Chinese counterparts.

In my research, Thomas Laqueur’s basic distinction between the one-sex body and the two-sex body will still be used, but in a distinct way. I will conduct my own method to measure and analyse the differences between male and female in selected texts. In general, I will summarize the understanding of the body and sex under three categories: (1) overall constitution, (2) bodily economy, and (3) bodily organs. By ‘overall constitution’, I mean general statements concerning

288 Laqueur, T. (1990): 25.

289 Laqueur, T. (1990): 19.

290 King, H. (2013).

291 Furth, C. (1999):46.

the nature of the body, such as when ancient authors discussed the dry and moist, or strong and weak, or *yin* and *yang* nature of the body. By ‘bodily economy’, I mean the functioning of the entire body, how the body works as a living whole, and particularly how the body system, including its parts and substances, works for the purposes of generation in male and female. For example, this might include the somatic vessels and the bodily fluids, such as menstrual blood and milk. By ‘bodily organs’, I refer to the understandings of sex differences concerning the body parts, particularly the body parts related to generative functions.

For a better understanding of sex differences, I will use ‘quantitative differences’ or ‘qualitative differences’ as a tool to measure the distinctions. A quantitative difference is only different in the sense of more-or-less. It usually has variances among individuals. A qualitative difference can be measured by a certain threshold point. It means there are significant changes if things are beyond this point or below this point. It is different in the sense of positive or negative. For example, it is possible to say that the womb is made of the same material, functions in the same manner, and it is affected by the same diseases as any other internal organ. It only means that women have one more number in the list of internal organs and have more chances to get similar diseases (e.g., inflammation) because of this additional organ. If so, it can be regarded as a quantitative difference. It is also possible to say that the womb has special diseases of its own and it attributes irreplaceable functions to women. If so, the womb becomes a gender-specific organ and it can be regarded as a qualitative difference. In my thesis, I will argue that sex differences might be defined using this dichotomy in different writings. Sometimes sex might be manifested in quantitative differences, while sometimes in qualitative differences. However, a common conclusion was reached in almost all the texts that the male body and female body must have different generative functions, even though different authors had different understandings of how the generative functions could be conducted through vessels, blood, semen and menstrual blood, etc. In both cultures, the different generative functions are used to distinguish and explain sex differences and gender-specific diseases.

Before examining the differences between their understandings, it is necessary to point out two basic facts. Firstly, most discussions about sex differences concern the body rather than the soul. In early Chinese texts, there is no such discussion of difference concerning the soul between male and

female. To all Hippocratic authors, humans are assumed to be complex compounds of body and soul. This should not be understood in a ‘dualist’ way—the two may be very closely integrated, and the soul is often conceived of in material terms—but it is important to remember that both are present.²⁹² The question of whether men and women have different souls is, therefore, implicitly posed but rarely addressed. The only clear statement on the matter is found in *Regimen*, where it is stated that ‘soul is the same in all living creatures, although the body of each is different’.²⁹³ This claim is made in the context of a discussion about generation, in which the possibility of male and female coming together to create a new life is founded on shared nourishment and a common soul composed of ‘a blend of fire (πυρός) and water (ὕδατος)’.²⁹⁴ It seems likely that most Hippocratic writers, if they thought about the matter at all, would agree that males’ and females’ souls are essentially alike. In Aristotle, men and women represent the same species of human being; hence they share the same form. In his classification of animals, he proposes the important concepts of ‘other in species’ (ἕτερον τῷ εἶδει) and ‘the same in species’ (τὰντὰ δὲ τῷ εἶδει). Animals ‘other in species’ must first be ‘the same in genus’ (ἐν ταὐτῷ γένει) but also involve differences, while being indivisible.²⁹⁵ Animals ‘other in genus’ (ἕτερον τοῦ γένους) must be different in their very nature, e.g. the one a horse and the other a man. Therefore, male and female are neither ‘other in genus’ nor ‘other in species’. They are ‘the same in genus’ and ‘the same in species’.²⁹⁶ For this reason, ‘the female possesses the same Soul as the male.’²⁹⁷ Male and female are different not in virtue of ‘their essence’, but in virtue of ‘their material and body’.²⁹⁸ Therefore, our discussion is not about the soul, but about the body.

Secondly, it must be pointed out that most ancient medical writings do not mention sex differences at all, either in relation to anatomy and/or physiology, or in relation to diseases. Many Hippocratic texts, such as *Anatomy*, *Nature of Bones*, *Heart*, *Breaths*, assume a general body which leaves the question of sex difference unanswered. There are two possibilities for the silence. Since

292 Bartoš (2009).

293 *Vict.* 28, Li VI 500-502.

294 *Vict.* 7, Li VI 480.

295 *Metaph.* 1057b37, *Metaph.* 1058a16-17.

296 *GA.* 730b35, *Metaph.* 1058a31-32.

297 *GA* 741a7-8.

298 *Metaph.* 1058a21-b25. *GA* 730b33-731a1. See also Deslauriers (1998).

most ancient medical writers were males, one possibility was that they simply regarded the male body as the ultimate model in all related discussions without any concern about the female body. Another possibility was that there was no need to mention sex differences because the authors thought that male and female have the same *phusis*. There are more writings on general symptoms and diseases like pain, fever, haemorrhoids, swelling, inflammation, consumption, diarrhoea, dropsy, gout, ulcers, fistulas, etc. Both men and women are subjects to these afflictions, and one individual is either more or less likely to be attacked than another. Again, male and female are not specifically mentioned. When dealing with diseases, there seems to be no need to consider whether the patient is male or female. The womb is regarded the same as any other internal organ. Purgation is the most common method used for treating diseases, including afflictions of the womb. Through purgation, it is believed that the bad humours would be evacuated from the body so that health could be regained. An abnormal situation of the humours can be diagnosed through the discharge of bodily fluids. Menstrual blood is listed along with the passage of urine, sputum, nasal discharge, sweat, and discharge from tumours, wounds and eruptions. Menstrual blood is just one discharge and has no special meaning for diseases of women. In *Airs Waters Places*, men and women have almost equal chances to be influenced by the external environment. The so-called ‘sacred disease’ and ‘melancholy’ are also common to both men and women. Wounds, dislocations and fractures might happen more frequently in men than women because most soldiers in the ancient world were males, but the treatment is basically the same if a woman were injured by accident.

Similarly, it is also true that most diseases are common to both male and female in *Huangdi Neijing*. When the authors described the human body and its diseases, they did not specify the sex of the body in most cases. Unlike the Hippocratic corpus, however, there is no specific gynecological treatise; there is no text entirely devoted to the female’s health and diseases in *Huangdi Neijing*. Moreover, it is not only a medical collection, but also a philosophical collection. It contains many philosophical ideas from antiquity to the late Han period and it usually talks about principles in a cosmic and universal sense, for which reason there is not much need to emphasize sex differences.

3.1 Overall Constitutions

In respect to overall constitutions, I first want to argue that Greek authors were mostly concerned with the moistness and the coldness of the female body, while Chinese authors mostly concerned with the different types of generative powers for either *yin* or *yang*. It shows that there are quite different standards to differentiate the female body from the male body. If we examine this matter further, we can find that different writings have different focuses because of different intellectual or textual projects. The focus of many Hippocratic treatises is largely on women's moistness. This moistness is caused by the porous, loose and spongy body, which can absorb a lot of moisture like 'a woolen fleece'. The focus of Aristotle's works is largely on women's coldness. Due to the coldness, women are unable to concoct their residue into the most complete form of semen, but they have more residue to nourish the foetus. The focus of *Huangdi Neijing* is largely on *yin* and *yang*. The differences between *yin* and *yang* are much emphasized. *Yin* and *yang* can be used to discuss sex differences if they are regarded as two different types of generative powers. The male body is characterized with a nature of *yang*, while the female body is characterized with a nature of *yin*. However, *yin* and *yang* are not so much emphasized for sex differences in the manuscripts of Mawangdui. Moreover, we learn that sex differences are not always about 'more or less'. Up to a certain point, male and female are not quantitatively different. They are qualitatively different. According to the Hippocratic writings, males never menstruate because their bodies are much less spongy and moist. According to Aristotle, females cannot produce semen because their bodies are not hot enough to do so. In the manuscripts of Mawangdui and *Huangdi Neijing*, the female body manifests both *yin* and *yang*, but it is always the *yin* that prevails. Now, I will provide a detailed explanation of my arguments.

In Hippocratic writings, one of main ways to talk about the overall constitution of the human body is through four qualities—hot, cold, wet and dry.²⁹⁹ The elemental system on which these qualities rest varies greatly, and, indeed, may not really be expressed at all, but these are key concepts in thinking about the somatic constitution in a global, but also changeable and relative way,

299 Lloyd (1964).

which lends itself to a domain of sexual differentiation (as well as age, for example, or environment). The treatise of *Regimen* provides a strong programmatic statement about sexual differentiation in qualitative terms. According to *Regimen*, the female body has a moister and colder *phusis*. There are three main causes for this body constitution: first, inborn status; second, lifestyle; and third, menstrual blood.³⁰⁰

*The males of all species are warmer and drier, and the females moister and colder, for the following reasons: originally each sex was born in such things and grows thereby, while after birth males use a more rigorous regimen, so that they are well warmed and dried, but females use a regimen that is moister and less strenuous, besides purging the heat out of their bodies every month.*³⁰¹

According to this theory, the female body is moister because it ingests moister foods and is colder because of heat loss during menstrual blood. Though coldness and moistness are qualities, these differences should be regarded as quantitative differences. The differences are all of a degree, that is, ‘more or less’. They can possibly be measured on a scale of warmth/coldness or moistness/dryness. Variation is inevitably manifested among individuals. Bodily constitution differs in women and also changes with age. The bodies of white women are moister than the bodies of dark women. The bodies of young women are moister than the bodies of old women.³⁰²

*This is my account of the phusis and diseases of women: the most important factor in human affairs is the divine; then the phusis of women, and their complexions: for very white women are moister and more subject to fluxes, and dark women are drier and more constricted, whereas wine-coloured women have something of both. The age of life has the following significance: young women are generally moister and richer in blood, while old women are drier and have less blood: those between the two have something of both.*³⁰³

For Aristotle, male and female are defined and distinguished by their different ways of reproduction. Their different roles in reproduction are primarily manifested in two ways. Firstly, they make different contributions in the formation of the embryo. One contributes the ‘principle of movement’, while the other contributes the ‘principle of matter’.³⁰⁴ Secondly, they have different modes of copulation and generation. The male is the one that generates ‘in another’ (τὸ εἰς ἄλλο), while the female is the one that generates ‘in itself’ (τὸ εἰς αὐτό). As a result, male and female are

300 *Vict.* 36, Li VI 522-524.

301 *Vict.* 36, Li VI 522-524.

302 In *Nature of Woman*, it is unclear whether women are moister than men. *Nat. Mul.*, Li VII 312.

303 *Nat. Mul.*, Li VII 312.

304 *GA* 716a4-8.

said to ‘differ in logos’ (διαφέρει κατὰ μέν τόν λόγον).³⁰⁵

*Now male and female differ in respect of their logos, in that the power or faculty possessed by the one differs from that possessed by the other; but they differ also to bodily sense, in respect of certain physical parts. They differ in their logos, because the male is that which has the power to generate in another (as was stated above), while the female is that which can generate in itself, i.e., it is that out of which the generated offspring, which is present in the generator, comes into being.*³⁰⁶

However, the modes of reproduction are not fixed for all animals. In certain insects, the female extends a part of itself into the male during copulation.³⁰⁷ In such cases, the male generates in itself, while the female generates in another. Moreover, some animals do not even have the division of sex, for example, the Testacea, Amphibia, and the fishes.³⁰⁸ In rare cases, it is even possible for some animal species to be entirely female with no males.³⁰⁹ Some animals, such as domestic hens, partridges, pigeons, peahens and geese can produce ‘wind-eggs’ (ὕπηνεμια) without the male.³¹⁰

Most importantly, Aristotle drew a substantial contrast between male and female in terms of hot and cold. Males are dry and hot, while females are cold and moist.³¹¹ Males are hotter than females because females have regular evacuations of menstrual blood. He reports that Parmenides and Empedocles have the opposite view on this matter. Parmenides believes that women are hotter than men because their menstrual flow indicates an excessive heat and the abundance of blood. Empedocles believes that women are colder than men because their heat is lost along with the menstrual blood.³¹² Aristotle’s view is close to that of Empedocles. For Aristotle, the cold nature of the female body is out of necessity. Because of the coldness, women do not use up the excessive residues of the body. These residues will be used to nourish the foetus during pregnancy and feed the child after birth. It is for the sake of generation that the female body must be colder than that of the male. In Aristotle, hotness and coldness are closely related to one important feature of the sex difference: ability and inability. Due to the cold nature of the female body, females lack the power to concoct semen out of nourishment, which produces a clear distinction between females and

305 GA 716a14-24.

306 GA 716a14-24.

307 HA 542a2-4; GA 723b19-25; 729b22-25; 739a18-20.

308 HA I 489a14, HA IV 537b23-26, HA V 539a27-28.

309 HA I 539a30-31.

310 HA V 539a30-31; 559b28-30, HA X 638a25-26.

311 GA 748b31-33; 765b19-22; Pr. 4.26, 879a33-34.

312 PA II 648a29-33.

males.³¹³ It means that up to a certain point, males can be distinguished from females because of their heat. Males have enough innate heat to transform blood residue into semen, while females are unable to do so. As a result, there is abundant blood residue in women, and it must be discharged as menstrual blood.³¹⁴ Semen and menstrual blood are regarded as the same product of the body, but one is in its finished and pure condition and the other is in its unfinished and impure condition.³¹⁵ In a sense, menstrual blood is unfinished semen. According to Aristotle, male and female can also be defined and distinguished by whether they are able to finish the process of ‘concoction’, which transforms nourishment into semen.

*A male is male in virtue of a particular ability, and a female is female in virtue of a particular inability; that the line of determination between the ability and the inability is whether a thing effects or does not affect concoction of the ultimate nourishment.*³¹⁶

This is the qualitative difference between ‘ability’ and ‘inability’, ‘yes’ and ‘no’. This difference is also related to the model of reproduction. If males have the ability to produce semen that females do not have, females also have abilities that males do not have. For instance, males are unable to become pregnant.³¹⁷ Laurence Totelin has argued for a similar case in plants. In some ways, in ancient embryology, males are ‘unable’, whereas females are ‘able’, because females can accomplish the whole work of generation alone (as in the case of wind eggs).³¹⁸

In the manuscripts of Mawangdui, we find that females and males are associated with *yin–yang* and inner–outer, respectively. ‘Therefore, the males belong to *yang*. For these of *yang*, they are the outer ones. The females belong to *yin*. For these of *yin*, they are the inner ones.’³¹⁹ It is quite possible that the pairs, male–*yang* and female–*yin*, are combined together right from the earliest discourses on these subjects.

In *Huangdi Neijing*, the human body is, in general, governed by the principle of *yin–yang* and the principle of the five phases. The principle of the five phases, however, is less important for sex

313 GA 728a18-19.

314 GA 765b9-18.

315 GA 765b36-766a2.

316 GA 766a31-34.

317 GA 738b36-739a2, 746a16-20. See also Connell (2016): 23.

318 Totelin, L. (2017): 57-75.

319 MWD 4:166 (天下至道談). My translation.

differences because it is the same for everyone. So, our discussion will mainly focus on *yin* and *yang*. As the most fundamental Chinese categories, *yin* and *yang* are essential to the discussion of sex and body. They have three main features. First, *yin* and *yang* are opposite but complementary forces with strong generative powers. It is uncertain whether the categories of *yin* and *yang* originated from the distinction of male (*nan* 男) and female (*nü* 女) or vice versa. Even in the earliest texts, the pairs usually appear together. Heaven (*qian* 乾), a symbol of the father and the *yang* force, interacts with Earth (*kun* 坤), a symbol of the mother and the *yin* force, to generate everything in the universe. Second, it is crucial to achieve a balance of *yin* and *yang* in the cosmos, the state and the body; otherwise, there will be disorder. The struggle or fighting of *yin* and *yang* is manifested inside the body as well as outside of it. A balance must be achieved between *yin* and *yang* for peace and harmony. Third, *yin* and *yang* are wholly relational terms. There is nothing fundamentally *yin* because *yang* will be generated when *yin* goes to its extreme. Similarly, there is nothing fundamentally *yang* because *yin* will be generated when *yang* goes to its extreme.³²⁰ It is improper to claim that the female constitution is *yin* or that of the male is *yang* in an isolated manner.

This raises a serious question: Can we use *yin* and *yang* to discuss sex differences if the body always encompasses both *yin* and *yang*? My argument is that *yin* and *yang* are still the most important categories to classify sex differences. First, *yin* and *yang* can be about the general status of the whole body. When the balance of *yin* and *yang* is achieved, the general status of the female body should be *yin* while that of the male should be *yang*. This means that sex can be related to the general status of the body being either *yin* or *yang*. If none can be identified, there is no sex, in which case the person is neither male nor female (*bunan bunü* 不男不女). This will be the case if someone is born without male or female generative power, that is, a ‘natural eunuch’ (*tianhuan* 天宦).³²¹ These people possess neither male nor female characteristics. In a sense, *yin* and *yang* can be regarded as two different generative powers. So, male and female are distinct from each other in the sense that they have different types of generative powers. There is a boundary between being a male and being a female. If a male loses his generative power, then the general status of the body

320 *Lingshu* 74:427 (論疾診尺).

321 *Lingshu* 65:380 (五音五味).

will change, but it does not mean that he will automatically obtain the generative power of a female. This will be the case, for example, if a man has his generative power removed through castration, thereby becoming a eunuch.³²² Hence, *yin* and *yang* can be regarded a qualitative difference.

3.2 Bodily Economy

In respect to bodily economy, I first want to point out that both Greek and Chinese authors gave much attention to the vessels involved in the body's operations, but different authors created different theories of the vessel system. They had very different views on the number, the starting point and the ending point of the vessels. More importantly, they had very different views on the generative vessels. This is my essential argument here. The notion of 'vessels' was very different in Greek and Chinese medicine. Indeed, it is still an intensively debated problem nowadays. However, it was commonly believed that there must be something connecting all the parts of the body, making it an integrated whole, no matter what it should be called. Various kinds of 'vessels' (broadly construed) play such a role. For such a notion, Greeks used the term *φλέβες*, while Chinese used the term *mai* 脉. Even though the two terms are radically different, they were commonly used to indicate some sort of a network in connecting the bodily parts into an integrated whole.

For Greek authors, the generative vessels have similar functions in male and female for conducting seminal fluids. However, Chinese authors had very different understandings of this matter. First, the authors of *Huangdi Neijing* thought that the controlling vessel, the thoroughfare vessel, the vessel below the girdle and the uterine vessel are the most important for women's generative power, while the superintendent vessel is the most important for men's generative power. Secondly, they believed that certain vessels, such as the walker vessel, have very different functions in male and female. When a certain vessel is blocked, it might cause different problems in male and female bodies. Moreover, both Chinese and Greek authors investigated the pulse in their endeavours to diagnose diseases, but the pulses were read very differently. Greek authors never thought that there is an essential difference of the pulse between a male and a female, while Chinese authors thought that sex is a crucial factor in pulse diagnosis. According to *Huangdi Neijing*, male and

322 *Lingshu* 65:380 (五音五味).

female patients have different pulses. Interestingly, none of these ideas appeared in the manuscripts of Mawangdui where sex is not even mentioned at all in several treatises on vessels. This provides clear evidence that there was a developing history, both of the theories of vessels and of the understandings of sex differences in early China. The phenomenon of the pulse was discovered by both Chinese and Greek authors, but they had very different interpretations. As Kuriyama revealed, ‘When Greek and Chinese doctors palpated the body, they were guided not only by specific beliefs about the arteries and the *mo* and the organization of the body, but also by broader assumptions about the nature of human expressiveness.’³²³

Now, I will offer a detailed explanation of the vessels and pulses in the Greek tradition. How does the body work as a whole system? In *Nature of Man*, we find the theory of four humours. It claims that the body is full of four types of fluids, namely blood, phlegm, yellow bile and black bile. Blood is hot and moist; phlegm is cold and moist; yellow bile is hot and dry; black bile is cold and dry.³²⁴ *Humours*, which is probably written by the same author of *Nature of Man*, contains the idea that most diseases are caused by the problem of the four humours. In this humoral system, both male and female are dominated by fluids. When dealing with diseases, there seems to be no need to consider whether the patient is a male or a female. The womb is regarded as the same as any other internal organ. The afflictions of the womb are treated by purgation.³²⁵ It is important to notice that purgation is the most common used method for treating diseases in this Hippocratic treatise. Through purgation, it is thought that the bad humours would be evacuated out of the body so that health would be regained. The abnormal situation of the humours could be known through the discharges of bodily fluids. Menstrual blood is listed along with passage of urine, sputum, nasal discharge, eyes, sweat, and discharge from tumours, from wounds, from eruptions.³²⁶ The menstrual blood is just one of the discharges and has no special meaning for diseases of women. The running of humours inside the body is conducted by a complex system of vessels. Breaths, nutrition and even sensation are all passed by these vessels. There is no distinction of artery and vein, tendons and nerves. We have several sources for the vessel system. *Places in Man* has a

323 Kuriyama (1999):55, 60, 91, 93, 107-108.

324 *Nat. Hom. (Loeb IV, 10-11)*.

325 *Hum. (Loeb IV, 67)*.

326 *Hum. (Loeb IV, 71)*.

particular interest in the brain and related sensitive organs like ears and eyes. It contains the idea that there are vessels descending from the brain to the rest of the body. Main vessels are the same in all individuals. Some vessels end at the kidneys or terminate at the testes, which might be related to generation. The whole body is connected together by these vessels and is sensitive to all parts of it. As a result, if even a small part of the body is harmed, the whole body will ‘experience the hurt of whatever sort it be’. One basic premise of this theory is that ‘the body is uniform throughout and is composed of the same things, connected in the same way’.³²⁷ This one-flesh body is the same in each part of the body regardless of whether it is large or small. Both male and female bodies are like this. Sex difference is not mentioned.

However, the vessel system is constructed differently in *Nature of Bones*. This treatise gives the most detailed description of the vessel system in the Hippocratic Corpus. In general, there are four pairs of wide vessels in the body. From the wide vessels, some branches are separated out. The vessels usually go in a cross-wise manner, from the right to the left, or from the left to the right.³²⁸ There are vessels that lead to the breasts, the kidneys and the testicles. It seems that the author even noticed the existence of the prostate in males: ‘A honeycombed seminal vesicle is situated on each side of the bladder: from these arise vessels which pass on each side of the urethra to the penis.’³²⁹ More importantly, it indicates that the vessel system has some differences in male and female bodies.

*In the penis, too, there are vessels, both wide and narrow, that are curved and run close together. In the female, this (sc. main) vessel runs to the uterus, the bladder and the urethra. From that point it goes straight on, in women to be suspended around the uterus, in men to be coiled around the testicles. Because of this structural arrangement, it is this vessel that collects most of the seed: for being nourished by the most copious and purest component of the body, while it itself is bloodless, hollow, thick-corded and filled with breath, when it is branch off into the spine are compressed, and as they are all compressed in the manner of a cupping glass they secrete into the vessel lying above them; an influx into the vessel also occurs from various other parts of the body, the largest amount, as has been indicated, being collected from the marrow. The pleasure felt at this time arises from the vessel – used at other times to contain some blood and breath-like material – being filled with seed. When the vessel becomes full and warm, as the semen flows down and collects together in it compressing its contents, the breath in it, being subject to the force present, the warmth, and the tension of the small vessels on all sides, produces a titillation.*³³⁰

327 *Loc. Hom.* 1, Li VI 278.

328 *Oss.*, Li IX 174.

329 *Oss.*, Li IX 168.

330 *Oss.*, Li IX 190.

These are the vessels conducting seminal fluids. In males, they run to circle around the testicles. In females, they run to circle around the uterus. They collect seed from the whole body (mainly the marrow) and send the seed into the testicles or the uterus. It indicates that both male and female are able to produce seed. The seed is produced in the same manner in both male and female. When the vessels are filled with seed, both male and female will feel pleasure. The mechanism is much the same as the records in *Generation*, where it says that the seed is ‘secreted from the whole body, from the solid parts and from the soft parts, and from all its moisture’.³³¹ By ‘all its moisture’, the author of *Generation* meant the four humours, but the four humours given here are slightly different with that of *Nature of Man*: not ‘blood, phlegm, yellow bile and black bile’, but ‘blood, bile, water and phlegm’. No matter what, there is no difference between male and female in producing the seed. In *Nature of Bones*, the testicles and the uterus are regarded as counterparts of each other. If so, the difference between male and female is rather slight in the arrangement of seminal vessels.

In Aristotle, the heart plays the most important role in the bodily economy. The vessels start from the heart and extend throughout the entire body. In the vessels, blood is carried to nourish the bodily parts. It is hard to make a clear distinction of a female heart from a male heart because they share the same form.³³² However, they are not entirely the same because of temperature. Since the female body is formed in cooler conditions, the heart of a female must have some differences in its functions from that of a male. As a result, the blood vessels become slightly different and the blood becomes slightly different too. Aristotle’s vessel system is quite different from earlier physicians, those of Syennesis, Diogenes of Appollonia and Polybus.³³³ In previous theories, the vessels usually go down the length of the body, from left to right, or from right to left. In Aristotle’s system, all vessels originate from the heart and extend all over the body. Along with these vessels, there are sinews and fibres which also extend all over the body. Among the vessels, the great blood-vessel is the largest and the most important one and it is attached to the largest cavity of the body. The vessel system is basically the same in male and female bodies, though there are some slight differences

331 *Genit.* 3, Li VII 474.

332 Connell (2016): 285.

333 *GA* 766a31-b1.

when the vessels go to generative organs.

From the middle of each kidney a hollow sinewy blood-vessel is attached, which runs alongside the backbone itself through the narrow regions; afterwards each of these blood-vessels disappears into its own flank, and farther on reappears extended towards the flank. The ends of these attached themselves [to the bladder and] to the penis in males, and in females to the uterus. From the Great Blood-vessel there is no blood-vessel running to the uterus, but there are many clustered together which do so from the Aorta.³³⁴

In the manuscripts of Mawangdui, there is no indication that male and female have different functions in vessels and pulses. Two texts from the manuscripts of Mawangdui provide significant evidence of the diversity of medical theories in early China. The ‘text on the eleven vessels of the arms and legs’ (*zhubi shiyi mai jiu jing* 足臂十一脈灸經) and the ‘text on the eleven vessels of yin and yang’ (*yin yang shiyi mai jiu jing* 陰陽十一脈灸經) are the two earliest treatises about vessels, but they provide very different theories on how the vessels are organized in the body. These theories also differ from those espoused in *Huangdi Neijing* in which the number of vessels is twelve rather than eleven.³³⁵ The generative vessels are not mentioned in the two texts. There is also one text on ‘methods of pulse diagnosis’ (*mai fa* 脈法). It is interesting to find that this text has no indication that male and female should be treated differently in pulse diagnosis. So, it is quite clear that sex differences are not so important for bodily economy in the manuscripts of Mawangdui.

In *Huangdi Neijing*, however, vessels become especially important for the bodily economy. There is a whole network of vessels throughout the body, including twelve vessels and eight singular vessels. The twelve vessels consist of six pairs of *yang* vessels and *yin* vessels, but the eight singular vessels do not have the *yin* and *yang* pairs. All of these vessels connect the parts of the body together into an integrated whole and conduct the flow of *qi* everywhere. Many of the vessels are implicated in our discussion of sex differences.

Firstly, there are four vessels particularly related to the female generative functions, including the controlling vessel (*renmai* 任脈), thoroughfare vessel (*chongmai* 沖脈), vessel below the girdle (*daimai* 帶脈) and uterine vessel (*baoluo* 胞脈). The controlling vessel starts from below the genitals and moves upwards toward the throat. The thoroughfare vessel ascends near the navel and

334 HA 514b36-515a7.

335 Ma, J.X. (1992): 87–94.

reaches the chest before it dissipates. The vessel below the girdle circles around the middle of the body. The uterine vessel goes across the uterus and regulates menstrual blood.³³⁶ In *Huangdi Neijing*, menstrual blood is called ‘monthly matter’ (*yueshi* 月事). It is a serious disease for women if the menstrual blood is unable to come down, which is called *buyue* 不月 or *yueshi bulai* 月事不來.³³⁷ The main cause is that the vessel of the uterus (*baomai* 胞脈) does not function well.³³⁸ Among these four vessels, the vessel below the girdle (*daixia mai* 帶下脈) is most worthy of mention. In *Shiji* 史記, the medical therapies of women are called *daixia yi* 帶下醫, literally ‘physicians who treat conditions below the girdle’.³³⁹ The female body is associated with *daixia* 帶下 because ‘the vessel below the girdle’ has special functions in menstrual blood and generation. In general, these four vessels are closely related to women’s fertility. Women cannot produce a child if these vessels become weak due to old age or disease. Indeed, the controlling vessel and the thoroughfare vessel are also important for the generative functions of the male. If the two vessels are damaged or too weak, the male would have no ability to produce a child and the situation is like eunuchs.

黃帝曰：士人有傷於陰，陰氣絕而不起，陰不用，然其鬚不去，其故何也？宦者獨去何也？願聞其故。歧伯曰：宦者去其宗筋，傷其沖脈，血寫不復，皮膚內結，唇口不榮故鬚不生。

*Huang Di asks, ‘If a man injures the yin [penis], the yin qi is cut off and is unable to rise. The yin turns to be useless. Then, why does his beard not disappear, but the beard of a eunuch disappears? What is the reason?’ Qi Bo answers, ‘When the generative organ of the Eunuch is cut off, the thoroughfare vessel is also damaged. The blood disperses and does not return. The skin is blocked inside. The lip and the mouth cannot get nourishment. Hence no beard can grow.’*³⁴⁰

黃帝曰：其有天宦者，未嘗被傷，不脫於血，然其鬚不生其故何也？歧伯曰：此天之所不足也，其任沖不盛、宗筋不成，有氣無血，唇口不榮，故鬚不生。

Huang Di asks, ‘There are some congenital eunuchs who do not suffer the cut off and do not have monthly loss, but they still cannot grow a beard. What is the reason?’ Qi Bo answers, ‘This is because there is an inborn insufficiency. The controlling vessel and the thoroughfare vessel are

336 *Suwen* 1:4 (上古天真論); *Lingshu* 65:380 (五音五味). *Suwen* 33:250–251 (評熱病論). See also *Nanjing* 3 (奇經八脈). For the channel of the uterus (*baoluo*), see *Suwen* 47:333 (奇病論). See also Furth, C. (1999): 29–30; Wu, Y.L. (2010): 90.

337 *Suwen* 7 (陰陽別論); 33 (評熱病論); 44 (腹中論).

338 *Suwen* 33 (評熱病論).

339 *Shiji* 105 (扁鵲倉公列傳).

340 *Ling Shu* 8- 65: 380 (五音五味). My translation.

*too weak to form the generative organ. There is qi, but no blood. The lip and the mouth cannot be nourished, so there is no beard*³⁴¹

Secondly, the above-mentioned four vessels may also cause some sex-specific diseases or symptoms. For example, the controlling vessel may cause internal knottings (*neijie* 內結) and the seven elevation illnesses (*qishan* 七疝) in males and the problems below the belt (*daixia* 帶下) and conglomerations (*jiaju* 瘕聚) in females.³⁴²

Thirdly, we can find a vessel specifically related to the male generative functions: the superintendent vessel (*dumai* 督脈, sometimes being translated as ‘supervisor vessel’). *Huangdi Neijing* suggests twelve normal vessels (*zhengjing* 正經) and eight extraordinary vessels (*qijing* 奇經). One of the extraordinary vessels, the superintendent vessel, is particularly important for reproduction. It originates from the body’s lower end of the genitals and moves upward through the backbone toward the brain. This vessel has different paths in male and female bodies due to the differences in generative organs:

*As for the supervisor vessel, it emerges from the lower abdomen and then moves down to the centre of the [pubic] bone. In females it enters and ties up with the court cavity. {This cavity is the tip of the urinary cavity.} In males it follows the stalk and descends to the perineum; [their further course] equals that in females.*³⁴³

Li Jianmin proposed that this passage is extremely important for the conceptualization of a gendered body in early China. According to his view, the male body is conceptualized around the functions of the superintendent vessel and its role in the early art of ‘nourishing life’.³⁴⁴ If so, the superintendent vessel is functionally different in male and female bodies.

Fourthly, some non-generative vessels also show different functions in male and female. For example, the walker vessel (*qiaomai* 蹻脈) has different functions in each sex because of the *yin–yang* 陰陽 distinction. The walker vessels have two branches: branch of *yang* (*yangqiao* 陽蹻) and branch of *yin* (*yinqiao* 陰蹻). In males, the one of *yang* has main function. In females, the one of

341 *Ling Shu* 8-65: 380 (五音五味). My translation.

342 *Suwen* 60:404 (骨空論). See Unschuld, P. and Tessenow, H. (2011): vol. 2, 77.

343 *Suwen* 60:404 (骨空論). Translated by Unschuld, P. and Tessenow, H. (2011): vol. 2, 78–79.

344 Li, J.M. (2005): 249–314; (2008): 17.

yin has main function.³⁴⁵ When doctors make a diagnosis and prescribe therapy based on the walker vessel, it is necessary to know the sex of the patient and the *yin–yang* distinction. For male patients, it is wrong to treat the vessel of *yin*. For female patients, it is wrong to treat the vessel of *yang*.³⁴⁶ This provides a principle for diagnostics and therapeutics based on sex differences.

The flow of *qi* runs inside the vessels. Doctors can get to know how *qi* is running and the health status of the body through the pulse. The *qi* has two forms: the *yang* form and the *yin* form. If it is closer to the outer part (e.g. the skin), then it is the form of *yang*. If it is closer to the inner part (e.g. the internal organs), then it is the form of *yin*. Because males are associated with *yang*, the outer part of *qi* plays a more important role for the bodily economy of males. Because females are associated with *yin*, the inner part of *qi* plays a more important role for the bodily economy of females. As it is said, ‘Yin is inside, it is the guardian of the yang; the yang is outside, it is employed by the yin.’³⁴⁷

The division of inner (*nei* 內) and outer (*wai* 外) is very important for pulse diagnosis. In its normal condition, the *qi* of the male body should be located in the outer part and the *qi* of the female body should be located in the inner part, which is called ‘obtain the qi’ (*deqi* 得氣).³⁴⁸ The opposite situation must be avoided. If the vessels are unable to obtain the *qi* correctly in terms of inner and outer, death may occur. Hence, it is necessary to guide the *qi* of the male back to the outer part and the *qi* of the female back to the inner part. Interestingly, we can find a similar division between inner and outer in the household. Early Chinese texts note that a family should have a division of labour between husband and wife. This division associates the female with inner and the male with outer.³⁴⁹ The internal space of the household is regarded as the domain of women. The division of inner and outer shows that the female and male bodies manifest a different pulse. This is one of the most significant sex differences in early Chinese medicine:

Hence, those who are experts in the [examination of the] vessels, they carefully investigate the five depots and the six palaces, whether [a movement] runs contrary to or follows [its regular

345 *Lingshu* 17 (脈度).

346 *Lingshu* 73 (官能).

347 *Suwen* 5:45 (陰陽應象大論). Translated by Unschuld, P. and Tessenow, H. (2011): vol. 1, 111.

348 *Lingshu* 9:69 (終始).

349 A similar pattern exists in the Greek world too, although it is not particularly explicit in Greek medical texts.

course]. The arrangements of yin and yang, exterior and interior, female and male: they store them in their bosom, and they link the heart with the essence. If it is not this kind of a person, do not teach him. If it is not this kind of truth, do not confer it. This is called achieving the Way.³⁵⁰

In pulse diagnosis, one of the most basic requirements for doctors is to distinguish male and female. Because the *qi* runs in different ways inside the body in different sexes, it is necessary to ‘Squeeze the vessels, inquire about the name [of the diseases], and match [your findings] with the male or female [gender of the patient].’³⁵¹ If a male shows a pulse that a female should have, his body is in disorder; and vice versa.

Another important division of male and female is associated with left (*zuo* 左) and right (*you* 右). In *Huangdi Neijing*, the *qi* of *yang* is said to follow the way of left, while the *qi* of *yin* is said to follow the way of right. ‘As for yin and yang, they are the male-female [couple] of blood and qi. As for left and right, they are the paths of yin and yang.’³⁵² The *qi* circulates in opposite directions in the different sexes: the *qi* of the male body circulates in a leftward direction resembling Heaven, while the *qi* of the female body circulates in a rightward direction resembling Earth. The *yang qi* 陽氣 follows ‘the [course on the] left’, while the *yin qi* 陰氣 follows ‘the [course on the] right’.³⁵³ For this reason, ‘In males [these signs] develop on the left; in females they develop on the right.’³⁵⁴ In fact, the left–right division is not only reflected in early Chinese medicine, but also in early Chinese cosmology. In early Chinese cosmology, left is usually associated with the way of Heaven because ‘Heaven rotates leftward’, while right is usually associated with the way of Earth because ‘Earth goes rightwards’.³⁵⁵ Because male and female resemble Heaven and Earth, they are also associated with left and right, respectively.

Therefore, it is strongly required that a doctor must know the division of left and right, because the *qi* of the male and the female circulates in different directions. Due to the leftward circulation, the left side of the male body is more abundant in *qi* than the right side. Due to the rightward

350 *Suwen* 4:32–33 (金匱真言論). Translated by Unschuld, P. and Tessenow, H. (2011): vol. 1, 93–94.

351 *Suwen* 77:654 (疏五過論). Translated by Unschuld, P. and Tessenow, H. (2011): vol. 2, 672.

352 *Suwen* 2-5:45 (陰陽應象大論). Translated by Unschuld, P. and Tessenow, H. (2011): vol. 1, 110.

353 *Suwen* 9-80:667 (方盛衰論). Translated by Unschuld, P. and Tessenow, H. (2011): vol. 2, 705.

354 *Suwen* 5-48:343 (大奇論); *Lingshu* 1-9:69 (終始). Translated by Unschuld, P. and Tessenow, H. (2011): vol. 1, 712.

355 *Huainanzi* 3:25 (天文訓); *Lunheng* 11-32:86 (說日).

circulation, the right side of the female body is more abundant in *qi* than the left side. ‘The ability to separate left and right is the great Dao. Men and women have different appearances, so it is called *yin-yang*.’³⁵⁶ However, when the *qi* of *yang* is doubled in the left, it is called ‘double *yang*’ (*chongyang* 重陽); when the *qi* of *yin* is doubled in the right, it is called ‘double *yin*’ (*chongyin* 重陰). There will be problems due to the excess. This can be diagnosed by a check of the outlook (*se* 色) on the face. ‘In females, on the right is opposition, on the left is compliance. In males, on the left is opposition, on the right is compliance. A change to doubled *yang* [*qi*, this indicates] death, to doubled *yin* [*qi*, this indicates] death’.³⁵⁷ Therefore, men and women must be treated differently.

In *Nanjing* 難經, we are told that male and female have different pulses.³⁵⁸ A good doctor is required to distinguish the sex just from the pulse without seeing the patient. There was a famous story in *Hanshu* 漢書. Emperor He 和帝 wanted to test the medical skill of Doctor Guo Yu 郭玉. He asked a man and a woman each to put one hand outside a curtain for the doctor to diagnose. The hand of the man was very soft and looked almost the same as the hands of the woman. The Emperor wanted to confuse the doctor and waited to see his mistakes. However, the doctor told him that the pulses of the two hands belonged to different sexes. Then, the Emperor was surprised and satisfied with his skillful diagnostic techniques.³⁵⁹

Concerning the bodily economy, my second argument is that different authors had very different understandings of blood, especially menstrual blood. In general, Greek authors viewed blood as nourishment for the body, which is constantly generated, distributed and consumed. By contrast, Chinese authors viewed blood as the essential matter in sustaining life, which flows throughout the body. In spite of that, in both ancient Greece and early China, the regulation of menstrual blood is crucial for women’s health and the blockage of menstrual blood is a serious problem for women. Now, I will provide a detailed explanation on the matter of blood.

In the Hippocratic works, blood is one of the humours. It is essentially the same in quality, but different in quantity, between male and female. Women have menstrual discharge, but the menstrual

356 *Lingshu* 6-49:305 (五色).

357 *Suwen* 3-15:107(玉版論要). Translated by Unschuld, P. and Tessenow, H. (2011): vol. 1, 252–253.

358 *Nanjing* 19 (十九難). See also Unschuld (1986): 259.

359 *Houhanshu* 82-72:2735 (方術列傳).

blood is not a kind of seminal fluid because it is the same as normal blood in other parts of the body. Women must discharge their excess blood in order to keep healthy, which is the reason for women to menstruate. Menstrual blood is essentially the same as blood in other parts of the body. The function of menstrual blood in reproduction is only to nourish the growth of the foetus. In pregnancy, there is no menstrual blood because the menstrual blood goes to nourishing the embryo. In *Diseases of Woman II*, the health of the female body can be judged by the discharge of fluids. Women may have discharges of different colours, for example, a white discharge, a red discharge, a yellowish-red discharge, a yellow next to white discharge, a greenish-yellow discharge, etc. Among these discharges, one fluid is most important of all for the health of women, the menses. It is very significant for the health of the female body and is highly related to generation. It defines the essential difference between male and female in the bodily economy of fluids. If the passage of menses is blocked, all sorts of problems may occur. In *Girls*, this is most likely to happen in unmarried women or barren women. When the excessive blood is unable to be evacuated, it fills the uterus and exceeds to the heart and the diaphragm.

When young women in the season of marriage remain without a husband, they suffer, in particular at the time of the downward passage of their menses, this evil to which before they were not very subject. For at this later time in their life, blood collects in the uterus, destined to run out, but when the mouth of the exist does not open up, more blood keeps being added from food and the growth of the body, and then, left with nowhere to flow out, the blood springs up in its excess to the heart and the diaphragm. Now when these parts are filled, the heart becomes stupefied, then from the stupefaction numb, and finally from the numbness these women become deranged.³⁶⁰

It is called ‘the sacred disease’. The patient shows paralyses and numbness. Here, the disease is sex-specific because the patient must be a female. Since men are never bothered by diseases of menses, this is of course a qualitative difference. Apart from the so-called ‘sacred disease’, a lot of diseases might be caused by menstrual blood. *Nature of the Child* explains that women are troubled much by menses because a woman’s body is ‘moister than a man’s’ so that it is very sensitive to changes of coldness and heat in the changes of months.³⁶¹

In some Hippocratic writings, the female body is associated with porous, loose and spongy

360 *Virg.*, Li VIII 468.

361 *Nat. Puer.* 4, Li VII 496.

flesh.³⁶² In *Diseases of Women I*, the female body is able to draw more blood because of its looser texture and softer flesh. Men can draw off moisture through hard work, but women do not work hard like men. Hence, women can only get rid of the excessive moisture through menstrual blood. Menstrual blood is a necessity for women, but it is not necessary for men. If the passage of menses is blocked, all sorts of problems may occur, such as symptoms like headaches, gout, fever, haemorrhoids, pains, consumption of the lungs, suffocation, loss of reason and even death.³⁶³ The blockage of menses is most likely to happen in unmarried or barren women.³⁶⁴ When the excessive blood is unable to be evacuated, it fills the uterus and moves to the heart and the diaphragm. As a result, patients exhibit paralysis and numbness.³⁶⁵ This disease is gender-specific because the patient must be female; since men are never bothered by diseases of menses, this is a qualitative difference. The necessity of menstrual blood defines at least one of the essential differences between male and female physiology.

*I say that the woman has a looser texture and is softer than a man, and so, because she is like this, the woman's body draws more fluid from the bowels, and more quickly than a man's body. Here is the proof: if someone should place clean fleece and a clean, thickly woven robe, equal in weight to the fleece, above water, or even in a moist place, for two days and nights, when he removes them he will find after weighing that the fleece is much heavier than the garment. This happens because condensation always goes upwards from water which is in a wide-mouthed vessel, and the fleece, because it is both loose-textured and soft, will absorb more of the emission. The garment, on the other hand, because it is compact and closely woven, is full and cannot receive more of the emission. Therefore, the woman also, because she is looser-textured, draws up more moisture from the intestines in the body and the man draws up less. Because the woman has softer flesh, whenever her body is filled with blood, if it does not leave her, she has pain because the flesh is saturated and warm. For the woman has warmer blood and because of this she is warmer than the man. The man, having firmer flesh than the woman, does not become overfilled as much by the blood. Indeed, none of the blood is evacuated from the body each month to cause pain; he draws such nourishment from the body, and his body is not soft because it is not overstrained, nor is it overheated by fullness as with the woman. But it makes a great contribution in this way for the man, because he works harder than the woman. For his toil draws off the moisture.*³⁶⁶

The image of spongy flesh also appears in *Glands*. This treatise is about the general *phusis* of glands (οὐλομελίη). Glands are spongy, rarefied and fatty. They are located in any somatic part

362 Dean-Jones (1994):85; 115; 129; Hanson (1990).

363 *Nat. Mul.* 18, Li VII 338; *Aph.* 6, Li IV 570; *Mul.* 1.3, Li VIII 26; *Epid.* 4.24, Li V 164; *Epid.* 4.38, Li V 180; 5.91, Li V 254; *Mul.* 1.2, Li VIII 18; *Nat. Mul.* 18, Li VII 338. See also Dean-Jones (1994): 131.

364 *Virg.*, Li VIII 468.

365 *Virg.*, Li VIII 468.

366 *Mul.* 1.1, Li VIII 12.

where there is fluid, particularly the hollow parts of the body and the joints. There are glands in the intestines, the kidneys, the throat and the head, all places where there is no sex difference; however, the glands in the chest are highly gender specific. A man does not have breasts like a woman and a man does not produce milk.

The glands on the chest are called breasts, and these develop in individuals that make milk, not in those that do not make milk: women make milk, but men do not. In women the substance of the glands is very rarefied, just like the rest of their bodies, and the nourishment these glands draw to themselves they alter into milk. This passes from the uterus to the breasts as nourishment for the baby after its birth, being squeezed out by the omentum and cast up to the higher regions of the body when it becomes cramped by the foetus. In males it is largely the compactness and density of their bodies that contribute to the smallness of these glands; for the male is close-pressed like a thick carpet both in appearance and to the touch. The female, on the other hand, is rarefied and porous like a fleece of wool in appearance and to the touch: it follows that this rarefied and soft tissue does not reject moisture. The male cannot accept anything, first because of his naturally dense and unyielding substance, and then exercise, too, strengthens his body, so that it has no way of taking up any excess. Thus, this reasoning proves that the chest, breasts and rest of the body in females are porous and soft, both because of the sex's inactivity and because of what has been said above, whereas in males the opposite is true.³⁶⁷

Here, it explains why a male does not have breasts like a female. The female breasts are connected directly with the uterus and the residues of nutriment are squeezed into the breasts from the uterus after childbirth. Then milk is produced. It shows that milk was considered to be concocted menstrual blood. In such a way, the female body is well prepared not only for bearing a foetus, but also for nourishing a newborn baby. Here, milk is regarded as another method for women to get rid of the excessive moisture apart from menstrual blood. It defines another aspect of the essential differences between male and female physiology: 'women make milk, but men do not'. For the same reason, milk could be regarded as a qualitative difference.

To a certain degree, menstrual blood is one main cause of diseases in women. If the menstrual blood is unable to be discharged regularly, women will easily be sick.³⁶⁸ In most cases, the problem is caused by menstrual suppression and there will be symptoms like headaches, gout, fever, haemorrhoids, pains, consumption of the lungs, suffocation, loss of reason, and even death.³⁶⁹

³⁶⁷ *Gland.* 16, Li VIII 572.

³⁶⁸ *Mul.* I.2, Li VIII 14; 62, Li VIII 126; *Virg.* Li VIII 466-468.

³⁶⁹ *Nat. Mul.* 18, Li VII 338; *Aph.* 6, Li IV 570; *Mul.* I.3, Li VIII 26; *Epid.* 4.24, Li V 164; *Epid.* 4.38, Li V 180; 5.91, Li V 254; *Mul.* I.2, Li VIII 18; *Nat. Mul.* 18, Li VII 338. See also Dean-Jones 1994: 131.

Occasionally, the problem is caused by excessive menstrual blood.³⁷⁰ Hence, menstrual blood may cause diseases, but it also has a function to keep the female body healthy as a natural purging process when it works properly. The waste of the female body can be evacuated along with the menstrual blood, so there is a natural purification in the female body. Since the male has no menstrual blood, on the one hand the male body will not suffer from diseases caused by menstrual blood, and on the other hand the male body will not have any natural purification. Therefore, the Hippocratic author of *Diseases of Women I* repeatedly emphasizes that male patients and female patients should be treated very differently.³⁷¹

In Aristotle, the blood is different both in quality and quantity between male and female. The word ‘blood’ has various meaning in Aristotle’s works. Firstly, according to Aristotle, menstrual blood is not the same as normal blood because menstrual blood is a kind of seminal fluid. It is similar to semen, but greater in quantity and less thoroughly ‘concocted’ due to the coldness of the female body. Menstrual blood is not the same as blood in other parts of the body. It is concocted blood, but not fully concocted into its final seminal form. In Aristotle’s works on the subject, the male equivalent of menstrual blood is semen, not the blood of males. Menstrual blood and semen are two different but analogous matters with the common origin being normal blood. They are similar in some ways and different in others. Secondly, menstrual blood is not merely nourishment for the foetus, but is also involved in the formation of the embryo. Thirdly, the blood of females is said to be thicker and blacker than that of males.

*The blood of females differs from that of males. Thus, if both are on an equality with regard to health and age, the blood is thicker and blacker in females, and while it is less plentiful on the surface it is more plentiful inwardly. Further, of all female animals the human female has the most abundant blood, and the catamenia are more plentiful in women than in any other animal. The blood if it has become diseased is known as flux. Apart from this one, women are less troubled by maladies <of the blood>. Few women suffer from varicose veins, haemorrhoids, or nose-bleeding; and if any of these occurs, the catamenia deteriorate.*³⁷²

It seems that menstrual blood is also significant for the health of the female body. It is a way to evacuate excessive and diseased blood. Hence, women do not often suffer from diseases of the

370 *Aph.* 5.57, Li IV 552.

371 King (2013): 39. There was a long debate on whether there are peculiarly female diseases and therapies. Diocles of Carystus and many others after him support the existence of special female diseases, but Erasistratus, Asclepiades and most of their followers are against it. Sor. *Gyn.* 3.4, CMG IV 96. cf. Flemming 2000: 122.

372 *HA* 521a21-31.

blood. Aristotle believed that this evacuation usually happens monthly in women when ‘the moon is waning’ because the environment becomes colder at that time.³⁷³ In a sense, the female body is somehow influenced by the moon. For the male body, there is no such an influence.

As to other bodily fluids, e.g. milk, Aristotle also had different ideas from those of Hippocratic authors. In Hippocratic theories, women make milk, while men do not. However, Aristotle thought that ‘milk is found to occur in males as well as females’. The only difference is the flesh of breasts: male breasts are firm, while those of the female are ‘spongy and full of passages’.³⁷⁴ When the milk appears in males, it even contains divine messages from Heaven.

*Generally speaking, milk is not produced in any male animals, man included, but it is in some individuals. For example, at one time there was in Lemnos a he-goat which used to be milked by its dugs (the male has two near the penis), and it produced so much that cheese was made out of it; and the same occurred with a male of which it was the sire. In spite of that, phenomena of this sort are regarded as signs from Heaven. When the owner of the goat in Lemnos consulted the oracle, the god’s reply was that he would come into possession of a fortune. There are men from whom, after reaching puberty, a small amount can be squeezed out; some when milked have actually produced large quantities.*³⁷⁵

In Aristotle, another difference is in relation to the hair. He thought that women, boys and eunuchs would not become bald. It is not an essential difference, but it brings some changes in bodily features. The reason is not fully explained, but it seems that the cause of baldness is highly related to sexual activities.³⁷⁶

*Smoothness on the top of the head is called baldness, on the eyebrows anaphalanthiasis. Neither of these occurs in a man until he has entered upon sexual activity. No boy or woman or castrated man ever goes bald; if castration takes place before puberty, the later growths of hair do not occur; if after, the later growths only (except the pubic) fall away. Women do not grow the hairs on the chin, except that in some cases a few hairs grow when menstrual blood ceases.*³⁷⁷

In general, Aristotle’s construction of the bodily economy was quite different from that of Hippocratic authors. He had very different understandings of the blood, menstrual blood and milk. In Aristotle’s works, many sex differences are in a quantitative sense, of being ‘more or less’ in relation to each other, but the menstrual blood is something special. In Aristotle, the analogous

373 GA 738a17-24.

374 HA 493a14-16.

375 HA 522a12-21.

376 HA 518a26-35.

377 HA 518a26-35.

matter of menstrual blood is the semen, not the blood of males. Menstrual blood and semen are two different but analogous matters with the common origin from normal blood. They have similarities in some aspects, but have more differences in other aspects.

In the *Huangdi Neijing*, the blood itself is the same in male and female, but the blood is not consistently generated as food for the body. Blood is essential for life. Losing blood means losing the essence of life. Originally, blood comes from the flows of *qi*. The flows of *qi* may be transformed into different kinds of fluids inside the body. These bodily fluids have one common source: ‘water and grains’ (food and drinks). Among the bodily fluids, blood is most important of all. Four internal organs mainly regulate blood: the stomach, liver, kidneys and heart. It becomes menses, namely ‘monthly affairs’ (*yueshi* 月事), when it comes into the uterus. In *Huangdi Neijing*, it is unclear whether menstrual blood will change into milk after childbirth. It is not emphasized that women’s health depends on the behaviour of blood.

Even so, the situation of blood, particularly menstrual blood, is still very important for women. All sorts of factors might cause the disorder of menstrual blood. For instance, in a medical case recorded in *Shiji* 史記, a maidservant did not menstruate. The doctor found out that it was due to internal coldness. However, the ultimate cause was that ‘the desire of sexual intercourse with men is not satisfied.’³⁷⁸

In many early medical manuscripts, it is recommended that women should take an amount of medicine different to that taken by men.³⁷⁹ The blockage of menstrual blood is one of main problems for women. There are different explanations for this occurrence. One explanation is that the blockage is due to massive loss of blood in childhood or improper sexual activities:

*Qi Bo: ‘The disease is named blood decay. It is acquired in younger years either [because of] a massive loss of blood or [because] one has entered the [women’s] chambers in a state of drunkenness [with the result that] the qi is exhausted and the liver is harmed. Hence, the monthly affair is weak and diminished and fails to arrive.’*³⁸⁰

378 *Shiji* 105-45 (扁鵲倉公列傳). See also Hsu, E. (2010).

379 cf. Yates (2005): 28. In *Jingui Yaolue* 金匱要略 (Essentials of the Golden Casket), written in the Eastern Han by Zhangji 張機, there are three chapters on diseases of women. The author points out that, for diseases below the girdle, women must be treated differently from men.

380 *Suwen* 40:288 (腹中論). Translated by Unschuld, P. and Tessenow, H. (2011): vol.1, 601.

Another explanation is that the blockage is due to the closure of the uterine vessel:

*When the monthly affair does not arrive, [this is because] the uterine vessel is closed. {As for the 'uterine vessel,' it is connected with the heart and forms a network inside the uterus. In the present case, qi rises and presses against the lung. The heart qi cannot pass through downwards. Hence the monthly affair does not arrive.}*³⁸¹

In both explanations, we find a common premise that the regulation of the 'monthly affairs' is related to the circulation of *qi*. The problem of 'monthly affairs' occurs only if the *qi* is exhausted or blocked. It shows that blood and *qi* have a very close relationship. Moreover, this shows that *qi* has differences in male and female. If *qi* is exhausted or blocked in the male body, it also causes problems. There is another passage indicating the different quantities of blood and *qi* in male and female bodies. It explains why women do not have beards.

黃帝曰：婦人無鬚者，無血氣乎？歧伯曰：沖脈任脈皆起於胞中，上循背裏，為經絡之海，其浮而外者，循腹右上行，會於咽喉，別而絡唇口，血氣盛則充膚熱肉，血獨盛者澹滲皮膚，生毫毛。今婦人之生有餘於氣，不足於血以其數脫血也，沖任之脈，不榮口唇，故鬚不生焉。

*Huangdi asks, 'Women do not have a beard. Is it a lack of blood and qi?' Qibo answers, 'The controlling vessel and the thoroughfare vessel originate from the uterus and come up in the back. They are the sea of the vessels and their branches. One branch on the surface comes up in the right abdomen and reaches the thorax, sending branches to the lips and the mouth. If the blood and qi is excessive after the nourishment of the flesh, they penetrate the skin and become hairs. Now, women are superfluous in qi, but insufficient in blood due to its monthly loss. The thoroughfare vessel and the controlling vessel will not nourish the lip and the mouth, so women do not grow beards.'*³⁸²

This passage provides a basic framework for the differences of bodily economy between male and female. It advocates a theory that women are 'superfluous in *qi* 氣' but 'insufficient in blood'. It is uncertain whether it possible to say in reverse that men are 'superfluous in blood' but 'insufficient in *qi* 氣'. No matter what, the passage explains why women do not have a beard. It is because women do not have enough blood to nourish the beard due to the massive loss of blood in monthly affairs. Therefore, it is necessary to pay attention to the importance of vessels, *qi* and blood in *Huangdi Neijing* when the bodily economy's is concerned. The different functions of some

381 *Suwen* 33:250–251 (評熱病論). Translated by Unschuld, P. and Tessenow, H. (2011): vol. 1, 526.

382 *Lingshu* 65:379 (五音五味). My translation.

vessels and the different quantities of *qi* and blood are very significant to our discussion of sex differences.

3.3 Bodily Organs

In respect to bodily organs, I want to make three arguments. My first argument is that Greek and Chinese authors had very different assumptions about the importance of the kidneys for its role in reproduction. In ancient Chinese medicine, the renal system is assumed to be the most important depot in the physiology of generation. The concept of a ‘depot’ (*zang* 藏) is a place, more precisely, a function of a certain place, to store something, which is not completely equal to the anatomical internal organs. The renal system is one of the five depots, along with the cardiac system, the hepatic system, the splenic system, and the pulmonary system. When the *qi* of the stomach enters the kidney, it will be stored there. In *Huangdi Neijing*, the kidney is called ‘the essential place for storage’. It is the place where the human essence (*jing*) is collected and stored.³⁸³ In *Nanjing* 難經, the kidney system is called ‘the root of the body’. It shows that the kidney system plays the most central role in reproduction and even in keeping a person alive.

‘All the twelve conduit vessels are linked with the origin of the vital qi. (3) The “origin of the vital qi” refers to the root and foundation of all the twelve conduits – that is, to the “moving qi” between the kidneys. (4) These [qi] are the foundation of the [body’s] five long-term depots and six short-term repositories; they are the root of the twelve conduit vessels; they are the gate of exhalation and inhalation, and they are the origin of the Triple Burner. (5) ...Hence, the [moving] qi [between the kidneys] constitute a person’s root and foundation. (7) Once the root is cut, the stalk and the leaves wither. (8) In case the vessel [movement] at the inch opening displays a condition of normal balance and yet [the respective person] dies, that is due only to an internal cutting off of the vital qi.’³⁸⁴

In ancient Greek medicine, however, the kidney system does not play such an important role in the physiology of reproduction. The function of the kidneys in reproduction is rarely mentioned by Hippocratic authors. For Aristotle, the existence of the kidneys is not a necessity. In his view, many animals can survive even without kidneys. The kidneys are dispensable and can be replaced

383 *Suwen* 9:77.

384 *Nanjing* ch.8. Translated by Unschuld (1986):107.

by the bladder since the bladder can play a better role in the collection of residues.³⁸⁵ The kidneys exist for two purposes: ‘to sub-serve the blood-vessels’ and ‘to excrete the fluid residue’.³⁸⁶ There are hollow cores ‘by which kidneys filter blood as it moves from the blood vessels.’³⁸⁷ Hence, we see the significant contrast. For Chinese physicians, the kidneys are the most important viscera. For Aristotle, however, the kidneys are nothing more than blood filters.

My second argument is that both Greek and Chinese authors gave much attention to the generative organs, but they emphasized on different aspects. In general, the Greeks were more interested in the morphological aspect of the organs, while the Chinese were more interested in the functional aspect of the organs. Now, I will provide a detailed explanation of this.

In the Hippocratic Corpus, the existence of the womb can distinguish the female body clearly from that of the male. The uterus plays an active and even determinable role not only for women’s health, but also for childbearing. In males, there is not a bodily organ that plays a determinative role equal to the uterus. After all, childbearing must take place in the uterus. On account of its unique role in generation, the uterus must be considered as something essential for defining women. It is a qualitative difference rather than a quantitative difference. The uterus is also unique in another aspect. All internal organs are stable, except the moveable uterus. The structure of the uterus is described as a ‘vessel’ (ἄγγος) or a swollen wineskin (ἀσκός).³⁸⁸ In *Ancient Medicine*, the uterine structure is described as ‘wide in part and narrow down’ for the purpose of drawing and pulling moisture from the rest of the body.³⁸⁹ There are different names to the parts of the womb. Many Hippocratic writers portrayed the womb as ‘an upside-down jug’ for men to put seed into: σταθμός or πυθμὴν *fundus*, ‘bottom’, is on top; στόμα *os*, ‘mouth’, lies at the bottom; αὐχὴν *cervix*, ‘neck’, opens in a downward direction.³⁹⁰

More importantly, the uterus is described as movable in the Hippocratic writings. It may ‘turn’ (στρέφω), ‘rush’ (θέω) or ‘swiftly move’ (σεύομαι) away from its normal position and then ‘leap

385 *PA* 670b23-28.

386 *PA* 671a34-671b3.

387 *PA* 672a12-13. Lennox (2001):106.

388 *Epid.* 6.5.2, *Li* V 318; *Mul.I.* 61, *Li* VIII 124.

389 *VM.* 22, *Li* I 626-628.

390 Hanson (1987):598; (1990): 317, 325. See also Dean-Jones (1994): 65-69; King (1998): 34.

upon' (ἐμβάλλω), 'fall toward' (προσπίπτω), 'set against' (προσιστάμεναι), 'touch' (ψάύω) or 'cling to' (προσκέωνται) some parts of the body.³⁹¹ It is well-known that a belief in the 'wandering uterus' has had a long history in ancient Greece.³⁹² In Plato's *Timaeus*, the uterus moves inside the female body as an irrational animal.³⁹³ Mark J. Adair argued that this discussion does not actually refer to the movement of the uterus, but 'an impulse arising from the uterus, the sexual appetitive impulse (ζῆλον ἐπιθυμητικόν), which, frustrated in its natural aims, wanders around the body, and in its ruthless pressure for satisfaction distresses the woman, and causes hysterical somatic symptoms.'³⁹⁴ If so, it is possible that the movement of the uterus in the Hippocratic writings is also referring to 'an impulse arising from the uterus'.

Apart from the uterus, Hippocratic authors generally used 'τὰ αἰδοῖα' to refer to the genitalia and 'τό αἰδοῖον' to refer to the vagina.³⁹⁵ However, the genitalia and the vagina were not as important as the uterus in defining a female. The ovaries were not yet discovered by Hippocratic authors. The idea that the female reproductive organ is analogous to the male reproductive organ is a later appearance.

In Aristotle's writings, however, sex differences are much less emphasized. From a certain perspective, the male body could be regarded as the same as the female body because they are of the same species. If there are differences, they are only 'by more or less' (διαφέρει ὡς ἐπὶ τὸ πολὺ τῷ μᾶλλον καὶ ἥττον).³⁹⁶ It is in degree, but not in kind. For example, females are said to have a smaller body size, a smaller brain, fewer skull sutures, fewer teeth, fewer defensive tools, etc.³⁹⁷ Even so, there is no essential structural difference between male and female in their brains, sutures, teeth, defensive tools, etc. Moreover, Aristotle usually allowed exceptions. Many female animals, such as insects, crabs, crayfish and most fish, both Ovipara and Larvipara, are larger than their male

391 *Mul.* 1.7, *Li* VIII 32-34; 2.127, *Li* VIII 272; 2.128, *Li* VIII 274; 2.134, *Li* VIII 302. Cf. Dean-Jones 1994:70.

392 Dean-Jones (1994):69-77, 135-36; Hanson (1995); King (1998): 36-38, 120, 206, 205-246; Flemming (2000):117; Holmes (2010):187; Faraone (2011). For hysteria in history, see Rousselle (1988):63-77; Gilman (1993); Thompson (1999).

393 *Ti.* 91b7-c7.

394 Adair, M.J. (1996): 163.

395 Cf. Dean-Jones 1994:77-78.

396 *HA* IX 583b8-9.

397 For the body size, see *Pr.*10.8, 891b21-24; 894b28. For the brain, see *PA* II 653a28-30. For the skull sutures, see *HA* I 491b2-4, *HA* III 516a18-19, *PA* II 653a37-b2. For the teethees, see *HA* II 501b19-24; For the defensive tools, see *HA* IV 538b15-25.

equivalents. Some female birds live longer than male ones.³⁹⁸

For Aristotle, there is one rather important difference between male and female in their bodily organs: the reproductive organs. This difference is argued to be ‘for the purpose of copulation and generation’.

*Now for the exercise of every function instruments are needed, and the instruments for physical faculties are the parts of the body. Hence it is necessary that, for the purpose of copulation and procreation, certain parts should exist, parts that are different from each other, in respect of which the male will differ from the female; for although male and female are indeed used as epithets of the whole of the animal, it is not male or female in respect of the whole of itself, but only in respect of a particular faculty or a particular part - just as it is ‘seeing’ and ‘walking’ in respect of certain parts. Now in the female this special part is what is called the uterus, and in the male the regions about the testes and the penis.*³⁹⁹

Where generation is concerned, Aristotle emphasized that the generative parts differ in ‘form’ (το εἶδος). Male and female have very different principles of generation: one generates in others and one generates in itself. Even if male and female bodies do not have distinct forms in respect to their species, they have distinct ways of generation and distinct forms in respect to the generative organs. This is because they have divergent reproductive roles.⁴⁰⁰

*Of the remaining animals many have, in addition to the parts mentioned, a part by which they emit semen; and of those animals which generate, one will emit semen into itself, one into another individual. The former is known as ‘female’, the latter as ‘male’ – though in some animals male and female are not found. Hence the parts which serve this function differ in form.*⁴⁰¹

For Aristotle, main reason for the existence of the uterus is for the purpose of generation. Aristotle’s view of the uterus was different from Hippocratic authors because he entirely rejected the idea that the uterus is active and moveable.⁴⁰² Even so, he agreed with Hippocratic authors in many ways. In Aristotle’s theory, women are the only female animals ‘liable to uterine affections’ because they ‘produce an excess of menstrual evacuations and cannot concoct them’.⁴⁰³ A woman may have difficulty producing a child if the uterus is deformed or sealed.⁴⁰⁴ It is also emphasized that the uterus is a special organ of females. It is exceptional despite the fact that all other parts ‘are

398 For the body size, see *HA* IV 538a22-25; VIII 613a26-29; VII 608a4-5. For life period, see *HA* IV 527b30-34; 538a26-27, V 540b15-18; 541b29-24; 550b22-23; 555b20; *GA* 721a12-13.

399 *GA* 716b23-34. See also *HA* I 493a25-26; 497a30-33.

400 *HA* I 489a10-13.

401 *HA* I 489a10-13.

402 *HA* 582b22-26.

403 *GA* 776a9-15.

404 *GA* 746b20-35; 77315-29. See also *GA* 748b20-21 for the infertility of mules.

similar in the females as well'.⁴⁰⁵

*There must be an organ both for the male and for the female; hence the male has his genitals and the female has the uterus. Nature gives each one its organ simultaneously with its ability, since it is better done thus. Hence each of these regions of the body gets formed simultaneously with the corresponding secretions and ability, just as the ability to see does not get perfected without eyes, nor the eyes without the ability to see.*⁴⁰⁶

Aristotle viewed the testes as an equivalent of the uterus: males have the testes, while females have the uterus.⁴⁰⁷ However, Aristotle believed that the testes are not necessary for generation because some animals, such as snakes and fish, do not have testes. The existence of the testes is not out of necessity, but for the purpose of being better.⁴⁰⁸ They are not organs necessary for producing semen, but instruments that make the movement of the seminal residue steadier, 'just like the stone weights which women hang on their looms when they are weaving'.⁴⁰⁹ Moreover, their form varies among species. The testes of many animals are inside their bodies, e.g. lizards, tortoises, all birds, all oviparous quadrupeds and all animals with horny scales.⁴¹⁰

Aristotle also mentioned other generative organs, such as the penis and the vagina. In Aristotle's work, each part of the male body must have a counterpart in the female body, including the generative organs. The uterus is the counterpart of the testes, and the vagina is the counterpart of the penis. Male and female are different only in a relatively minor way in regard to the structural aspects of the generative organs – one is inward, and one is outward.

*The path along which the semen passes in women is of the following nature: they possess a tube (kaulos) - like the penis of the male, but inside the body - and they breathe through this by a small duct which is placed above the place through which women urinate. This is why, when they are eager to make love, this place is not in the same state as it was before they were excited.*⁴¹¹

According to Aristotle, the penis is not an essential part of the body. It does not exist out of necessity, but for a better purpose. It is merely a tube meant to conduct seminal fluids. Aristotle believed that men with large penises are in fact less fertile than men with average-sized penises because the semen becomes cold when it is transported a long distance.⁴¹² Some animals, such as

405 HA 497a33-35. GA 766a3-9.

406 GA 766a3-9.

407 GA 716b27-34.

408 GA 717a16-22.

409 GA 717a30-37.

410 GA 716b14-25.

411 HA 637a23-25.

412 GA 718a18-26.

snakes and birds, do not have penises at all, but they still enjoy a good life.⁴¹³ Moreover, the penis has ‘much diversity’ and ‘numerous differences’ among individuals.⁴¹⁴ The penis of many animals, such as dolphins, is not external.⁴¹⁵

The penis must have an equivalent in women, which is said to be the vagina. The only difference between the two is that one is inward, and the other is outward.⁴¹⁶ We can find similar passages in *History of Animals*, where it is said that the vagina is receding, and the penis is protruding.⁴¹⁷ However, these passages can also be interpreted in a very different way. First of all, the vagina and the penis are only said to be analogous, but they are still different. Aristotle regarded them as ‘opposite in structure’, rather than ‘similar in structure’.⁴¹⁸ Inward and outward is still an important difference, which can be used to distinguish some features of male and female. Secondly, the generative organs of male and female are different in kind rather than in degree. If a man loses a few teeth, he would not change into a woman who is supposed to have less teeth. However, if a man loses the penis, there will be some significant changes in the whole body. Apart from the loss of the generative power, a castrated male would no longer be regarded as a male.⁴¹⁹ When a man is castrated, he becomes a eunuch and loses the ability to reproduce.⁴²⁰ There is a change of a principle.

*It is clear with castrated animals, where, although the generative part alone is destroyed, almost the whole form of the animal thereupon changes so much that it appears to be female or very nearly so, which suggest that it is not merely in respect of some causal part or some casual faculty that an animal is male or female. It is clear, then, that ‘the male’ and ‘the female’ are a principle. At any rate, when animals undergo a change in respect of that wherein they are male and female, many other things about them undergo an accompanying change, which suggests that a principle undergoes some alternation.*⁴²¹

On the one hand, male and female are not only about having either a uterus or a penis or testes. On the other hand, the generative parts are truly important to sex differences. Since the removal of the male generative organs involves some alternation of a principle, it shows that male and female are not simply two versions of one single human body.

413 HA 500b20-25; GA 717b14-19.

414 HA 500 a13-15; b20; 509a30-32.

415 HA 500a32-b1.

416 HA 637a23-25.

417 HA 493b3-6, 637a17-20.

418 HA 493b3-6.

419 GA 716b5-13.

420 GA 766a25-6; 784a11.

421 GA 716b5-13.

The nature of all these seems as though it has been distorted, just as some males become feminine in appearance and some females masculine-looking. For through undergoing a change in small parts animals appear to have a major difference in their whole bodily nature. It shows in the case of castrated animals: for after a small part has been mutilated the animal changes over towards the female; so that it is clear that in the animal's original constitution too if some tiny part changes, provided that it is an originaive kind of part, one becomes female and another male, and if it is wholly destroyed the animal become neither.⁴²²

It shows that the generative organs still have special importance in defining sex in Aristotle. In a sense, the generative organs are indispensable for the formation of sex. The unstable sexual characteristics are subject to change if the generative organs change. When a man is castrated, he becomes a eunuch and loses the ability to reproduce.⁴²³ A eunuch looks like a woman, but not really obtain the functions of a woman. According to Aristotle, a man is unable to change into a real woman even if he loses the genital part. It proves again that females are not simply a privation of males.

In the manuscripts of Mawangdui, we are told almost nothing about the uterus, but we are given many names for parts of the penis and the vagina. Indeed, the medical writings in Mawangdui show special attention to the differences of male and female genitals, but these differences can hardly be regarded as 'qualitative differences'. In these writings, the 'uniqueness' of the uterus is rarely implied, though there is much discussion about the differences between the genital organs. 'Jade' (*yu* 玉) is a metaphor for the male. The male semen is called 'jade spring' (*yuquan* 玉泉) and it is necessary to 'close the jade' (*yumi* 玉閉) in order to control ejaculation.⁴²⁴ The male genital organ is named 'Jade Whip' (*yuce* 玉策),⁴²⁵ a symbol of a horse's whip (*ce* 策), to be used as 'riding a woman' (*yunǚ* 禦女).⁴²⁶ The male genital organ is given many names, e.g. 'penis' (*zui* 賁), 'middle of the body' (*zhongshen* 中身), 'opening in the middle of the body' (*zhongshen kong* 中身空), 'the ultimate one' (*zui* 最), 'the red child' (*chizi* 赤子), etc. The female genital organ is given many other names, e.g. 'front' (*qian* 前), 'front vessel' (*qianmai* 前脈), 'mysterious gate' (*xuanmen* 玄門), 'joining vessel' (*jiaojin* 交筋), 'jade orifice' (*yudou* 玉竇), etc. There are even detailed names for different parts of the female genital organ, e.g. 'red pearl' (*chizhu* 赤珠), 'string of zither' (*qinxian* 琴弦), 'light of ji' (*jiguang* 筭光), 'milgrained wheat' (*maichi* 麥齒), 'smelly

422 HA 589b28-590a5.

423 GA 766a25-6; 784a11.

424 MWD 4:146 (十問).

425 MWD 4:107, 108 (養生方); 4:145, 152 (十問); 4:156 (合陰陽). *Ce* 策 is written as *ce* 筭 in the texts.

426 Li, L. (1993): 380.

mouse' (*xiushu* 臭鼠) and 'solid grain' (*gushi* 穀實).⁴²⁷

In *Huangdi Neijing*, the female body became much more distinctive. The uterus is frequently referred to as *bao* 胞 or *zichu* 子處, despite the fact that the bladder is also sometimes referred to as *bao* 胞.⁴²⁸ In *Huangdi Neijing*, the uterus is still associated with women, so sometimes 'the uterus of women' (*nüzi bao* 女子胞) is taken as one of the 'six extraordinary palaces'. The function of the uterus is indicated as being to 'store' something that is the foetus. There is no description of the structure of the uterus:

*The brain, the marrow, the bones, the vessels, the gallbladder, and the female uterus, these six are generated by the qi of the earth. Their storing is associated with yin; their image is that of the earth. Hence, they store and do not drain; they are called extraordinary palaces. Now, the stomach, the large intestine, the small intestine, the triple burner, and the urinary bladder, these five are generated by the qi of heaven. Their qi resembles heaven. Hence, they drain and do not store. They receive the turbid qi of the five depots. They are called palaces of transmission and transformation.*⁴²⁹

There are also some discussions of the male generative organs in *Huangdi Neijing*. For example, the penis is given different names in different treatises. It may appear as *zongjin* 宗筋 (the central tendon) or *jing* 莖 (the stem). In addition, there are names for the testes, e.g. *chui* 垂 (scrotum) or *luan* 卵 (testicle). The penis and the testes have an important function to 'control the yin essence' and make 'paths for the bodily fluids', so they are called together 'the crucial parts of the body' (*shenzhong zhiji* 身中之機).⁴³⁰ These terms are not used for females.

莖垂者，身中之機，陰精之候，津液之道也。故飲食不節，喜怒不時，津液內溢，乃下留於臞，血道不通，日大不休，俛仰不便，趨翔不能。

The penis and the scrotum are the crucial parts of the body. They control the yin Essence and are paths for the bodily fluids. If a man has food and drink irregularly and has anger and joy in an untimely fashion, the bodily fluids will overflow and come down to the scrotum. The way of blood will be blocked. It becomes more serious day by day. The man will have difficulties in bending and

427 cf. Li and McMahon (1992).

428 *Suwen* 76:646 (示從容論). The relationship between *bao* and the bladder is quite complicated, see Wu, Y.L. (2010): 274 (note 36). Some later texts suggest that males have a uterus, but the idea of the male uterus is only widely accepted after the early seventeenth century. See Wu, Y.L. (2010): 86.

429 *Suwen* 11:89–90 (五藏別論). Translated by Unschuld, P. and Tessenow, H. (2011): vol.1, 203–204.

430 *Lingshu* 9-75:430 (刺節真邪).

My third argument is that both Greek and Chinese authors had a broad recognition of problems with sexual health and other problems that are mainly caused by the generative organs, but there were different focuses. The Hippocratic authors focused more on female diseases which were caused by the uterus, while the authors of manuscripts of Mawangdui focused more on male diseases which were related to sexual powers. In the Hippocratic writings, little attention was paid to erotic therapies (the promotion of male desire) on male reproductive health. For this phenomenon, Marquis Berrey argued that ‘the Hippocratics think men are erotically desirous by nature and that, consequently, Hippocratic therapy does not attempt to promote erotic stimuli in male patients.’⁴³² In the manuscripts of Mawangdui, little attention was paid to erotic therapies (the promotion of female desire) for female reproductive health.

Moreover, ‘sex therapy’ is a common recommendation by authors in both societies, but it is recommended for different reasons. In the Hippocratic writings, it is advocated that intercourse can make a woman healthy; that it is a great danger for girls if they do not have a husband by the age of marriage; that all diseases of women are caused by the uterus and by menstrual blood; that if a woman gets pregnant, all extra blood will go to nourish the foetus, so there will be no more trouble with menstrual blood;⁴³³ and that the uterus will return to its place and cause no more problems if a woman will ‘sleep with her husband’.⁴³⁴ In the manuscripts of Mawangdui, sex is recommended as a way of seeking a long life, while pregnancy is something that should be avoided in the process of sexual cultivation. If the focus of the Hippocratic writings is on the diseases of women, the focus of the manuscripts of Mawangdui is on longevity and immortality. Now, I will provide a further explanation.

In the Hippocratic writings, the wandering womb may cause all sorts of diseases for women. These diseases are limited to women, as men are never bothered by movements of a non-existent uterus. Hence, these diseases are called ‘diseases of women’ (τὰ γυναικεῖα). To a certain degree,

431 *Ling Shu* 9- 75, 430 (刺節真邪). My translation.

432 Berrey (2014): 288

433 *Virg.*, Li VIII 470; *Nat. Puer.* 4, Li VII 494.

434 *Steril.*, Li VII 460; *Mul.* 2.144-145, Li VIII 316-318.

‘diseases of women’ in the Hippocratic Corpus are primarily focused on the uterus.

Diseases of women, as they are called. The uterus is the cause of all these diseases; for however it changes from its normal position – whether it moves forward, or whether it withdraws – it produces diseases. When the uterus does not drop its os and does not move so that it is outside and touching the labia, the disease is very minor. But when it moves ahead towards the front and inserts its os against the labium, first this produces pain because of the contact, and also the menstrual flow fails to take place because the uterus is obstructed and capped by its impaction against the labia, and when this flow is held back, it produce swelling and pain.⁴³⁵

In theory, the uterus is able to move around the whole body, so it may strike against any part, for example, the head, the heart, the hypochondria, the rib, the loin, the hip joint, etc.⁴³⁶ It would be the most serious situation if the uterus moves against the liver, which can cause choking, suffocation and even death.

If the uterus turns towards the liver, the woman suddenly becomes speechless, her teeth are locked fast, and her complexion becomes livid. The woman suddenly suffers these complaints, although she is healthy. It happens mostly to old virgins and widows, such as those who are widowed when they are very young. It mostly happens also to the completely barren and sterile women, because it comes from childbirth. For the purged lochia does not happen and the uterus does not swell up, nor does it relax, nor does the woman vomit. Whenever it happens in this way, push the swelling away from the liver towards the lower area by gently using the hand, bind the hypochondria fast with a bandage and open up the mouth,9 pour in diluted wine which is as fragrant as possible, when it is necessary; hold ill-smelling items against the nose and fumigate, holding sweet-smelling items and such types of incense against the uterus. When the uterus is released, purge, and it is necessary for the patient to drink medicine for cleansing from below; if she is bilious, that which purges bile, but if the woman is phlegmatic, give that which purges phlegm. Then she must drink boiled ass’ milk, and fumigate the uterus with fragrant vapours and apply the pessary made with the buprestis beetle. Use oil of bitter almonds on the following day and, leaving an interval of two days, douche the uterus with perfumes. Thereafter, leaving a one day interval, fumigate with aromatic spices. These applications are made for the widow. It is best for the woman to be pregnant. Persuade the young girl to live with a man.⁴³⁷

We can find similar passages in *Diseases of Woman II*, *Diseases of Woman I* and *Nature of Woman*. They may come from a common source. The author(s) took it as the most serious disease of woman when the uterus strikes against the liver. This disease only happens to a certain type of person: old virgins, widows, completely barren and sterile women. They are all women with one thing in common: they do not have children. In other words, the uterus is empty. It seems that the uterus is always eager to be filled with a foetus. Hence, if the patient gets pregnant, the uterus will

435 *Loc. Hom.* 47, Li VI 344.

436 *Mul.* 2.123, Li VIII 266ff.

437 *Mul.* 2.127, Li VIII 272-274. *Mul.* 1.6-7, Li VIII 30-32. *Nat. Mul.*, Li VII 314-316.

be satisfied and return to its right place.

Therefore, sex therapies are highly recommended by Hippocratic authors to cure such a disease – ‘have her sleep with her husband’.⁴³⁸ So unmarried girls are encouraged by doctors to get married and deflowered as soon as possible when they reach puberty.⁴³⁹ It is suggested that the uterus will be satisfied and return to its correct place if the patient gets pregnant. It is better for widows to find another husband and for barren women to regain the ability of generation. When they become pregnant, all diseases of women are naturally cured – ‘best would be for her to become pregnant.’⁴⁴⁰ For such a reason, reproduction gets another meaning for women. Reproduction can be a useful therapy for diseases of women. Women can be rescued from certain diseases after pregnancy. Hence it establishes a strong link between sex and generation.

‘Odour therapies’ were also frequently recommended to treat diseases of the uterus.⁴⁴¹ If the uterus runs to the upper part of the body, it is recommended to hold evil-smelling fumigations on the patient’s nostrils or months, so that the uterus can be repelled from its wrong place. At the same time, one should use fragrant fumigations below the patient’s genitalia, so that the uterus can be attracted to its normal place.⁴⁴² If the uterus runs to the lower part of the body, then the practice would be the opposite. Of course, the odour therapies entirely depend upon a basic assumption: the uterus has the ability to react to smell.⁴⁴³ Some rituals might be involved as well. In the Hellenistic and Roman periods, there were special amulets designed to drive the demon-like uterus back to its proper place.⁴⁴⁴

However, some Hippocratic authors had different views. For example, the author of *Places in Man* thought that the problem is ‘very minor’ if the uterus does not run outside of the body. According to his basic theory, all bodily organs should be ‘composed of the same things’, including the uterus.⁴⁴⁵ Hence, the uterus is no more than flesh. It causes problems in the sense that one piece

438 *Nat. Mul.*, Li VII 314-316. Thumiger, C. (2017): 228-264.

439 *Virg.*, Li VIII 468.

440 *Mul.* II.18, Li VIII 272-274.

441 *Nat. Mul.* 3.14, Li VII 314; Li VII 342.

442 *Mul.* I.13, Li VIII 50; 2.126, Li VIII 270; 2.142, Li VIII 314.

443 *Nat. Mul.* 3.14, Li VII 314; Li VII 342; *Mul.* I.13, Li VIII 50; 2.126, Li VIII 270; 2.142, Li VIII 314. Cf. Dean-Jones 1994:74. In the Hellenistic and Roman Period, there were special amulets designed to drive the demon-like uterus back to its proper place, see Aubert 1989; Hanson 1995; Kotansky 1995:267; Holmes 2010:187.

444 Aubert (1989); Hanson (1995); Holmes (2010):187.

445 *Loc. Hom.* I, Li VI 278.

of flesh makes close contact with another and blocks the passage of bodily fluids (e.g. menstrual flow). In *Places in Man*, the situation is serious only if the uterus descends completely out of the genitalia. However, different Hippocratic authors had different opinions on the particular disease caused when the uterus completely prolapses from the vagina. In *Nature of Woman*, the disease happens if a woman sleeps with her husband ‘during the lochial flow’.⁴⁴⁶ In *Barrenness*, there is an opposite view: the disease happens if a woman does not sleep with her husband ‘right after she has given birth’ or ‘during her lochial flux’, so the best therapy is to ‘sleep with her husband’.⁴⁴⁷ In *Diseases of Woman II*, it is thought that the disease happens ‘more with barren women’, so he recommended the same therapy to all female patients: to have intercourse with her husband during ‘the lochial discharge’ so that the uterus would be willing to return to its place.⁴⁴⁸ No matter what, all these authors agreed that this disease of women is highly related to sexual activities.

Where sexual diseases are concerned, the manuscripts of Mawangdui show little interest in womb problems, menstrual problems and other female problems. These texts are more interested in male diseases, particularly the male problem of impotence. There are many recipes for treating men’s impotence and loss of generative power. There are many suggestions about how to increase men’s sexual ability, including ‘ways of curing impotence in the old man’ (*laobuqi* 老不起), ‘ways of curing impotence in ordinary men’ (*buqi* 不起), ‘ways of increasing the size of the penis’ (*jia* 加), ‘ways of using liquids to strengthen the penis’ (*sha nan* 灑男), ‘ways of curing the decline of sexual desire and the thinness of sexual fluids’ (*yongshao* 用少) and ‘ways of conducting food and energy to strengthen the penis’ (*shiyin* 食引).⁴⁴⁹

In the Han medical manuscripts found in Wuwei 武威, there are few ‘plasters and recipes for women’ (*zhi furen gaoyao fang* 治婦人膏藥方), but there are many recipes for men, e.g. ‘the recipe recommended by the Marquis of the White Water to cure seven diseases of men’ (*Baishuihou suo zou zhi nanzi you qi ji fang* 白水侯所奏治男子有七疾方) and ‘the recipe recommended by the Marquis of the White Water from the East Sea to cure seven diseases and seven damages of men’ (*Donghai baishuihou suozou zhi nanzi you qiji ji qishang fang* 東海白水侯所奏治男子有七疾及

446 *Nat. Mul.*, Li VII 316.

447 *Steril.*, Li VII 460.

448 *Mul.* 2.144-145, Li VIII 316-318.

449 cf. Li, L. and McMahon, K. (1992).

七傷方). The two recipes have similar names, but they contain different drugs. They both mention ‘seven diseases’ (*qiji* 七疾) or ‘seven harms’ (*qishang* 七傷) of men.⁴⁵⁰ One recipe refers to (1) ‘the coldness of the penis’ (*vinhan* 陰寒), (2) ‘the impotence of the penis’ (*vinwei* 陰痿), (3) ‘the decline of the penis’ (*kushuai* 苦衰), (4) ‘the loss of semen’ (*jingshi* 精失), (5) ‘the lack of semen’ (*jingshao* 精少), (6) ‘the moistness of the scrotum’ (*nangxia shi* 囊下濕) and (7) [unclear]. Another recipe mentions (1) ‘the coldness of the penis’ (*vinhan* 陰寒), (2) ‘the impotence of the penis’ (*vinwei* 陰痿), (3) ‘the decline of the penis’ (*vinshuai* 陰衰), (4) ‘the moistness of the scrotum’ (*nangxia shi* 囊下濕), (5) ‘the retention in urinating’ (*xiaobian youyu* 小便有餘), (6) ‘the pain in the penis’ (*jingzhong tong* 莖中痛) and (7) ‘the automatic ejaculation of semen’ (*jingzichu* 精自出).

It is clear that these medical manuscripts focus on genital problems and sexual problems rather than uterine problems and infertility. Male and female have different diseases, but these diseases are only related to the genital organs and sexual function. The treatment of these diseases could provide better conditions for sexual cultivation. This contrasts with the Hippocratic writings, in which the focus is rather on diseases of women caused by the womb and the treatment of these diseases could provide better conditions for conception. The issue of male impotence is not mentioned much in early Greek texts, even though recipes for sexual potency do appear in later Greek and Latin medical texts. What is the reason for this difference? Now, I will provide my idea.

The existence of the ‘art of the bedchamber’ (*fangzhong shu* 房中術) can possibly explain why there are so many ‘recipes’ for male sexual diseases in the manuscripts of Mawangdui. The ‘art of the bedchamber’ was also called ‘the techniques of sexual cultivation’, which was advocated to enjoy the pleasures of sex and still protect life essence at the same time. It was said that relying on such a technique, Peng Zu 彭祖 lived up to 800 years, and the Yellow Emperor even achieved immortality after having sex with hundreds of young girls.⁴⁵¹ Therefore, the techniques of sexual cultivation could solve a conflict between bodily pleasures and longevity of life for a ruler. On the one hand, these techniques could relieve the worries of losing life essence so that the ruler could be satisfied by sexual pleasure; on the other hand, they could provide the possibility of realizing the

450 *Wuwei Handai Yijian* 武威漢代醫簡 (1975).

451 *Hanshu* 99-69 (王莽傳).

common dream of all rulers—longevity and, ultimately, immortality. It is recorded that there were many masters of the ‘art of the bedchamber’ in the Han period, such as Ling Shouguang 冷壽光, Tang Yu 唐虞, Lu Rusheng 魯女生, Gan Shi 甘始, Dongguo Yannian 東郭延年, and Feng Junda 封君達. All of them were men of recipes and techniques. The manuscripts of Mawangdui contain many texts on the ‘art of the bedchamber’ (e.g., *yangshengfang* 養生方, *Zaliaofang* 雜療方, *shiwen* 十問, *heyinyang* 合陰陽, *zajinfang* 雜禁方, and *tianxia zhidao tan* 天下至道談).⁴⁵² The acquisition of such knowledge was pursued by ‘men of recipes and techniques’ in hopes of winning the favour of a ruler who desired both pleasure and longevity.

However, it does not mean that there was no reorganization of female diseases in early China. In *Huangdi Neijing*, the uterus is not taken as main cause of gynaecological diseases, but it still causes some problems for women. One typical example is the disease of a stony uterus (*shijia* 石瘕). When the cold invades the mouth of the uterus (*zi men* 子門), the mouth of the uterus will close. As a result, there will be an accumulation of corrupted blood in the uterus. Hence, this is called ‘diseases of women’ (*nüzi zhi bing* 女子之病)⁴⁵³:

石瘕何如？歧伯曰：石瘕生於胞中，寒氣客於子門，子門閉塞，氣不得通，惡血當寫不寫，衄以留止，日以益大，狀如懷子，月事不以時下，皆生於女子，可導而下。

*What is stony uterus? Qibo answers, ‘The disease of a stony uterus takes place in the uterus. When cold invades the mouth of the uterus, the mouth of the uterus will be closed. The qi can pass through. The evil blood cannot be discharged when it should be. The evil blood accumulates inside and enlarges daily. It looks like pregnancy with children. Monthly matter does not come out in time. This disease occurs only in females. The accumulated matter can be guided to come down.’*⁴⁵⁴

In *Huangdi Neijing*, the disease of a stony uterus can also be considered a sex-specific disease because the patient must be a female. It also assumes that the female body must regularly evacuate some blood; otherwise, its accumulation will cause problems. Because the male body does not need to evacuate any blood, there is no need to worry about a stony uterus. Some other common diseases may also affect the uterus, such as dropsy, inflammation and swellings, but these diseases are not

452 Harper (1987); Li, L. (1993):368-379.

453 *Lingshu* 81 (癰疽). Ma, D.Z. (1991): 37–40; Zhang, Z.B. (2000): 23–31, 40–79.

454 *Lingshu* 57:332 (水脹). My translation.

mentioned as ‘diseases of women’. There is another gender-specific called *Chang Tan* 腸覃 (a tumour of the intestines). It makes the female patient look pregnant, but it is actually caused by tumours. It is easy to distinguish this condition from true pregnancy because there is still monthly matter in the case of the false one:

腸覃何如？歧伯曰：寒氣客於腸外，與衛氣相搏，氣不得榮，因有所繫，癖而內著，惡氣乃起，瘕肉乃生。其始生也，大如雞卵，稍以益大，至其成，如懷子之狀，久者離歲，按之則堅，推之則移，月事以時下，此其候也。

[Huang] Di: ‘What is Chang Tan?’ Qibo, ‘The cold qi invades the intestines and fights with the defending qi. The qi cannot go around smoothly, so it is accumulated. When the qi attaches inside, it becomes the corrupted qi. Then the tumour comes out. At the beginning, it is in a size like chick eggs. It grows larger and larger. On its completion, it makes an appearance of pregnancy. Sometimes the symptom may last for many years. It is hard if you press it. It is moveable if you push it. Monthly matter still comes out regularly. It is like this.’⁴⁵⁵

In some later medical texts, the symptom of *Chang Tan* 腸覃 is also called ‘the foetus of ghosts’ (*gui tai* 鬼胎) because some people think that it is caused by intercourse with ghosts.⁴⁵⁶ The foetus of ghosts is believed to be caused by the sexual desire of women. Due to sexual desires, the female seed is gathered in the uterus, but it cannot form a complete child without the male seed. A lump will be formed and the woman will appear to be pregnant. Because main cause is internal, it is necessary to get rid of the unsatisfied desires. It is commonly agreed that dreams of intercourse with gods, ghosts or spirits will cause all sorts of serious gynaecological diseases.

Of course, Greek authors and Chinese authors had very different understandings about ‘diseases of women’. In Hippocratic writings, the movement of the uterus causes all diseases of women. The Hippocratic concept of the wandering womb never appears in early Chinese texts. In *Huangdi Neijing*, the stony uterus is a clear example of ‘diseases of women’, but it is hard to find other examples. It is also said that diseases of the internal organs can be reflected on the face. If a male has some signs there, he may have diseases of the genitals or testicles; if a female has symptoms there, she may have diseases of the urinary bladder or the uterus. Diseases of the uterus

455 *Lingshu* 57 (水脹). My translation.

456 For the concept of ‘the foetus of ghosts’, see Wu, Y.L. (2008): 159–188; Zeitlin, J. (1997): 242–263; Dikotter, F. (1998); Li, J.M. (1998): 101–148.

are only related to women, which indicates that the uterus is only a female part.⁴⁵⁷

In summary, this chapter raises many arguments concerning sex differences. On the overall constitutions, I have argued that sex differences might be defined in terms of the moistness, or coldness, or *yin-yang*. On the bodily economy, I have argued that sex differences might be defined in terms of vessel functions and pulse expressions. It is important to emphasize again the Chinese view of vessels: they saw vessels as having the same structures but different functions in male and female. I have also argued that different authors have very different views on blood, especially the menstrual blood. It is commonly emphasized by Greek and Chinese doctors that male and female patients should be treated differently. On the bodily organs, I have argued that there was a common awareness of gender-specific diseases in the two cultures and there was a common recognition of diseases caused by unsatisfied sexual desires. I have also argued that sex differences might emphasize different aspects. Some are just quantitative differences. Up to a certain point, there are qualitative differences, which might be reflected in menstrual blood, milk, vessel functions and pulse, female's uterus diseases, male's sexual diseases and some other aspects. We can learn that the model of the one-sex body is far from sufficient to include all situations. The diversity of ideas in ancient writings should be appreciated and taken as a matter of fact. They had different understandings of how the generative functions could be conducted through vessels, blood, semen and menstrual blood. However, it was commonly agreed in almost all investigated texts that the male and female bodies have different generative functions and gender-specific diseases.

457 *Lingshu* 49:307 (五色).

Chapter 4 Females in Generation

This chapter will investigate the different roles of male and female in generation, especially the female's role as it is highly debated. There are four sub-questions for exploration: (1) In ancient embryological theories, is the female inferior to the male? (2) Does the female make essential contribution (the female seed) in producing a child? (3) Does the female just play a passive role as a container to provide space for the embryo during gestation? (4) Is a female child a failure of Nature?

I want to give the following answers. First, the inferior social status of women was easily reflected in embryological theories, especially in Greek writings. There is no reason to deny the existence of sexual hierarchy, but another important aspect of the male and female relationship is its complementary nature. Second, I want to argue that the female's essential contribution (the female seed) was generally recognized in both Greek and Chinese cultures. For Aristotle, the female contribution (I call it 'the secondary seed') is different from the male contribution (I call it 'the primary seed'), but it is still a sort of essential contribution. Third, I want to argue that there was a common recognition of the female's indispensable and positive role in generation. Fourth, I want to argue that a female child should not be regarded as a failure of Nature.

We cannot find the question if a female child is a failure of Nature in early China, but it is still important to discuss this question in a comparative study of Greek and Chinese tradition. There are at least two reasons. The first reason is that it is unavoidable to encounter such a central debated question in the existing academic research on Aristotle's embryology. We must have a discussion about this question if we want to make a fair judgement on Aristotle's attitudes toward women. The second reason, which is even much more important, is that we can find one of the best examples how ancient embryological thought could be influenced by contemporary philosophy and also one of the best examples how a unique concept could be found in one culture but not in another. According to Aristotle's doctrine, everything must have a goal or *telos* (τοῦ τέλους) because nature does nothing in vain. Under this teleological framework, it is reasonable to ask what is the purpose of nature to produce both males and females. Or, in other words, is it the case that nature only wants to produce males but sometimes just failed? These questions will be meaningless outside the teleological framework. That is the reason why we cannot find these questions in early China.

4.1 Sexual Hierarchy

It is a basic fact that sexual hierarchies existed in both ancient Greece and early China, and there is no doubt that the female held a social status inferior to that of the male in both cultures. Consequently, we can easily find social influences on the medical and embryological writings in the two societies. In a patriarchal society, it is not surprising that the superiority of males would be reflected in medical theories. A male child is more favoured than a female one, not only because it is held to be better for the health of the mother, but also because a legitimate heir must be a male. As Geoffrey Lloyd wrote, ‘it was commonly supposed that the essential or more important contribution to reproduction and to heredity was that of the male parent.’⁴⁵⁸ Or in Lesley Dean-Jones’ words, ‘theories of reproduction were bound to emphasize the importance of the male component over the female.’⁴⁵⁹ Moreover, the ancient materials that we have were exclusively written by males and thus reflect a strong male orientation of interest. Therefore, it should be no surprise to find some ideological biases in the writings of these male doctors. It is hard to avoid the male-oriented values and prejudices, since all our sources probably come from male authors,⁴⁶⁰ even though there is an extensive debate about whether some of the information (especially recipes and some physiological observations) included in the treatises was contributed by women – that is, it would be women’s information re-appropriated by men.⁴⁶¹ In both cultures, therefore, medical theories were intensely value-laden.

In general, the Hippocratic writings speak with a male voice of social and sexual domination. Male and female are considered inherently different and sex is thought to be determined at the beginning of conception. The author of *Generation* established the weakness of a woman’s body as a physical fact that has its own origin at the beginning of the seed. A female child is a result of the dominance of the weaker seed in quantity.⁴⁶² This theory could be used as a proof that the female body is inherently weaker than the male body. The subordinate position of women in society could,

458 Lloyd (1983): 86.

459 Dean-Jones (1994): 148.

460 Lloyd (1983):58-60.

461 Rousselle (1980), Hanson (1985), Totelin (2009), King (2018), etc.

462. *Genit.* 6.1-2, Li VII 478.

therefore, be explained and justified.

The social expectations of sex characteristics (both physical and psychic) are best reflected in *Regimen*, which sets up a hierarchy of masculinity and femininity. In *Regimen*, the best type of man, who is made of ‘purely male’ seed, has the greatest masculinity and must be ‘brilliant in soul and strong in body’.⁴⁶³ The next type of man, who receives ‘female seed’ from the mother but an overabundance of ‘male seed’ from the father, has less masculinity, but still performs as a normal man. The worst type of men, those who receives ‘female seed’ from the father but an overabundance of ‘male seed’ from the mother, has the least masculinity and display female characteristics, and so are called ‘androgynes’ (ἀνδρόγυνοι). The hierarchy is in reverse for femininity. The ‘mannish’ (ἀνδρεῖαι) girl, who receives ‘male seed’ from the mother but an overabundance of ‘female seed’ from the father, has the least femininity and displays male characteristics. In this way, *Regimen* provides a theory that matches the social expectations of different sexual characteristics and behaviour. For example, a man should have strong muscles. More importantly, a man should do what a man is expected to do. If a man fears fighting and likes to deal with family affairs, then he would be regarded as abnormal because he does not fulfil the ‘male’ social expectations. Similarly, if a woman gains strong muscles and likes to fight, she would be called a ‘mannish’ girl.

The uniqueness of the uterus provides a chance for rationalizing that women must take most responsibilities for the failures of conception. If a couple cannot have a child for many years, the husband can find good reasons to blame his wife. He may call doctors to help. Then, doctors will confirm that it is caused by problems of the uterus and use all sorts of drugs to treat the uterus. Or, he may find another woman to be his wife. Doctors give suggestions on how to test women’s fertility. There are several famous odour tests to see whether the uterus can open up properly, through which a woman’s ability to conceive can be predicted. For example, ‘cover her round with wraps and burn perfumes underneath. If the smell seems to pass through the body to the mouth and nostrils, be assured that the woman is not barren through her own physical fault.’⁴⁶⁴ This test method assumes that there is a passage throughout the whole body, connecting ‘the mouth upward’ and ‘the mouth

463 *Vict.* 1.28, Li VI 502.

464 *Ap.* 5.59, Li IV 554. *Mul. I.* 78, Li VIII 178; *Mul. II.* 146, Li VIII 322; *Nat. Mul.* 96, Li VII 412-414; *Steril.* 214, Li VIII 414-416; 219, Li VIII 424; 230, Li VIII 440; *Superf.* 25, Li VIII 488-490; Hanson (1991):86.

downward'. The power of test is controlled by men, but there is no test for men's fertility. In a certain way, doctors give good reasons why women should be tested rather than men based on the unique role of the uterus. Similarly, in *Barren Women* and some other gynecological treatises, it is generally true that women are blamed for their inability to conceive. As Geoffrey Lloyd pointed out, 'A more distinct masculine bias is, however, present in the explanations offered of sterility. Although some theorists held that the contribution of the female parent is on a par with that of the male, there is, on the whole, little recognition, in the gynecological works, that failure to conceive may be due to the male as much as to the female.'⁴⁶⁵

Moreover, a male foetus is always more vigorous than a female foetus and is much better in its health, its strength, and its influence on the mother. It is believed that there is a difference of speed in the formation depending on whether the embryo is a male or a female. As Ann Ellis Hanson wrote, 'An important concern of Hippocratics was to manipulate gestation in such a way as to assert the primacy of the male'.⁴⁶⁶ The superiority of males is reflected in the belief that a male foetus grows much faster than a female because it has more strength.⁴⁶⁷ In *Nature of the Child*, males need only 30 days for all parts to be formed, but females need at least 42 days.⁴⁶⁸ The female seed is weaker and more fluid than the male seed, so the female embryo needs more solidifying, and the parts will be differentiated later than the male.⁴⁶⁹ In *Seven Months' Child*, everything in males becomes quite distinguishable after 40 days, while in females the process is much slower.⁴⁷⁰ Similarly, it is said in some Hippocratic writings that males start to move much earlier than females: 'The male foetus starts to move at three months, the female at four months'.⁴⁷¹ Sexual hierarchy is manifested again in Hippocratic embryology.

Now, we come to Aristotle. In recent years, some scholars tried to defend Aristotle by arguing that his biological theories were a combination of metaphysical requirements and good empirical evidence, rather than the product of any ideological influence or any sexist motivation. According

⁴⁶⁵ Lloyd (1983), 84.

⁴⁶⁶ Hanson (2008): 97-98.

⁴⁶⁷ Demand (1994): 5; 31-32.

⁴⁶⁸ *Nat. Puer.*, Li VII 494; Li VII 500; Li VII 498; Li VII 504; Li VII 508; Li VII 510. See also *Mul. I.* 1, Li VIII 12-14; *Vict.* 1.34, Li VI 512.

⁴⁶⁹ *Nat. Puer.*, Li VII 504.

⁴⁷⁰ *Septim.* 9, Li VII 450.

⁴⁷¹ *Mul. I.* 71, Li VIII 150. See also *Nat. Puer.* 21.1, Li VII 510; *Steril.* 233 Li VIII 446.

to this interpretation, Aristotle's biological theories, which are separate from his ethical and political claims, do not imply an absolutely passive and inferior role for women, as some feminists have interpreted, nor do they endorse the suppression of women.⁴⁷² For example, Sophia Connell argued for a new interpretation that 'coldness' can be regarded as an active power in Aristotle because the 'coldness' of females balances the 'hotness' of males. 'The female principle counterbalances the male one by the active power of cold, which opposes active heat, resulting in the correct balance. Cold is really an active agent.'⁴⁷³ However, it is more generally recognized that Aristotle's views of sexual differences are shaped by preconceptions of male superiority. Aristotle's biological theories are not based entirely on value-neutral observation, but are strongly influenced, whether consciously or unconsciously, by the ideological biases (or the common sexual prejudices) of his society, inevitably so.⁴⁷⁴

There is no reason to deny the existence of sexual hierarchy in Aristotle, namely, that in many places he held the idea of the dominant and superior role of males in both his biological and political theories. From the biological perspective, Aristotle thought that the female body is 'cold' in nature and thus does not have sufficient 'power' to concoct semen out of blood.⁴⁷⁵ Aristotle had long been criticized for his usage of the word *πεπηρωμένον* which defined the females as a 'mutilated' or 'deformed' male⁴⁷⁶ so that 'we should look upon the female state as it were a deformity.'⁴⁷⁷ In *Generation of Animals*, there is one paragraph that talks very clearly about this female inferiority:

*And as the proximate motive cause, to which belong the logos and the Form, is better and more divine in its nature than the Matter; it is better also that the superior one should be separate from the inferior one. That is why wherever possible and so far as possible the male is separate from the female, since it is something better and more divine in that it is the principle of movement for generated things, while the female serves as their matter.*⁴⁷⁸

This paragraph shows that Aristotle made a dichotomy in which males are associated with form

472 Nussbaum (1998); Deslauriers (1998);

473 Connell (2016): 273.

474 Whitbeck (1976); Tumulty (1981); Lloyd (1983); Bleier (1984), Allen (1985), Keuls (1985), Matthews (1986); Furth, M. (1988); Laqueur, T. (1990); Green (1992), Tuanna (1994), Femenias, M. L. (1994); Zeitlin (1996), Witt, C. (1998); Henry, D. (2007); Nielsen, K.M. (2008).

475 *GA* 728a18-19.

476 *GA* 737a28-29.

477 *GA* 775a15-16.

478 *GA* 732a3-10.

and females with matter. Thus, male superiority is based on the ‘fact’ that form is more divine than matter. In a summary of the dichotomy, he associated male with form, motive cause, hot, right, etc., and female with matter, material cause, cold, left, etc.

In Aristotle’s works, it is believed that the male embryo benefits the health of the mother in pregnancy, while the female embryo does the opposite.⁴⁷⁹ Moreover, male embryos develop much faster than female embryos. Aristotle’s explanation is that the female body is a ‘deformity’. Females are weaker and colder in their nature. The development of the embryo is a process of concoction, which needs much heat. Since females are always lacking in heat, the development is largely affected.⁴⁸⁰

*Now when the male comes away at forty days, although if put into anything else it dissolves and disappears, if put into cold water it sets as if in a membrane; and if this is teased apart, the embryo appears the size of one of the big ants, with all its parts evident, especially the genitalia, and the eyes very big just as in other animals. But any female that is aborted within the three months appears unarticulated as a rule; any that has reached the fourth month has become divided and achieves the rest of the articulation in quick stages.*⁴⁸¹

However, this fact does not imply the male embryos always have more advantages than the female ones. Aristotle believed that there is a greater chance to find disabilities or other problems in male embryos than in female ones. The reason is that male embryos are hotter, so they move often inside the womb. Since they are still very weak, they are very likely to be harmed in their arbitrary movements.⁴⁸²

From a political perspective, Aristotle argued that the female is inferior ‘by nature’ (φύσει). He argued for political subordination of women to men in the home and in society: ‘The female and the slave are by nature distinct [from the male].’⁴⁸³ Aristotle made another dichotomy, one between the ruler and the ruled, making a list of several pairs such as the master and the slave, the husband and the wife, the father and the child.⁴⁸⁴ Aristotle’s ideal of domesticity is that women, children, and slaves are all to be ruled under the sole authority of the father in the household.⁴⁸⁵ In *Politics*, he

479 *HA* IX 584a13-14.

480 *GA* 775b13-23. *HA* VI 576b8-9; *HA* IX 583b24-29.

481 *HA* IX 583b14-24.

482 *GA* 775a4-9.

483 *Pol.* 1252b1.

484 *Pol.* 1253b5-8, 1260a8-11.

485 *Pol.* 1259a30-40.

wrote in such a way: ‘It is by nature that the male and the female are distinguished as superior and inferior, the ruler and the ruled. This general principle must similarly hold good of all human beings generally.’⁴⁸⁶

If we compare the two passages, *GA* 732a3-10 and *Pol.* 1254b13-15, we can find two different emphases on female inferiority: the one passage is about females’ inability to provide the principle of movement, while the other is about females’ lack of the wisdom to command. Both concern female ‘inability’ and both are to be explained by the ‘cold’ nature of the female body. Hence, many scholars argued that Aristotle justified and reinforced political subordination of women to men, and, for this reason, he legitimized and rationalized the Greek patriarchal system.⁴⁸⁷

Sex is not the only *topos* where we find the idea of hierarchy in Aristotle. Let us look at just two examples. The first example concerns the hierarchy of ‘the left’ and ‘the right’: in many places in his writings, Aristotle said that the left is inferior to the right.⁴⁸⁸ The second example concerns the hierarchy of bodily parts. Aristotle thought that not all bodily parts are created equal because some are more essential than others. The best material must be used first to create the essential ones, and the left-over material is used later to create other, non-essential ones. As Mariska Leunissen argued, this is a ‘material necessity’ or a ‘secondary teleology’.⁴⁸⁹ The heart is formed first because it is the most important bodily part.⁴⁹⁰ In the creation of bodily parts, Aristotle expressed the idea that the biological hierarchy is comparable to the social hierarchy.

*Like a good housekeeper, Nature is not accustomed to throw anything away if something useful can be made out of it. In housekeeping the best of the food available is reserved for the freemen; the residue left from this as well as the inferior food goes to the servants, and the worst of all goes to the domestic animals.*⁴⁹¹

In this analogy, Aristotle mentioned the hierarchy of bodily parts and the hierarchy of freemen, servants, and domestic animals. It shows again that the male is superior to the female, as the best

486 *Pol.* 1254b13-15.

487 Garside-Allen (1971); Horowitz (1976); Fortenbaugh (1977); Okin (1979); Morsink, J. (1979), (1982); Elshtain (1981); Lange (1983); Allen, P. (1985); DuBois, P. (1998); Tuana, N. (1988); Cole, E. B. (1989); Laqueur, T. (1990); Dean-Jones, L. (1994).

488 *PA* 665a 18ff; 705b 20ff; 706a 20ff; 706b 12ff.

489 Leunissen, M. (2010).

490 *GA* 740b2-4; *PA* 666a18-21.

491 *GA* 744b16-21.

material is used to create the male, while the less perfect material is used to create the female. Aristotle did not discuss the sex of slaves throughout his works because their gender did not matter at all.⁴⁹²

Indeed, Aristotle was influenced by a kind of common prejudice which forms a value-laden premise underlying his embryological theories. However, he was not specifically motivated to construct the embryological theories by some antipathy towards females. It is true that, in ancient Greek society, ‘women are debarred from citizenship and active participation in the *polis*’,⁴⁹³ but this situation had existed for a long time. In fact, Aristotle never denied the necessity and importance of the female. The indispensable role of the female is emphasized throughout his works, not only in his biology, but also in his politics. Even though he thought that women are inferior to men, he still emphasized the complementary and significant role of women in generation as well as in household. Even though Aristotle assigned an inferior place to women, he nevertheless pointed out the necessity of females for the continued existence of the species. The existence of females also has its own purpose, which is not merely for the sake of males.⁴⁹⁴ Human individuals are not immortals, but reproduction is a way to achieve eternity for the species. The work of reproduction must be done by the joint effort of the male and the female.⁴⁹⁵ Aristotle put forth this idea of the male and the female co-operating for the continuance of the species also in his political writings. It is for the purpose of reproduction that marriage exists. ‘The first coupling together of persons then to which necessity gives rise is that between those who are unable to exist without one another, namely the union of female and male for the continuance of the species.’⁴⁹⁶

In Aristotle’s hylomorphism, the male holds the dominant position, but the female still plays a complementary role. The female is the contrary (ἐναντίον) of the male because they have contrary features. It is true that the male can provide the form which the female cannot provide, but the female can also do things that the male cannot do. They ‘exhibit complementary powers’.⁴⁹⁷ It is for this reason that they should join together: to make up for each other’s deficiency. According to

492 e.g. Laqueur, T. W. (1990): 54.

493 Elshtain, J.B. (1981): 46.

494 Connell (2016):28.

495 *GA* 731b31-23.

496 *Pol.* 1252a26-28.

497 Kosman, A. (2015): 167.

Aristotle's dichotomy in the *Politics*, the male's role is to beget offspring, while the female's role is to bear and nurture offspring.⁴⁹⁸ Thus Aristotle attributed to male and female two different but complementary roles. Even if the male form is said to be more divine than the female matter, this is not to say that the embryo will turn out better with more of a contribution from the male. If they are unable to reach a *harmonia* (συνμετρία), they are unable to have a successful conception. In some cases, it is the opposite: females are 'able' while males are 'unable.' Aristotle found that some female animals can accomplish the whole work of generation alone. They are able to generate on their own (e.g., wind-eggs in birds and infertile eggs in fish), but no male animal is able to do so without the assistance of a female. For Aristotle, the biological puzzle is not why males need females in generation, but, rather, why females need males in this regard.

In the management of the household, Aristotle had the same idea of the complementary role of women. The male is the 'soul' of the couple, but the female is also significant.⁴⁹⁹ The only difference is that they play different roles. 'The household functions of a man and of a woman are different—his business is to get and hers to keep.'⁵⁰⁰ Aristotle's idea is actually that men should do what is 'fitting' to men, while women should do what is 'fitting' to women. Even if women have less 'ability to command' than men, men should make decisions for the family only in those matters which he is 'fit' to decide and leave whatever 'fits' the woman to her.⁵⁰¹ This shows that Aristotle did allow women a share of rule in the household. In a sense, there is still a sort of democracy in the form of 'government' that is the family. Some scholars even argued that, if Aristotle allowed women to participate in the management of the household, this might imply the same with respect to the rule of the city.⁵⁰² According to Aristotle, man is a political animal, but more fundamentally, man is a *pairing* animal, who needs a woman to make a couple. Such 'coupling' is for the purpose of continuing the species, but also for the purpose of personal well-being. There is one excellent passage in the *Nicomachean Ethics* which I shall cite in its entirety. This passage clearly indicates that the relationship between men and women is one of mutual reciprocity rather than subordination:

498 *Pol.* 1335b27-29.

499 *Pol.* 1291a24.

500 *Pol.* 1277b21-25.

501 *EN* 1160b33.

502 e.g. Levy, H.L. (1990): 397-416; Nichols, M.P. (1992); Swanson (1992).

The friendship between husband and wife appears to be a natural instinct; since man is by nature a pairing creature even more than he is a political creature, inasmuch as the family is an earlier and more fundamental institution than the State, and the generation of offspring a more general characteristic of the animal creation. So whereas with the other animals the association of the sexes aims only at continuing the species, human beings cohabit not only for the sake of begetting children but also to provide the needs of life; for with the human race division of labour begins at the outset, and man and woman have different functions; thus they supply each other's wants, putting their special capacities into the common stock. Hence the friendship of man and wife seems to be one of utility and pleasure combined.⁵⁰³

Sophia Connell made an important observation. She pointed out that male and female have three important relationships in Aristotle: first, they are mutually exclusive; second, they are hierarchical; third, they are entirely rigid.⁵⁰⁴ On the one hand, females are contrary to males; on the other hand, females are complementary to males. They are just like two sides of a coin. Even if males appear to be superior to females, both are indispensable in the process of generation.

The emphasis on the reproductive value of the female does not necessarily contradict the notion of the superiority of the male. The hierarchical relationship and the complementary relationship are not incompatible with each other. In the Hippocratic corpus and Aristotle's works alike, the true relation between the male and the female is both, on the one hand, hierarchical, and on the other hand, complementary. The situation is almost the same in early Chinese texts. Even if women are held to be generally inferior to men, the generative role of women is still much emphasized in *Taichanshu* and *Huangdi Neijing*.

It will help us to better understand this hierarchical yet complementary relationship if we consider the Chinese philosophical concepts of *yin* and *yang*. *Yin* is generally inferior to *yang*, but they are complementary to each other as the two creative powers of the world. Without *yin*, there is no *yang*. Indeed, *yin* is always associated with the female principle and *yang* with the male principle. It is also helpful if we consider the relationship of 'the left' and 'the right.' In Greek society, the left is thought to be inferior to the right, so the left is usually associated with the female, the darkness and the bad, while the right is associated with the male, the brightness and the good.⁵⁰⁵ In Chinese

503 EN 1162a16.

504 Connell, S. (2016): 25.

505 *Metaph.* A 5 986a 22 ff.16.

society, the left is thought to be superior to the right, so the left is usually associated with Heaven and the male, while the right is associated with Earth and the female. This cultural difference has a great influence on the theories of sex determination, in which the sex of the foetus is said to be determined by either the right or the left.⁵⁰⁶ No matter, without left, there is no right.

In a sense, discourses of ancient embryology could be regarded as a product of their contemporary cultures, but at the same time they could also be regarded as constructive factors in their respective cultures. In the hands of ancient authors, the idea of men's superiority was theorized, rationalized, and reinforced. The emphasis on women's reproductive roles praised women for their value in bringing an heir to the family, but this could also restrain women from other activities in society by reinforcing the idea that women's main responsibility was just to bear and raise children. However, this was not all about ideology and control; the dominant value system of the two societies was at work in these texts, but there was plenty that went beyond this agenda, much that was more complicated and diverse and elaborated key ideas in imaginative and distinctive ways. There was a rich interaction between embryological theories and social ideology, and one could deeply influence the other. These theories were possibly influenced but not determined by social ideology, and vice versa.

4.2 Female Contribution

Now, I will make my argument that the female's essential contribution (the female seed) was generally recognized in both Greek and Chinese cultures. In ancient Greece, there was a highly debated question of whether the female parent makes the same essential contribution as the male parent in generation. As for the seed, early Greek natural philosophers held two main views: (1) both male and female contribute a part that unites to form one foetus;⁵⁰⁷ (2) the female contributes nothing but space and nourishment in which the male seed can grow.⁵⁰⁸ Through the investigation of Hippocratic embryology, we find that Hippocratic authors generally acknowledged equal

506 Lloyd, G. (1962), (1966), (1972), (1983), (1996) and Kember, O. (1971), (1973).

507. Alcmaeon (DK 24A13), Parmenides (DK 28B18), Empedocles (DK 31B63), Pythagoras, Epicurus and Democritus (DK 68A142).

508. Anaxagoras (DK 59A107), Hippon of Rhegium (DK 38A14), Diogenes of Appollonia (DK 64A27), some Pythagoreans (DK 58B1a) and 'certain other Physiologists' (GA 763b33-35).

contribution of seed from the female and male parents. In *Generation/Nature of the Child*, it is argued that the female parent also releases seed from her body. Sometimes it is released to the outside of the womb, but it will be mixed with the seed from the male parent in the womb.⁵⁰⁹ There are two types of seed: strong and weak. The strong type produces a strong child. The weak type produces a weak child.⁵¹⁰ The stronger type is also called ‘the male-producing seed’ (τὸ ἄρσεν σπέρμα), but it can come from the female parent. The weaker type is also called ‘the female-producing seed’ (τὸ θήλυ σπέρμα), but it can also come from the male parent.⁵¹¹

No Hippocratic author denied the existence of the female seed. On the contrary, the female contributions to conception and heredity are admitted and strongly advocated by Hippocratic authors. In *Barren Women*, it is said that when the womb releases seed, women will feel wet at that time.⁵¹² In *Nature of Bones*, it is said that there are vessels in both male and female to ‘collect most of the seed’. It is indicated that the female can also contribute seed. ‘In the penis, too, there are vessels, both wide and narrow, that are curved and run close together. In the female, this vessel runs to the uterus, the bladder and the urethra. From that point it goes straight on, in women to be suspended around the uterus, in men to be coiled around the testicles. Because of this structural arrangement, it is this vessel that collects most of the seed’.⁵¹³ In *Diseases of Women I*, it is suggested that the female seed will be strengthened and can mix with the seed of the male easily when women desire intercourse. They become pregnant ‘mainly because they desire it’. If women do not have any desire, the opening of the uterus is ‘more closed’ and it is more difficult for the veins to ‘attract the seed’. When menstrual blood goes wrong, however, both male and female seeds might be destroyed by a ‘flood’ of menstrual blood.⁵¹⁴

In Hippocratic writings, the female seed and menstrual blood are clearly distinguished. In *Diseases of Women II*, neither the menses nor the seed will enter a diseased uterus.⁵¹⁵ In *Nature of the Child*, the passage of both menses and seed is open at the same time in young girls. It is also

509. *Genit.* 4.1, Li VII 474, *Nat. Puer.* 1.1, Li VII 486.1.

510. *Genit.* 8.2, Li VII 480.

511. *Genit.* 6.1-2, Li VII 478; 7.1, Li VII 480.

512. *Steril.* 220, Li VIII 424.

513. *Oss.* Li IX 188-190.

514. *Mul. I* 8, Li VIII 34, 12, Li VIII 48; 24, Li VIII 62; 71, Li VIII 148-150.

515. *Mul. II.* 129, Li VIII 276 ; 141, Li VIII 314 ; 154, Li VIII 328.

indicated that regular menstrual blood is necessary to keep women healthy. ‘If the menses do not flow, the bodies of women become sick’.⁵¹⁶ In *Regimen*, it is argued that the seeds from the male and female parents are both necessary in generation because ‘either part alone has not motion enough, owing to the bulk of its moisture and the weakness of its fire, to consume and to solidify the oncoming menses’.⁵¹⁷ It shows that the author interpreted the female seed and menstrual blood as very different matters. It also answers the question of why a male is needed if a female can provide place and nourishment at the same time.⁵¹⁸

Whether women contribute seed in generation is a highly debated question as well in Aristotle. Even though there is no clear statement of ‘the female seed’, Aristotle did not deny the female contribution to generation. There are two different questions. One is about whether there is ‘the female seed’ in counterpart to ‘the male seed’. One is about whether there is a female contribution in the formation of the embryo. Hippocratic theories are straightforward, while Aristotle’s theory is much more complicated. There is σπέρμα from the father, which provides the ‘form’ and the basic principles for the formation and growth of the embryo; and there is also καταμήνια from the mother, which provides ‘matters’ and the basic materials for the development of the embryo.

The question of the female seed is quite complicated in Aristotle because of his confusing terminology. Some scholars suggested that sometimes σπέρμα actually refers not to semen, but to an embryo.⁵¹⁹ In his definition, γονή is the name given to that which comes from the generating parent. σπέρμα is the name given to that which contains the principle derived from both the parents who have copulated.⁵²⁰ Women do not contribute γονή because the generative principle or the soul comes only from the male parent, but women do contribute to the σπέρμα. The term σπέρμα has several different meaning in Aristotle’s works: (1) seed of a plant; (2) male semen (strictly γονή) ; (3) the female contribution to generation; and (4) the first stage of the foetus (strictly κῆμα).⁵²¹ Most recently, Ignacio de Ribera-Martin argued for two different notions of seed in the *Generation of Animals*: the seed as generative residue and the seed as the first κῆμα set up together with the

516. *Genit.* 4, Li VII 474; *Nat. Puer.* 15, Li VII 494; 20, Li VII 508.

517. *Vict.* 1.27, Li VI 500.

518. Dean-Jones (1994):149,161.

519 Jones (1974):489; Morsink (1982):100; Gill (1989):229.

520 *GA* 724b13-18.

521 Balme (1992):131; Henry (2007): 256.

two principles of generation mixed. The former is restricted to the γονή and to the καταμήνια. The latter (σπέρμα) is common to plants and animals – regardless of their mode of reproduction – and excludes the γονή and the καταμήνια.⁵²²

For the problem of confusing terminology, I would like to propose the concept of ‘the secondary seed’, which can possibly be helpful for a better understanding of the notion of σπέρμα in Aristotle. The secondary seed of the female discharge (καταμήνια) is also an essential part in generation, but it is not the same as ‘the primary seed’ of the male discharge (γονή). I want to emphasize several points about ‘the secondary seed’. First, it is obvious that Aristotle had never denied that women can contribute a sort of seed. There is no reason to criticize Aristotle by asserting that he denies women’s seminal contribution to generation. Second, the secondary seed is in many ways different from the primary seed. The female and male contributions are different. Third, the secondary seed is less thoroughly concocted (ἥττον πεπεμμένον).⁵²³ It has no pneuma. It contains only the nutritive soul potentially, which is at a lower level than the sentient soul provided by the male seed. It is in this sense that it is called ‘secondary’. There is a hierarchy between perfect and imperfect, higher and lower. In the sense of necessity, however, the female seed seems to be more basic, since no sentient soul is needed in inferior animals and plants, for example, in wind-eggs. Fourth, the secondary seed serves a complementary role as well as a subordinate role to the primary seed. It provides what the primary seed cannot provide, but it is passive and meant to be acted upon by the primary seed.

‘The secondary seed’ contains two significant meaning. On the one hand, ‘the secondary seed’ is not the same as ‘the primary seed’. Hence, Aristotle’s theory is very different from that of the Hippocratic authors who were proponents of ‘two-seed theories’. It is interesting that Aristotle criticized many Hippocratic theories, but he did not mention any Hippocratic work. Firstly, Aristotle associated the female σπέρμα with the theory that the seed comes from the whole body. In his rejection of the theory that the seed comes from the whole body, he rejected the idea that the female can emit the same type of seed as the male.⁵²⁴ In contrast, many Hippocratic authors held the theory

522 De Ribera-Martin, I. (2019), 121-122.

523 GA 726b30-32.

524 GA 724a8-12.

that the seed comes from the whole body.⁵²⁵ Secondly, Aristotle believed that it is impossible for the female to produce σπέρμα (as the male one) and the menstrual fluid at the same time.⁵²⁶ In contrast, some Hippocratic authors indicated the clear difference between the female seed and the menstrual blood, but they still admitted the existence of the female seed.⁵²⁷ Thirdly, Aristotle denied that the embryo is a combination of two σπέρματα, equally from the father and the mother.⁵²⁸ In contrast, some Hippocratic authors believed that the embryo is a combination of both the semen from the father and the mother.⁵²⁹ Fourthly, Aristotle rejected the idea of the female σπέρμα (as the male one) because women do not feel pleasure in the place where the liquid is emitted.⁵³⁰ In contrast, some Hippocratic authors suggested that pleasure is essential for the secretion of semen in females.⁵³¹ Fifthly, Aristotle suggested that the female contribution is not γονήν, but something else.⁵³² Sixthly, Aristotle believed that the white secretion from women is not the female σπέρμα, but the residue that is not concocted, which ‘contributes nothing at all to the foetus’.⁵³³ Seventhly, teleology is another reason for Aristotle to reject the female σπέρμα (as the male one). If the womb emits the female σπέρμα outside of the body in order to combine with the male σπέρμα, then this fluid must draw it back. For Aristotle, this is a superfluous thing that nature would not do.⁵³⁴ In contrast, some Hippocratic authors suggested that sometimes the female seed is emitted outside of the body and is then drawn back into the womb.⁵³⁵ Lastly, Aristotle believed that women, children and eunuchs do not go bald because they have a similar nature, being incapable of producing seminal secretion (σπερματικῆς).⁵³⁶ Based on this evidence, we may conclude that Aristotle’s theory is very different from the Hippocratic theories, which state that the male’s and female’s contributions to reproduction are roughly equal.

On the other hand, ‘the secondary seed’ is still a kind of seed which contains the essential

525 *Genit.* 8.2, Li VII 480; *Aer.* 14, Li II 60; *Morb. Sacr.* 2, Li VI 365.

526 *GA* 727a26-31.

527 *Nat. Puer.* 20, Li VII 508. *Mul.* II. 129, Li VIII 276; 141, Li VIII 314; 154, Li VIII 328.

528 *GA* 727b7-9.

529 *Genit.* 6.1-2, Li VII 478; *Vict.* 1.8, Li VI 482; 1.29, Li VI 504.

530 *GA* 728a29-31.

531 *Genit.* 4.1, Li VII 474.

532 *GA* 729a21-24, a30-31.

533 *GA* 738a23-28, 739a21-22.

534 *GA* 739b16-20.

535 *Genit.* 4.1, Li VII 474.

536 *GA* 784a4-8.

contribution to generation. Hence, Aristotle's theory is also different from the 'one-seed theory' of other natural philosophers. First, Aristotle clearly indicates that both the male and the female are 'the chief principles of generation'.⁵³⁷ The σπέρμα is formed not only by the male, but also by the female.⁵³⁸ The female is also able to produce seminal matter (τὴν σπερματικήν).⁵³⁹ The difference between male and female in producing σπέρμα is that one emits it into itself, and one emits into another.⁵⁴⁰ Secondly, there is a great similarity between the female secretion and the male secretion. Aristotle identified the female secretion, explicitly the menstrual blood, as the female seed which is comparable with the male secretion, since both go through the same process of concoction from residues. Male and female seminal fluids are different in function, not in material origins.⁵⁴¹ Thirdly, Aristotle regarded menstrual discharge (καταμήνια) as a type of σπέρμα in an impure condition, which requires action.⁵⁴² Fourthly, the female σπέρμα is contained in the menstrual discharge. One important reason for καταμήνια being analogous to the male γονή is that it appears and disappears at the same time of life as the male seed, altogether with some second sexual characteristics, e.g. changes of voice, breasts, etc.⁵⁴³ Fifthly, Aristotle viewed the embryo (κύημα) as 'the mixture of male and female'. The mixture is not half and half in the male seed and 'the female seed' (τοῦ θήλεος σπέρματι) so that they are infused together into one embryo, but the male seed acts as an activator or catalyst to work on the seminal residue of the female by concentrating and fashioning, 'just as fig-juice acts upon the fluid portion of the milk.'⁵⁴⁴ The male seed in fact does not become part of the embryo physically in the sense that it does not contribute any material to it. Therefore, in saying that one body (σῶμα) only is formed from one seed (σπέρματος), Aristotle meant that the bodily parts of the embryo come from the female seminal fluid. Preformationism is actually one of main targets of Aristotle's criticism.⁵⁴⁵ Sixthly, it is indicated that some female animals can produce a liquid secretion similar to that of males. The female liquid secretion flows out in a small amount

537 *GA* 716a5-6, 14.

538. *GA* 716a8-10.

539. *GA* 750b4-5.

540. *HA* 498a9-13.

541. *GA* 725b3, 726b35-727a1, 727a30-31, 746b27-28, 766b8-14.

542. *GA* 728a27-28, 737a28-30, 774a1-3, *PA* 689a11-12.

543. *GA* 727a5-10, 728b22-25, 776b16-17, *HA* 582a16-18.

544 *GA* 728b33-36; 771b18-24.

545 *Ph.* 187a25-b7; *GA* 734a17-25; 763b33-35. This mistake has been pointed out by Tress (1992):320.

because it is difficult to produce.⁵⁴⁶ Lastly, it is also indicated that some female birds can produce what is known as wind-eggs without the male. In the case of wind-eggs, it is hard to find the male principle.⁵⁴⁷ If the female contributes nothing, then it is impossible to generate anything at all.

Therefore, Aristotle's notion of seed can hardly be labelled as 'one-seed theory' nor 'two-seed theory'. It is better to be regarded as something intermediate. The female is not simply providing nourishment for the embryo. The female makes an essential contribution of seed, providing the material cause. It is not the same as the male one, but it is another type of seed. It is 'the secondary seed'.

Now, we come to the question of female seed in early China. In the manuscripts of Mawangdui, the *jing* exists in both male and female. It is the essential part of life and the generative part of the body. The *jing* of the two sexes are different only in the sense that one is *yin* and the other is *yang*. It can be easily understood under the framework of ancient Chinese philosophy. In the pattern of *yin-yang* philosophy, male is always associated with *yang* and female is always associated with *yin*. The female seed is sometimes called *yin jing* 陰精, while the male seed is sometimes called *yang jing* 陽精. It is believed that everything generates through the combination of *yin* and *yang*. Thus, humans must be generated through the combination of female and male. In *Guanzi*, it is argued that man comes from water, while both the male and female are necessary in generation. 'Man is water. When the *jing* and *qi* of the male and the female combines with each other, water flows and forms the body.'⁵⁴⁸

The existence of the female essence provided a theoretical foundation for the practice of sexual cultivation, which is also called 'the art of the bedchamber' (*fangzhongshu* 房中術). It is believed that the essence (*jing*) could be produced and re-absorbed through sexual activities, through which the body would be filled with energy and diseases would be cured. The central technique of the art of the bedchamber is to absorb the essence (*jing*) for bodily nourishment. As it is recorded,

*In the evening the man's essence flourishes; in the morning the women's essence accumulates.
By nurturing the woman's essence with my essence, muscles and vessels both move; skin, vapor,*

546 HA V 541a23-2, HA VI 572a26-28, HA VI 572b27-29.

547 GA 730a5-33; 737a30; 741a15; 750b1ff; 75qb25; 757b1ff; 785b10.

548 *Guanzi* 14-39:815 (水地).

*and blood are all activated. Thus, you are able to open blockage and penetrate obstruction. The central cavity receives the transmission and is filled.*⁵⁴⁹

One technique of sexual cultivation is to absorb the essence (*jing*) from the sexual partner and vice versa. The female essence is believed to be able to strengthen the male essence, when the male absorbs it through the practice of semen retention. This is the technique of ‘plucking *yin* to replenish *yang*’ (*quyin buyang* 取陰補陽). It is also called ‘the way to meet *yin* and regulate *qi*’ (*jieryin zhiqi zhi dao* 接陰治氣之道).⁵⁵⁰ The existence of the female essence is the basis for the technique of sexual cultivation. By taking the female essence, it is said that all diseases can be cured and longevity can be achieved. It is assumed that the male genital has the ability to absorb the female essence into the male body.

Because the technique of sexual cultivation can be practised by women, there is a technique called ‘plucking *yang* to replenish *yin*’ (*caiyang buyin* 采陽補陰), in which case the male essence is absorbed to strengthen the female essence. Following this technique, the male essence will not be used for the generation of children because it will flow into vessels to nourish the female body. All diseases will be cured and the female will have a beautiful face and soft skin like a young girl. It is also called ‘the way of nourishing *yin*’ (*yangyin zhi dao* 養陰之道).⁵⁵¹ The female essence can be used to nourish the male body in the same way that the male essence can be used to nourish the female body. Thus, some later authors warned that the technique should be kept as a secret from women. It is said that some women learned this technique and achieved immortality by absorbing the male essence. In the folk stories of *Liexianzhuan* 列仙傳, Nü Wan 女丸 achieved immortality through this technique of absorbing the male essence:

女丸者，陳市上沽酒婦人也，作酒常美。遇仙人過其家飲酒，以素書五卷為質。丸開視其書，乃養性、交接之術。丸私寫其文要，更設房室，納諸年少，飲美酒，與止宿，行文書之法。如此三十年，顏色更如二十。時仙人數歲復來過，笑謂丸曰：「盜道無私，有翅不飛。」遂棄家追仙人去，莫知所之云。

Nü Wan is a woman selling wine in the place of Chen. She made wine quite well and met one immortal who came to drink there and mortgaged the five juan of Su Shu for wine. Nü Wan opened

549 MWD 4:156 (合陰陽). Translated by Harper, D. (1998): 420.

550 MWD 4:148–149 (十問).

551 Levy (1968): 27.

the book and found the techniques of nourishing life and sexual conduct. She wrote down the essential points secretly. Then she prepared a room and attracted young men to come with good wine and nice accommodation, following the methods of the book. After thirty years in such a way, she still looked like a young girl at the age of twenty. Then the immortal came again and smiled to Nü Wan, 'There is nothing selfish in the way of stealing, but it is a pity that you do not fly even if you have wings.' Hence she abandoned her home and followed the immortal. No one knew where she went.⁵⁵²

In another story, the Queen Mother of the West (Xiwangmu 西王母) achieved immortality in a similar way.⁵⁵³ This became a well-known theme in later novels. Monsters and ghosts change into beautiful women and attract men to have intercourse, so they can absorb the male essence from humans. When the *jing* is exhausted, these men die immediately. It is quite clear that all these techniques of sexual cultivation are based upon an assumption of the female seed.

In Chinese historical texts, the technique of sexual cultivation was named after a legendary figure, Rong Cheng 容成, and was called 'Rong Cheng's method of riding women' (*rongcheng yufurenshu* 容成禦婦人術).⁵⁵⁴ Rong Cheng 容成 was said to be a legendary king like Huangdi 黃帝. The first Chinese sexological work was also attributed to him, called *Rong Cheng Yin Dao* 容成陰道 (*The Way of Yin by Rong Cheng*) (26 volumes).⁵⁵⁵ In the folk stories of *Liexianzhuan* 列仙傳, Rong Cheng is regarded as the greatest master of sexology and the teacher of Lao Zi 老子 for the technique of absorbing the female essence:

容成公者，自稱黃帝師，見於周穆王，能善輔導之事。取精於玄牝，其要谷神不死，守生養氣者也。髮白更黑，齒落更生。事與老子同，亦云老子師也。

*As for the master Rong Cheng, he called himself the teacher of Huangdi. He once met the King of Zhou Mu and taught him the art of guiding qi. He absorbed jing from the mysterious female. His central doctrine is keeping the vitality of the spirit of grain and cultivating qi to protect life, through which the white hair can turn to black and the lost teeth can grow again. He did something similar to Lao Zi. He is also said to be the teacher of Lao Zi.*⁵⁵⁶

It is important to clarify that the ancient Chinese had a clear understanding of the difference between monthly matter (menstrual blood) and the female essence. The basic difference is that one

552 *Liexianzhuan* 2:156 (女丸). My Translation.

553 Levy (1968): 27.

554 *Houhanshu* 82-72: 2740-2750 (方術列傳).

555 *Hanshu* 30-10: 1778 (藝文志).

556 *Liexianzhuan* 1:14 (容成公). My translation.

is regularly generated in women and the other is only generated in sexual activities. In the manuscripts of Mawangdui, it is indicated that monthly matter has some medical value. ‘Women’s cloth of monthly matter’ (*nüzi yueshibu* 女子月事布) is mentioned several times in the treatment of some diseases.⁵⁵⁷ However, monthly matter has little value in sexual cultivation because it seems to be useless for nourishing the body. Monthly matter is not generated by sexual activities, so it has little relationship with the arts of the bedchamber. In contrast, in the arts of the bedchamber, all sorts of techniques were created to absorb the female essence, but none is created to absorb monthly matter. It is suggested that sexual activities should be avoided during the menstrual period. ‘If a woman is during the menstrual period, she should refuse to have sex activities.’⁵⁵⁸ Interestingly, the role of the female seed in generation is rarely mentioned in the manuscripts of Mawangdui. These texts mention the female seed as belonging to a particular genre of texts on sexology. The focus of these texts is less about generation and more about sexuality.

In *Huangdi Neijing*, there is a different theory which emphasizes the importance of monthly matter (*yueshi* 月事) for female reproduction. Monthly matter is the Chinese name for the menstrual blood. The equivalent counterpart of the male essence, in this model, is said to be monthly matter, rather than the female essence. As for the female, the generative power is indicated by the condition of monthly matter. A female begins to be able to produce a child when monthly matter first appears. When the passage of monthly matter is blocked in an old age, a woman can no longer to give birth to a child.⁵⁵⁹ As to the male, the generative power is closely related to the ability to produce *jing* and *qi*. A male begins to be able to produce a child when the *jing* and *qi* first flows out due to its superabundance at the age of sixteen. When *jing* and *qi* become less in old age, it would be difficult for a man to produce a child.⁵⁶⁰

4.3 Female’s Positive Role

Now, I will make my argument on the female’s indispensable and positive role in generation. I

557 MWD 4:43, 49, 53, 55, 61, 73, 74 (五十二病方); MWD 4:116 (養生方). The medical value of the male semen was also mentioned, see MWD 4:28 (五十二病方).

558 *Shiming* 4-15:164 (釋首飾).

559 *Suwen* 1:3 (上古天真論). See also Unschuld 2010(1):39.

560 *Suwen* 1, 5 (上古天真論) See also Unschuld, P. and Tessenow, H. (2011), vol. 1, 40.

want to emphasize that the female is not simply a passive container to provide the space for the embryo. It was a common understanding in ancient Greece and early China that gestation is a mutual, interactive and dynamic process. It is for this reason that women should be careful about all food and drink they consumed during pregnancy. In *Huangdi Neijing*, the health of the foetus is also greatly affected by the situation of the mother. The mother should take care of her behaviours, regimens and even emotions. According to *Huangdi Neijing*, emotional changes could result in serious illness of the foetus if the mother was not careful in this respect.

*[Huang] Di: 'A person from birth on suffers from peak illness. What is the name of this disease? How did he acquire it?' Qi Bo: 'The disease is named foetal disease. It is acquired in the mother's abdomen. When the mother was extremely frightened, the qi rises and does not move down. It takes residence together with the essence qi. Hence, this lets the child develop peak illness.'*⁵⁶¹

In return, the female body is greatly affected by the foetus during the long period of gestation. A woman may have difficulty in speaking at the ninth month of pregnancy. There is no need for medical treatment because her voice can be recovered automatically in the tenth month:

*Huang Di asked: 'Someone has a doubled body. In the ninth month [that person] turns mute. Why is that?' Qi Bo responded: 'The network vessel of the uterus² has been interrupted.'*³ *[Huang] Di: 'Why do you say so?' Qi Bo: 'The network [vessel] of the uterus is tied to the kidneys. The minor yin vessel penetrates the kidneys and is tied to the base of the tongue. Hence, [that person] cannot speak.'* *[Huang] Di: 'To treat this, how to proceed?' Qi Bo: 'Do not treat. Recovery will set in in the tenth month.'*⁵⁶²

On the Greek side, none of the Hippocratic authors tried to deny the importance of women in reproduction. In Hippocratic writings, gestation is certainly a mutual, interactive and dynamic process. The health of the embryo depends largely upon the health of the mother. The nourishment of the embryo relies totally on the supply of the mother. The size of the foetus is even determined by the size of the womb.⁵⁶³ In return, the embryo also changes the female body and contributes to female health.⁵⁶⁴ Since the extra blood can be used up by the embryo, the female body will be greatly relieved from troubles of menstrual blood. The best therapy, recommended by *Diseases of*

561 *Suwen* 47 (奇病論). Translated by Unschuld, P. and Tessenow, H. (2011): vol. 1, 701–702.

562 *Suwen* 47 (奇病論). Translated by Unschuld, P. and Tessenow, H. (2011): vol. 1, 689–690.

563 *Steril.* 238, *Li VIII* 452; *Superf.* 27, *Li VIII* 490; *Genit.* 9, *L VII* 482.

564 Rousselle (1980): 1095; Hanson (1975): 570–572.

Young Girls, is to sleep with a man as soon as possible,⁵⁶⁵ because ‘if she becomes pregnant, she will be healthy’.⁵⁶⁶ If she can conceive a male foetus, it is best for her health. In this sense, the relationship between the mother and the embryo can be mutually beneficial, and it is hard to say who must be active and who must be passive. The mutual relationship between the mother and the embryo should be much emphasized. It could possibly explain the overlaps and interactions between embryology and gynaecology in antiquity.

There might be a problem of involuntary abortions (διαφθείρουσιν ἄκουσαι)⁵⁶⁷ during the gestation – it is likely to happen if the relationship between the mother and the foetus becomes inharmony – for example, if the foetus grows beyond the size of the womb.⁵⁶⁸ There is, as *Barren Women* describes, a basic tension in the point that ‘although the foetus increases, the womb never does’.⁵⁶⁹ In most cases, however, miscarriages are caused by improper actions of pregnant women, for example, improper drinking and eating.⁵⁷⁰ It is, therefore, women’s responsibility to take care of the foetus. In *Diseases of Women I*, it is said, ‘In this case women need not be surprised because they miscarry; for it requires a lot of watchfulness and knowledge in order to bring to term and nourish the child in the womb, and to bring it successfully to birth during the delivery’.⁵⁷¹ In *Airs, Waters, Places*, it is said that women in a city with hot or cold winds may frequently have miscarriages as a result of exposure to the winds.⁵⁷² Therefore, the mother must have a proper regimen and proper behaviours during pregnancy.

In Hippocratic embryology, sometimes women play a rather active role in reproduction by providing the female seed, ‘attracting’ the male seed, nourishing the foetus and so on. At the same time, there are a lot of rules for them to follow. They must control their regimens, avoid dangers, and stay in good health, since the success or failure of conception, gestation, and birth are largely determined by the condition of the mother. In many ways, therefore, Hippocratic authors attributed

565 *Virg.* Li VIII 466-470.

566 *Mul. I.* 37, Li VIII 92. See also *Mul. I.* 59, Li VIII 118; 63, Li VIII 130; *Mul. II.* 119, Li VIII 260; 121, Li VIII 264; 131, Li VIII 280; 135, Li VIII 308; 162, Li VIII 342.

567 *Mul. I.* 25, Li VIII 68.

568 *Superf.* 27, Li VIII 490; *Mul. I.* 68, Li VIII 142.

569 *Steril.* 238, Li VIII 452.

570 *Mul. I.* 25, Li VIII 66-68.

571 *Mul. I.* 25, Li VIII 68.

572 *Aer.* 3, Li II 16; 4, Li II 22.

to women a positive and significant role in reproduction, not a passive and insignificant role. This is not to say that Hippocratic authors were advocating what we today call ‘gender equality’ and ‘women’s rights’ when they insist that females contribute a lot to the process of generation.

Greek authors described knowledge of how nourishment could be transported to the embryo. The following knowledge is commonly shared in Hippocratic and Aristotle’s writings: (1) the blood is regarded as the nourishment to the embryo; (2) the womb collects blood from the whole body; (3) the embryo consumes much blood for its development, for which reason there is no menstrual blood during pregnancy; (4) the embryo is connected to the womb by the umbilicus; (5) the cotyledons play a role for the nourishment of the embryo; (6) the blood is gradually diverted to milk in the later stage of pregnancy. It is quite possible that Greek authors took such knowledge as common sense, but what might be regarded as common sense in one society should not be taken for granted in another.

In Hippocratic writings, the womb is essential for the cultivation of the embryo. The womb is frequently described as ‘a cupping jar’, which means an instrument of attraction.⁵⁷³ In *Ancient Medicine*, the womb is described as a collector of blood that draws extra blood from all over the body into itself.⁵⁷⁴ In *Diseases of Women I*, it is said, ‘For when the woman is pregnant blood comes down from the whole body into the womb little by little, and, because it is enveloped, the embryo grows’.⁵⁷⁵ The face of a pregnant woman usually becomes completely pale, because ‘the pureness of her blood trickles down every day from her body and goes down into the foetus, and the foetus grows in her’.⁵⁷⁶ All the extra blood will be drawn into the womb to nourish the foetus: ‘When a woman conceives, no more menses flow, except for a small quantity in some’.⁵⁷⁷ It is important to note that the blood being drawn into the womb is ‘the final form of food’ for the growth of the foetus.⁵⁷⁸ This blood will be used up and never return to the mother. In *Nature of the Child*, it is emphasized from time to time that since all the embryo’s nutrition comes from the mother, the constitution of the child must depend on that of the mother, ‘just like things growing in Earth are

573 Hanson (1991): 89; Dean-Jones (1991): 120.

574 *VM*. 22, Li I 628.

575 *Mul. I*.25, Li VIII 64.

576 *Mul. I*.34, Li VIII 78.

577 *Mul. I*.73, Li VIII 154.

578 Dean-Jones (1994): 202.

also nourished from Earth'.⁵⁷⁹ The embryo is nourished 'by its mother's blood which comes from all parts of the body',⁵⁸⁰ so the blood must be constantly drawn into the womb on a daily basis. However, it is not the womb, but the embryo that draws the blood into itself through its porous membrane and the umbilicus.⁵⁸¹ Some other people think that the foetus draws nourishment from the mother by sucking certain nipples or 'cotyledons' (κοτυληδόνας) inside the womb with the mouth.⁵⁸² In *Fleshes*, it is said that 'the foetus in the belly continually sucks with its lips from the uterus of the mother and draws nourishment and breath to its heart inside'.⁵⁸³ It is argued that if the foetus did not suck in the womb, at the time of birth there would be no faeces in the intestines, and the baby would not know how to suck from the breast immediately.⁵⁸⁴

In Aristotle's works, blood is the ultimate form of nourishment for all animals. Some animals do not have blood, but they have the equivalent of blood.⁵⁸⁵ The development of the embryo also depends on blood for its nourishment. Blood vessels connect the uterus to the mother, and the umbilicus connects the child to the uterus.⁵⁸⁶ The embryo completely depends upon the mother for its nourishment. 'The foetus's growth is supplied through the umbilicus in the same way that a plant's growth is supplied through its roots'.⁵⁸⁷ Therefore, Aristotle held the view that the formation and growth of the embryo are directly influenced by the condition of the mother, 'just like growing plants are influenced by Earth'.⁵⁸⁸ The vessel system is compared with an irrigation system. Just as in a garden, the blood vessels of the mother provide irrigation for the nourishment of the embryo.⁵⁸⁹ It is believed that there are cotyledons inside the uterus. Cotyledons are formed as the terminal points of the blood vessels associated with the uterus. They are connected to the umbilicus and play an important role in the nourishment of the child. As the embryo grows, the cotyledons gradually become smaller and finally disappear. However, Aristotle rejected the idea that the child is nourished

579 *Nat. Puer.* 22.1–26.5, Li VII 514–528. See also Lonie 1981:189; Lloyd 1966:345–360.

580 *Nat. Puer.* 14.1, Li VII 492.

581 *Nat. Puer.* 15.1, Li VII 494.

582 *Aph.* 5.45, Li IV 548; *Mul. I.* 27, Li VIII 70; 58, Li VIII 116; *Nat. Mul.* 17, Li VII 336; 78, Li VII 406.

583 *Carn.* 6, Li VIII 592.

584 *Carn.* 6, Li VIII 594.

585 *PA* II 652a7.

586 *GA* 740a33–35, 753b26–30. See also *GA* 736b8–13.

587 *GA* 740b9–11.

588 *Pol.* 1335 b18–19.

589 *GA* 746a16–18. For the analogy of the irrigation system, see also *PA* 668a13ff, Plato, *Ti.* 77cff.

in the uterus by sucking the cotyledons.⁵⁹⁰ Furthermore, Aristotle believed that milk is formed from blood. There are no menses after conception and no residual secretion after the embryo makes its way out. The whole nourishment is diverted to the breasts and becomes milk.⁵⁹¹

From comparison, we can find that there was a common awareness of the importance of proper regimens for pregnant women. It is not only because the supply of nourishment comes from the mother, but also because the health of the mother will largely influence the health of the foetus. Hence, regimens for pregnant women was a significant subject for both Greek and Chinese physicians, even though they had different suggestions.

4.4 Female as A Failure of Nature?

Many scholars believed that Aristotle viewed generation as a teleologically directed process towards the production of a male child rather than a female one.⁵⁹² However, I want to argue a different view, which will be in support of Devin Henry's proposal that the female, as a type of sex, should never be regarded as a failure of Nature.⁵⁹³ I want to argue that, in Aristotle's embryology, sex determination is mostly incidental, or in other words, out of chance. The result of a boy or a girl is random and unpredictable.

First of all, there must be a purpose for the existence of the male and the female as two types of sexes. In the *GA* I, there is a general principle that 'Everything Nature does is done either on account of what is necessary (διὰ τὸ ἀναγκαῖον) or else on account of what is better (διὰ τὸ βέλτιον).'⁵⁹⁴ Now, there is a basic fact that the existence of male and female in all living creatures is not universal.⁵⁹⁵ The male and the female are not separated in many living creatures: for example, some insects, Testacea, etc.⁵⁹⁶ In some plants as well, the male is mixed within the female without

590 *HA* IX 586a31-35, b11-13, b23-24; *GA* 745b33-35; *GA* 746a19-20. Aetius (Aet.5.16) ascribes a similar theory of sucking the cotyledons to Democritus and Epicurus (DK 68 A 144); Censorinus (De die Natali 6.3) to Diogenese and Hippocrates (DK 38 A 17). Cf. Hippocrates, *On Flesh*, Li VIII 592. The view that the embryo sucked the cotyledons was held by Diocles of Carystus (fr.27, 10ff.).

591 *GA* 776b28-35, 777a4-8. *HA* IX 583a32-34.

592 Morsink (1982): 136; Balme (1987): 253; Furth, M. (1988):128; Tuana (1988):40; Sober (1992):361-2; Deslauriers (1998); Nielsen (2008): 374. For the most recent research on this topic, see Lefebvre (2018).

593 Henry (2007).

594 *GA* 717a15-16.

595 *GA* 715a20-22.

596 *GA* 728b33-34.

separation of the sexes.⁵⁹⁷ If the separation of sexes is on account of what is necessary for generation, then all animals would have the male and the female. Then it is proved that the separation of sexes is not on account of what is necessary for generation. Therefore, only one reason remains for the existence of sexes – on account of what is better. It is for a better purpose that Nature makes the differentiation of the male and the female as two types of sexes.

At the universal level, the existence of sexual parts is also on account of what is better. The existence of testes in all male creatures is not universal. The testes do not exist in some blooded animals, in all fishes and in all serpents.⁵⁹⁸ This shows that the existence of testes is not on account of what is necessary for generation. Hence, Aristotle concludes that ‘testes exist for some purpose – on account of what is better that they should exist.’⁵⁹⁹ Nature’s creation of the female system is also in order to serve a better purpose (ἔνεκα δὲ τοῦ βελτίονος).⁶⁰⁰ If the female could generate and bring offspring into completion alone, then the existence of the male would be superfluous or pointless. As Nature does nothing which lacks purpose, it is plain that she will not make the female system so perfect that she cannot attribute some functions to the male.⁶⁰¹ In such a sense, the imperfect situation of the female system is also on account of what is better. As David Lefebvre wrote, ‘It implies a teleological claim about nature: if nature has produced zoological groups with two separate sexes (which is the case for almost all the animals), it is impossible that the nature has made one of the two (the male for instance) in vain.’⁶⁰² Hence, the ‘degree of perfection’ model raised by Nielsen should not be used to prove the lack of purpose in the female.⁶⁰³ The female should not be regarded as a failure of Nature because of its imperfection.

In Aristotle, it is emphasized that ‘there must be a purpose in what is and in what happens in nature’.⁶⁰⁴ Hence, there must be a purpose in sexual generation. Sexual generation takes place in most blooded animals, including human beings. In these blooded animals, the female, as a type of

597 *GA* 762b9-13.

598 *GA* 716b15-23; 717a18-19; 718a 18-20. In Aristotle’s opinion, the male Serpents do not even have a penis.

599 *GA* 717a21-23.

600 *GA* 738b1-4.

601 *GA* 741b3-8.

602 Lefebvre, D. (2018), 77.

603 Nielsen, K.M. (2008), 375. Based on the ‘degree of perfection’ model, Nielsen argued that ‘Nature aims at what is best, and the best product is a male’, see Nielsen, K. M. (2008), 377.

604 *Ph.* 199a8-9.

sexes, is nevertheless set down as one of the chief principles (τὴν ἀρχὴν) in the sexual generation.⁶⁰⁵ Animals, like separated plants, should be united to generate.⁶⁰⁶ In the beginning of the *GA* II, Aristotle gave a teleological explanation of the separation. He explained why the separation of sexes is on account of what is better. It is on account of the final cause, which is for the continuity of the species since individual humans cannot achieve immortality.

*As for the reason why, one comes to be formed, and is, male, and another female, (a) in so far as this result from necessity, i.e. from the proximate motive cause and from what sort of matter, our argument as it proceeds must endeavor to explain; (b) in so far as this occurs on account of what is better, i.e., on account of the final cause (the Cause 'for the sake of which') , the principle is derived from the upper cosmos. What I mean is this. Of the things which are, some are eternal and divine, others admit alike of being and not-being, and the beautiful and the divine acts always, in virtue of its own nature, as a cause which produces that which is better in the things which admit of it; while that which is not eternal admits of being <and not-being>, and of acquiring a share both in the better and in the worse; also, Soul is better than body, and a thing which has Soul in it is better than one which has not, in virtue of that Soul; and being is better than not-being, and living than not-living. These are the causes on account of which generation of animals takes place, because since the nature of this sort is unable to be eternal, that which comes into being is eternal in the manner that is open to it. Now, it is impossible for it to be so numerically, since the being of things is to be found in the particular, and if it really were so, then it would be eternal; it is, however, open to it to be so specifically. That is why there is always a class of men, of animals, of plants; and since the principle of these is the male and the female, it will surely be for the sake of generation that the male and the female are present in the individuals which are male and female. And as the proximate motive cause, to which belong the logos and the Form, it is better and more divine in its nature than the Matter, it is also better that the superior one should be separate from the inferior one. That is why wherever possible and so far as possible the male is separate from the female, since it is something better and more divine in that it is the principle of movement for generated things, while the female serves as the matter. The male, however, comes together with the female and mingles with it for the business of generation, because this is something that concerns both of them.*⁶⁰⁷

It is clear evidence that the female, as a type of sex, comes to exist for a certain purpose. It is emphasized that the separation of sexes is on the account of what is better, i.e., on the account of the final cause – for the continuity of the species. That is also the final cause of human marriages. ‘The first coupling together of persons then to which necessity gives rise is that between those who are unable to exist without one another, namely the union of female and male for the continuance of the species.’⁶⁰⁸ Human individuals are unable to be eternal, but human can achieve a certain

605 *GA* 716a4-6, a13-14, 731b18-19.

606 *GA* 731a9-14, 21-24.

607 *GA* 731b20-732a13.

608 *Pol.* 1252a26-28.

eternality through marriages and reproduction on the large scale of the species.

Therefore, the general goal of Nature is to produce a normal human, no matter a male or a female, in order to keep the continuity of species. It is true that the natural process is always directed by a principle towards a determined goal (εἰς τι τέλος) if nothing prevents the process,⁶⁰⁹ but in human generation the ultimate goal is to keep the continuity of species. If nothing prevents the birth of normal humans, Nature will be always successful in achieving its goal. Then the existence of the female is on account of what is better. At the universal level, there is a telos for the separation of the two sexes, which is to keep the continuity of species.

The *GA* IV starts to discuss the differentiation of sexes and the mechanisms of inheritance at the individual level. It is concerned with how some special parts come to be formed and make a distinction between male and female in the development of an embryo. We shall bear in mind that the content is very different from the discussion of sexual differentiation in the *GA* I & II at the universal level. The female sex is represented in the female individuals, but it is very different in the sense of a type of sex and in the sense of an individual. The existence of the female sex is on account of what is better, but the acquirement of female character in an individual can be regarded as something on account of what is ‘coincidental’ (κατὰ συμβεβηκός).

At the individual level, sexual differentiation is mainly about the process by which an individual comes to assume something particular to characterize the male and the female. For Aristotle, the differentiation of the male and the female can be (1) in respect of a particular part (κατὰ τι μέρος), what is called the uterus in the female and the regions about the testes and the penis in the male,⁶¹⁰ and (2) in respect of a particular ‘dynamis’ (κατά τινα δύναμιν), what is distinguished by a certain ability (δυνάμειως) or inability (ἀδυναμίας) concerning the concoction of the ultimate nourishment.⁶¹¹ In respect of the particular sexual part, however, it is taken by Aristotle as a coincidental phenomenon (συμβαίνει). That is to say, neither the uterus or the testes should be taken as the principle or the cause of sexual differentiation in the development of an embryo because these particular parts are accidental, not essential, characteristics. Moreover, the generative parent

609 *Ph.* 199a.8-17; 199b16-18, 199b25-26.

610 *GA* 716a29-34.

611 *GA* 765b9-12, 766a31-32.

is not merely male, but in addition a male with certain characteristics.⁶¹² In such a sense, the acquirement of sexual characteristics can be regarded as coincidental.

*The motive principle must of necessity be prior always and be the cause of the process of formation in virtue of possessing a particular character. So then, this difference of the sexual parts as between males and females is a coincidental phenomenon (συμβαίνει): we must not look upon it as being a principle or a cause.*⁶¹³

According to Aristotle's natural philosophy, coincidental must belong to no essential attributes. 'Such a thing which occurs by coincidental is said to be out of chance. One comes to be by its own essence, while the other comes to be by coincidental.'⁶¹⁴ For such a reason, the material will not be a reason for the essential existence of something.⁶¹⁵ A coincidental cause, e.g. white and black, cannot produce any difference in species.⁶¹⁶ A coincidental cause can neither produce any difference in genus (γένος), for genus is 'not coincidentally differentiated'.⁶¹⁷ 'Coincidence' (κατὰ συμβεβηκός) is either 'out of *tyche*' (ἀπὸ τύχης) or 'out of *automaton*' (ἀπὸ αὐτομάτου).⁶¹⁸ '*Maton*' means 'for nothing' and 'for no purpose', and 'auto-maton' means 'in itself for nothing'.⁶¹⁹ 'There is always a purpose in coming-to-be. It is coincidental if something comes to be not in a purpose, but out of some external reasons. Then we call it *automaton* (αὐτομάτου).'⁶²⁰ A desirable result by Nature might be produced by *automaton* and *tyche*, even if they emerged coincidentally.⁶²¹

In the development of an embryo, sometimes sex determination is truly the result of external reasons. In *GA* IV, Aristotle writes lengthy paragraphs to describe the external influences in the differentiation of sexes, such as the ages, the winds, the water, and so on. Young parents or older parents are more likely to produce a female child.⁶²² Animals are more likely to produce males if they are facing the north winds in copulation, while they are more likely to produce females if they are facing the south winds in copulation.⁶²³ Hard and cold water are more likely to produce

612 *GA* 767b24-26.

613 *GA* 764b36-38.

614 *Ph.* 196b23-26.

615 *Ph.* 200a28-32.

616 *Metaph.* 1058 b3-6, b13.

617 *Metaph.* 1058a1-2.

618 *Ph.* 195b30-33; 196a13; b1; 197a33-36; 199a1-2; *Metaph.* 1070a6-7.

619 *Ph.* 197b24-30.

620 *Ph.* 197b19-23.

621 *Ph.* 198a6-8, 199b18-20.

622 *GA* 766b29-34, 767b10-13; *Pol.* 1335a12-15.

623 *GA* 766b35-767a2, 767a9-13; *HA* VI 574a 1-3.

females.⁶²⁴ Moreover, the generation of males and females can even be influenced by the periods of the moon and the movement of the sun and other heavenly bodies.⁶²⁵ In addition, healthy fertile parents are more likely to produce a male child, while unhealthy infertile parents, after treatment, are more likely to produce a female child.⁶²⁶ It shows that the result of a particular sex in an individual has no purpose because it can be easily influenced and changed for some external reasons. Hence, sex can be regarded as the outcome of something coincidental.

Castrated animals can be another strong proof that the characteristics of a particular sex might be changed because of some external reasons. The change involves the power to generate offspring, but mostly sexual characteristics.⁶²⁷ If the testes are removed from a male animal, almost all the characteristics associated with male sex will undergo an accompanying change into another condition, not just the voice, but also the rest of the form.⁶²⁸ Even if it is just a change in a small part, the animal appears to have a major difference in characteristics.⁶²⁹ It shows that sexual characteristics are not essential; otherwise, they should not be so easily changed for some external reasons. An individual is a male or a female not essentially in virtue of male characteristics or female characteristics. This is the reason why Aristotle regards sexual characteristics, including the sexual parts, as a coincidental phenomenon at the individual level.

If it is not in virtue of the sexual parts that it is male or female, then what is the principle and the cause of male and female sex? Aristotle explained that the male and the female are essentially different in respect of a certain ‘dynamis’ (κατά τινα δύναμιν), and this special ‘dynamis’ is situated in the heart of an individual. For Aristotle, the heart is regarded as the first principle (ἡ ἀρχή), from which the rest of the bodily parts are derived. It is the reason why other sexual characteristics, e.g. the uterus and the testes, are not regarded as the essential parts to define the male and the female. On the formation of the heart, the child becomes an independent human, ‘just like a son who has set

624 *GA* 767a34-35.

625 *GA* 777b16-31.

626 *HA* IX 582a30-32, 585b9-13.

627 Aristotle explains that the castrated animals are unable to generate offspring because the passages are drawn up within. However, a bull immediately after castration has been known to mount a cow and effect impregnation, because the passages had not yet been drawn up, see *GA* 717b1-5, cf. *HA* 510b3.

628 *GA* 787b20-21; 788a3-11.

629 *GA* 716b 4-13; 766a24-28; *HA* VII 589b31-590a5.

up a house of his own independent of his father'.⁶³⁰

In many occasions, Aristotle emphasized that the heart, as a first principle, is the first to become distinct in embryonic development.⁶³¹ The heart is that from whence movement is derived, while the sexual parts only serve as an instrument (τὸ ὀργανικόν). Hence, the heart is formed 'prior' (τὸ πρότερον) to sexual parts, just as players must exist prior to pipes.⁶³² It is also the heart that truly makes an essential distinction between the male and the female in respect of its special 'dynamis' in concoction. As Devin Henry wrote, 'the differentiation of animals into male and female is ultimately traced to a difference in their hearts and the principle of natural heat contained therein.'⁶³³ In the development of an embryo, it is finally determined to be a male or a female at the moment when the heart (καρδίαν), or the counterpart of the heart, is formed.

*From this it follows of necessity that, in the blooded animals, a heart must take shape and that the creature formed is to be either male or female sexes, and in other kinds which have male and female sexes, the counterpart of the heart. As far, then, as the principle and the cause of male and female concerned, this is what it is and where it is situated; a creature, however, really is male or female only from the time when it has got the parts by which female differs from male.*⁶³⁴

According to Aristotle's explanation, the male and the female are essentially distinguished in respect of a particular 'dynamis' (κατά τινα δύναμιν): the male is male on account of its ability (δυνάτου) to concoct the σπέρμα out of the final state of the nourishment, while the female is female on account of its inability (ἀδυνάτου) to do so owing to the deficiency of heat.⁶³⁵ It is in such a sense that the male and the female are defined as the opposite (ἀντίκειται): 'Male and female stand in the opposite in ability and inability'.⁶³⁶ Just as the female is the opposite of the male at the universal level, it is the same that an individual female is the opposite of an individual male.⁶³⁷ As David Lefebvre wrote, 'In any case, the fact that there is an opposition between the capacity of the male and the incapacity of the female explains why Aristotle can say that sexual generation is a

630 GA 739a2-9.

631 GA 740b2-4, 741b15-16, 742b35-38, PA 666a18-21.

632 GA 742a18-28, b1-7.

633 Henry, D. (2007), 255.

634 GA 766b1-8.

635 GA 765b9-10; 765b36-37; 766a31-32; 728a18-22.

636 GA 766a1-3.

637 GA 768a8-10.

generation from the contraries.’⁶³⁸

The concept of ‘opposite’ (ἀντίκειται) is the key to understand why differentiation of sexes is partly on account of what is ‘necessity’ (ἀνάγκη). In the process of sexual differentiation, there is a ‘necessity’ that, if an embryo is not to be a male, it must ‘change over into the opposite’ (εἰς τοῦναντίον μεταβάλλει) to be a female.

It must be laid down that, assuming the extinction of a thing means its passing into its opposite condition, then also that which does not get mastered by the agent which is fashioning it must of necessity change over into its opposite condition. With these as our premises it may perhaps be clearer why and by what cause one offspring becomes male and another female. It is this. When the principle is failing to gain the mastery and is unable to effect concoction owing to deficiency of heat, and does not succeed in reducing the material into its own proper form, but instead is worsted in the attempt, then of necessity the material must change over into its opposite condition. Now the opposite of the male is the female and it is opposite in respect of that whereby one is male and the other female. And since it differs in the ability it possesses, so also it differs in the instrument which it possesses. Hence this is the condition into which the material changes over.’⁶³⁹

This cited passage is an important source where Aristotle clarified his theory of sexual differentiation at the individual level.⁶⁴⁰ If an offspring cannot be a male, it must be a female. It depends on which might dominate, the male principle or the female material.

It is emphasized that there is no intermediate between the male and the female. ‘If the male principle can get the mastery, it brings a male like itself; if it is mastered by the female material, it either changes over into its opposite condition (εἰς τοῦναντίον μεταβάλλει) or else into extinction. And the contrary (ἐναντίον) of the male is the female.’⁶⁴¹ There is intermediate in its nature between white and black,⁶⁴² but there is no intermediate in its nature between the male and the female. The reason is that the female is the contrary (ἐναντίον) of the male, while the contrary cannot ‘apply at the same time to the same thing’.⁶⁴³ ‘Contraries such that the subjects in which they are naturally found or of which they can be predicated must needs contain the one or the other – these never can have intermediates.’⁶⁴⁴ If the one contrary is destroyed, the other contrary must come into being

638 Lefebvre, D. (2018), 84.

639 GA 766a13-24.

640 GA IV.3, Connell (2016), 292–324.

641 GA 766b15-17. In Hippocratic theories, there could be other intermediate types of sexes, such as Hermaphrodites, ‘mannish’ women, and so on, see *Vict.* 1.29, *Li* VI 504. These were regarded as monstrosities by Aristotle (GA 770b33-36).

642 GA 770b22-24.

643 *Metaph.* 1018a26-31.

644 *Cat.* 11b37-12a2.

from it.⁶⁴⁵ Therefore, an individual must come to be either a male or a female, for there is nothing intermediate between the two contraries.

The concept of ‘opposite’ (ἀντίκειται) is also the key to understand Aristotle’s theory of family resemblance. At the individual level, the process of passing inheritance also depends on which might get mastery, the male principle or the female material. If the male principle gets mastery, the part will resemble the father; if the female material gets mastery, the part will resemble the mother.⁶⁴⁶ If the part does not resemble the father, it must ‘change over into its opposite’, which is called the ‘departure from type’.⁶⁴⁷ Again, the opposite comes from the opposite. ‘Hence for the most part males take after their father – and females after their mother, since a departure from type takes place in both directions simultaneously, and the opposite of male is female and the opposite of father is mother, departure from type always being into opposites.’⁶⁴⁸ In the process of passing inheritance, there might be some further ‘relapses’ (λύομενον), which pass into the movement next to it in order (εἰς τὴν ἐχομένην κίνησιν). As a result, it is possible that a certain part does not resemble neither the father nor the mother, but just retains some common features of the human race.⁶⁴⁹ Moreover, these movements belong to various parts of the body. That is to say, it is possible that some parts resemble the father, some parts resemble the mother, and some other parts resemble the ancestors.⁶⁵⁰ Hence, family resemblance is not exactly the same process as the differentiation of sexes.

Even if the male and the female are ‘opposite’ (ἀντίκειται), they are not ‘opposite’ in the form. Nevertheless, the male and the female possess the same Soul.⁶⁵¹ Given that the male and the female are not different in form,⁶⁵² they should not be different in the final goal (τέλος) and the final cause

645 *GA* 724b2-4.

646 *GA* 767b21-24.

647 *GA* 768a15-16.

648 *GA* 768a24-28.

649 *GA* 768b8-13.

650 *GA* 768b2-8.

651 *GA* 741a7-8.

652 It is in the sense that the male and the female have the same general form of species. There is a debate on whether there are individual forms in Aristotle’s theory of generation. Some think that Aristotle allows individual forms so that the resemblance of children to the parents can be best explained, e.g. Balme, D. M. (1980); Frede, M. (1985), 17-26; Witt, C. (1985), Irwin, T.H. (1988), Whiting, J. (1990), Katayama, E.G. (1999), Nielsen, K.M. (2008). Some argue that in generation there is no transmission of parental individual forms, but merely the form of the species, e.g. Furth, M. (1990); Henry, D. (2006); Gelber, J. (2010), 210. If there are individual forms, then the male and the female would be different in the form. I stand on the side that there is only one general form of species; otherwise, there would be infinite forms in number. Indeed, the material has a certain form in itself, but this type of ‘form’ is very different from what we are discussing here.

(τὸ ἕνεκα). Since the form constitutes the final goal and the final cause, all else is for the sake of that purpose.⁶⁵³ Among the four causes of generation, the female and males are only different in the material cause (τὴν ὕλην), because the final cause and the moving cause (τὸ κινῆσαν) are usually identical with the formal cause (τὸ εἶδος).⁶⁵⁴ Moreover, the moving cause must bear some resemblance in ‘form’ to effect. For this reason, ‘human must be generated by human’.⁶⁵⁵

Therefore, the male and the female must be ‘opposite’ (ἀντίκειται) on account of the material cause. Contrarities in the principle produce difference in species, but contrarities in the material do not.⁶⁵⁶ Since material does not produce any essential difference, males and females are essentially the same. They are not neither ‘other in genus’ (ἕτερον τοῦ γένους) nor ‘other in species’ (ἕτερον τῷ εἶδει).⁶⁵⁷ They are ‘the same in species’ (τὰντὰ δὲ τῷ εἶδει) because men and women are both human beings, just as stallion and mare are both horses.⁶⁵⁸ ‘Males and females are indeed modifications peculiar to animal, however, not in virtue of its essence, but in virtue of its material and body. It is out of the same embryo (σπέρμα) that happens to a female or happens to be a male.’⁶⁵⁹ At the individual level, I would like to agree with Henry’s interpretation that ‘what sex an embryo happens to become is determined entirely by non-teleological forces operating through material necessity.’⁶⁶⁰ There is still a sort of ‘necessity’ (ἀνάγκη) that guides the process, for necessity is something ‘inherent in the material’.⁶⁶¹ For this reason, if an embryo is not to be a male, it must come to be a female. Therefore, ‘changing over into the opposite’ can be regarded as a result of the non-teleological material forces on account of what is ‘necessity’.

It is reasonable to argue that a female individual is neither ‘contrary to Nature’ nor ‘a failure of Nature’. It is worthy of noticing that a female individual is a ‘departure from type’ (ἔκστασις),

653 *Ph.* 198b3-4, 199a31-32.

654 *Ph.* 198a25-28.

655 *Ph.* 194b13-14, *Metaph.* 1032a26, 1070a8-9.

656 *Metaph.* 1058a37-b4.

657 *Metaph.* 1058a31-32.

658 *GA.* 730b33-35.

659 *Metaph.* 1058a21-24.

660 Henry, D. (2007), 251, 262.

661 *Ph.* 200a31-32. It is called by Leunissen as ‘a secondary teleology’. ‘Aristotle picks out two types of teleology that go together with two types of necessity: primary teleology with conditional necessity, and secondary teleology with material necessity. ... Sometimes nature simply ‘uses’ materials already available due to material necessity for the production of beneficial features, or even ‘lets’ material necessitated processes take their own course in the formation of such structures’, see Leunissen, M. (2010), 140.

which, as it is explained, is caused by the material necessity to change over into the opposite.⁶⁶² However, a female individual is not a ‘monstrosity’ because there is no damage of the principle. A female individual also takes the same form of the human species. Moreover, a female individual can also share resemblance to the parents, so a female individual is neither a ‘monstrosity’ according to its broader definition. At the universal level, the female sex is indispensable for the continuity of the species. ‘A female indeed is a necessity required by Nature, since the race of the creatures which are separated into male and female has got to be kept in being.’⁶⁶³ Regardless of its imperfection, the female nevertheless ‘occurs in the ordinary course of Nature’.⁶⁶⁴ If all new-born children are males, it would be a truly failure of Nature because there will be a danger for the continuity of the species. Hence, Nature does not teleologically aim to produce males. Nature is only teleologically directed to produce a normal human, no matter whether it is a male or a female. There is only one general goal in human reproduction, which is to have offspring so that the existence of the species will not be put into a danger at the universal level.

Now, we come to the Chinese side and we find that there was no debate on the question if a female child was a failure of Nature in early Chinese embryological texts. It is because such a debate comes along with Aristotle’s teleological philosophy. There will be no such a debate in a non-teleological world. Aristotle’s concept of ‘*telos*’ can hardly find any counterpart in early China. Since there was no teleological philosophy, it is not a surprise at all for the absence of related debates. We can see how ancient embryological thought were deeply influenced by contemporary philosophy. In a sense, Aristotle’s embryological theories could be regarded as products of his philosophical doctrines. In return, his embryological theories could be used to test and support his philosophy.

In summary, I have taken several discussions in this chapter concerning the different roles of male and female in generation. Firstly, I have emphasized the complementary relationship of male and female in generation, even though there is no reason to deny the existence of the hierarchical

662 In Nielsen’s argument, she takes the female individual as a ‘monstrosity’ because of ‘the departure from type’. Hence, she reaches the conclusion that the female individual is ‘a failure of Nature’ and ‘a contrary to Nature’, see Nielsen, K. M. (2008), 376, 377, 384. However, if process of generation is teleologically ordered towards the production of a male offspring in the father’s likeness in every respect, then such a goal could only be achieved through the cloning technology. Any child produced by Nature would be inevitably a deviation from that of the parents. Then, Nature would become a constant loser who can rarely generate a perfect product.

663 *GA* 767b8-10.

664 *GA* 775a15-17.

relationship. Secondly, the existence of the female seed has been widely recognized, even though different authors had different understandings of what is the female seed. I have argued that the female also contributes a seed in Aristotle. The female contribution (I call it ‘the secondary seed’) is still a sort of essential contribution, but it is different from the male contribution (I call it ‘the primary seed’). Thirdly, I have argued for the indispensable and positive role of the female in generation. There was a common awareness of the mutual interactions between the mother and the child in the Greek and Chinese cultures. The mother’s status will largely determine the situation of the embryo, while the embryo will bring some affections to the health of the mother in return. Fourthly, I have argued that a female child should not be regarded as a failure of Nature. In Aristotle’s theory, Nature has a general goal to produce a human, no matter the result is a male or a female. It is incidental whether any given embryo becomes a male or a female.

Chapter 5 Intellectual Contexts

It is widely accepted that no observation is theory-free. In both ancient Greece and early China, the observation of the embryo could be influenced by contemporary thought. For this reason, it is necessary to explore the intellectual frameworks from which the embryological writings were produced. A primary task of my thesis is to show how certain basic conceptual patterns are established at the outset in the two great traditions, and at the same time, to convey a greater appreciation of the diversity of Greek and Chinese embryological thought and speculation. In this chapter, I will reveal how the different conceptual frameworks lead to different explanations of similar phenomena. In such a way, I will take a few examples to explain how embryological thought came to be conceived in very different ways in ancient Greece and early China. I will also identify some ideas that are rather unique in one culture and have no counterparts in another culture.

In this chapter, I want to make three arguments. Firstly, I want to argue that the seminal fluid has special significance not only for generation but also for longevity (and even immortality) in early Chinese thought, which makes a great difference from the understanding of the seminal fluid in ancient Greek thought. Secondly, I want to argue that early Chinese embryological thought was extensively influenced by the contemporary Chinese concept of ‘resonance’ (*ying* 應 or *ganying* 感應), while there was no such kind of influence in ancient Greek embryological thought. Thirdly, I want to argue that early Chinese embryological thought might be influenced by the contemporary Chinese concept of ‘*wuxing* 五行’, as a result of which abnormal births were largely associated with natural disasters and political disorder.

5.1 Seed as the Essence

I want to argue that Chinese writings generally had a much greater emphasis on the importance of preserving *jing*. In Chinese thought, *jing* is not only important for generation, but also important for keeping health and achieving longevity. In many Chinese texts, *jing* is commonly regarded as the fundamental reason to explain why some people have a longer life and why some people have a shorter life, even though there are different ideas on how to preserve *jing* through sexual cultivation. In Greek thought, however, we can hardly find a direct relationship between the seed and longevity.

In the Chinese writings, there was much great emphasis on the importance of preserving *jing* 精 (the essence), partly because there was an understanding that *jing* cannot be so easily restored if it is reduced. If it is well preserved, however, it is possible to achieve a long life and even become an immortal. Hence, *jing* was closely associated with longevity and even immortality. Therefore, I want to argue that this association of essence and immortality is going to be important in making Chinese embryological thought different from Greek ones.

In *Huangdi Neijing*, there are two types of *jing*: *xiantian zhi jing* 先天之精 (the inborn essence) and *shuigu zhi jing* 水穀之精 (the acquired essence). The inborn essence is said to form at the beginning of life.⁶⁶⁵ Because the essence of life is inborn in a certain quantity, it needs to be preserved carefully. If the inborn essence is reduced, it is difficult to restore. If the inborn essence is exhausted, life may come to an end. In general, to preserve *jing* is to preserve life. In a sense, the whole process of life is losing the inborn essence until it is totally exhausted. In the Daoist tradition, the unborn child has the greatest virtue and the best energy for life. 'It knows not yet the union of Male and female, and yet its genitals may be excited, due to its abundance of the essence.'⁶⁶⁶ In the Daoist practice of inner alchemy, the purpose of self-cultivation is to return to the status of the embryo in which a man has the greatest potentiality.

The inborn essence is taken not only as something necessary for generation, but more importantly, as something essential for life. In principle, it is 'the essence of life' and 'the basis of the body'.⁶⁶⁷ It is seriously warned that the indulgence in sexual pleasures will waste the inborn essence and shorten life span. It is main reason why some people have a longer life and some people have a shorter life.

Now, he asked the Heavenly Teacher: 'I have heard that the people of high antiquity, in [the sequence of] spring an autumn, all exceeded one hundred years. But in their movements and activities there was no weakening. As for the people of today, after one half of a hundred years, the movements and activities of all of them weaken. Is this because the times are different? Or is it that the people have lost this [ability]?' Qi Bo responded: 'The people of high antiquity, those who knew the Way, they modeled [their behaviour] on yin and yang and they complied with the arts and calculations. [Their] eating and drinking was moderate. [Their] rising and resting had

665 *Lingshu* 10:73 (經脈). *Lingshu* 8:58–59 (本神).

666 *Laozi* 55:221.

667 *Suwen* 4:28 (金匱真言論).

regularity. They did not tax [themselves] with meaningless work. Hence, they were able to keep physical appearance and spirit together, and to exhaust the years [allotted by] heaven. Their life span exceeded one hundred years before they departed. The fact that people of today are different is because they take wine as an [ordinary] beverage, and they adopt absurd [behaviour] as regular [behaviour]. They are drunk when they enter the [women's] chambers. Through their lust they exhaust their essence, through their wastefulness they dissipate their true [qi]. They do not know how to maintain fullness and they engage their spirit when it is not the right time. They make every effort to please their hearts, [but] they oppose the [true] happiness of life. Rising and resting miss their terms. Hence, it is [only] one half of a hundred [years] and they weaken.⁶⁶⁸

In *Huangdi Neijing*, it is also suggested that, if someone has excessive sexual activities excessively, the basic sinew (*jinzong* 筋宗) will become slack and even impotent. It will also cause a serious disease of white overflow (*baiyin* 白淫).⁶⁶⁹ Many scholars of the Han dynasty favoured the idea of reducing sexual desires. In *Chunqiu Fanlu*, it is suggested that a gentleman must control the frequency of sex to preserve the *qi*, and it should be reduced accordingly in old age.⁶⁷⁰ Many later physicians also agreed with the control of sexual desires and suggested that the best way to accumulate *jing* is to reduce sexual desires. They found that poor peasants could produce many offspring, while many rich people faced infertility problems. The reason is that rich people usually had too many sexual desires, and such indulgence was actually harmful to their bodies rather than beneficial.

It is indicated from early manuscripts that the seminal fluid or the seed had already been taken as the essence of life probably as early as the fifth century B.C.E. In the Chu bamboo slips of the Warring States period preserved at the Shanghai Museum 上海博物館藏戰國楚竹書, there is a special text named *Fanwu Liuxing* 凡物流型 (*On Myriad Things Flowing into the Form*). It is asked, what is most important for the generation of myriad things and what is most important for determining life and death of humans?

𠂇(凡)勿(物)流型(形), 𠂇(奚)𠂇(得)而城(成)? 流型(形)城(成)豐(體),
 𠂇(奚)𠂇(得)而不死。民人流型(形), 𠂇(奚)𠂇(得)而生? 流型(形)城(成)
 豐(體), 𠂇(奚)𠂇(失)而死?

668 *Suwen* 1:1 (上古天真論). Translated by Unschuld, P. and Tessenow, H. (2011): vol.1, 30-33.

669 *Suwen* 44:318 (痿論). Unschuld, P. and Tessenow, H. (2011): 658.

670 *Chunqiu Fanlu* 77:451 (循天之道)..

*When myriad things are flowing into the form, what is obtained to achieve the accomplishment?
After the accomplishment of the body by flowing into the form, what is obtained so that death can
be avoided? When human beings are flowing into the form, what is obtained to acquire life? After
the accomplishment of the body by flowing into the form, what is lost so that death occurs?*⁶⁷¹

Similar questions were asked in another manuscript of the same period. In the bamboo strips of the Warring States period preserved at Tsinghua University 清華大學藏戰國竹簡, there is a special text entitled *Tang zai Chimen* 湯在啻門 (Tang in Chimen).⁶⁷² The text explains why some people have a longer life and some people have a shorter life. The fundamental reason originates from the seed. The author used another term, ‘the jade seed’ (*yuzhong* 玉種).

湯或（又）問於少（小）臣曰：
「人可（何）得以生？可多以長？孰少而老？
（固）猷（猶）是人，而一亞（惡）一好？」
少臣答曰：「唯皮（彼）五味之氣，是哉以為人。
元（其）末氣是胃（謂）玉種（種）...」
Tang asks Shaochen again.
On what do people rely to have life,
for more the longer, for less the shorter?
Since all are humans,
why is one not favoured and one favoured?
Shaochen answered,
It's the qi of the Five Flavours that is what first makes up people,
*with the basic qi being called the Jade Seed.*⁶⁷³

In *Tang zai Chimen* 湯在啻門, the essence of life was described in air-like form. It is the most important type of the *qi* 氣. Its function is very similar to the concept of the inborn essence in *Huangdi Neijing*. The change of the *qi* 氣 will determine the status of life for health, diseases and longevity.

元氣潛（歟）發（治），是元為長且好才（哉）。
元氣奮昌，是元為當壯。
氣融交以備，是元為力。
氣戚（促）乃老，氣（徐）乃猷，
氣逆亂以方，是元為疾央（殃）。
氣屈乃久（終），百志皆（窮）。
When the qi emerges, it is good and health.
When the qi grows, it becomes strong.

671 Ma, C.Y. (2008): vol. 7, 223. My translation.

672 Zhang Hanmo (2017): 173-212.

673 Li Xueqin (2015): 142. My translation.

*When the qi combines, it has power.
 When the qi is reduced, it becomes old.
 When the qi becomes much slow, it is an indication of death.
 When the qi goes in contradiction, it causes diseases.
 When the qi stops, hundreds of functions come to the end.*⁶⁷⁴

Similar questions were asked in another manuscript from the Han dynasty period. In the manuscripts of Mawangdui, there is a special text entitled *Shiwen* 十問 (*Ten Questions*). It also explains why some people have a longer life and some people have a shorter life. It is suggested that for a longer life, it is necessary to preserve the essence (*jing*).

*If your lordship wishes to be longlived, then comply with and examine the way of heaven and earth. The vapor of heaven is monthly exhausted and monthly replenished; thus it is able to live long. The vapor of earth during the year is cold and hot, and the precipitous and the gentle complement one another; thus the earth endures and does not deteriorate. Your lordship must examine the nature of heaven and earth, and put it into practice with your body. There are signs that can be known. At present it is not within the ability of even the sage. Only the person of the way knows it. The culminant essence of heaven and earth is born in the signless, grows in the formless, and is perfected in the bodiless. He who obtains it has a lengthy longevity, he who loses it dies young. Thus he who is skilled at cultivating vapor and concentrating essence accumulates the signless.*⁶⁷⁵

How might one preserve the essence (*jing*)? In *Shiwen* 十問, it is suggested that sexual cultivation should be conducted to preserve *jing*. The core technique of sexual cultivation is not about how to keep abstinent from sexual activities. On the opposite, the core technique of sexual cultivation is about how to suppress ejaculation through the practice of sexual activities. It is taught that in such way to preserve *jing*, all kinds of diseases can be avoided and longevity can be achieved.

*The Yellow Thearch asked Cao Ao, 'What do people lose so that they die? What do people obtain so that they live?' Cao Ao replied '...Attend to that conjoining of vapor and lightly move her form. When able to move her form and bring forth the five tones, then absorb her essence. Those who are empty can be made brimming full; the vigorous can be made to flourish lastingly; the aged can be made to live long. The procedure for living long is to carefully employ the jade closure. When at the right times the jade closure enfolds, spirit illumination arrives and accumulates. Accumulating, it invariably manifests radiance. When the jade closure firms the essence, this invariably ensures that the jade wellspring is not upset. Then the hundred ailments do not occur; thus you can live long.'*⁶⁷⁶

It is obvious that the teaching of *Shiwen* 十問 goes against the teaching of *Huangdi Neijing*.

⁶⁷⁴ Li Xueqin (2015): 142. My translation.

⁶⁷⁵ MWD 4: 146. Translated by Harper (1998): 393-394.

⁶⁷⁶ MWD 4:146 (十問). Translated by Harper (1998): 389-391.

One encourages sexual practices, while one encourages abstinence. Even so, the common purpose is to preserve *jing*. In *Shiwen* 十問, there are detailed descriptions of techniques to preserve *jing* in order to achieve longevity. For example,

Wangzi Qiaofu asked Ancestor Peng: ‘Of man’s vapor, which is the most essential?’ Ancestor Peng replied: ‘Of man’s vapor none can compare with penile essence. When the penile vapor is clogged and blocked, the hundred vessels produce illness. When the penile vapor is not perfected, you cannot procreate. Thus longevity lies entirely with the penis. When the penis is secured and cherished, its simultaneous giving becomes an aid. For this reason, at the first light of day the person of the way spits on his hands and strokes his arms. He rubs the abdomen, following the Yin and following the Yang. He must first spit out the stale, then suck in the penile vapor. Let penetrating breathing be together with the penis; let drinking and eating be together with the penis. Drink and food consummate the penis, like nurturing the red infant. When the red infant is boisterous and brash and repeatedly becomes erect, be careful to not burden it with labor. Then he can have lasting coitus and can travel distantly; thus he is able to have a lengthy longevity.’⁶⁷⁷

In comparison with Hippocratic writings and Aristotle’s works, we can find that Chinese writings generally had a much greater emphasis on the importance of preserving *jing*. In Chinese thought, *jing* is not only important for generation, but also important for keeping health and achieving longevity. In many Chinese texts, *jing* is commonly regarded as the fundamental reason to explain why some people have a longer life and why some people have a shorter life, even though there are different ideas on how to preserve *jing* through sexual cultivation. In Hippocratic writings and Aristotle’s works, we can hardly find a strong relationship between the seed and longevity, even though there are plenty of recipes for love as well.⁶⁷⁸

5.2 A Resonance World

I want to argue that the concept of ‘resonance’ (*ying* 應 or *ganying* 感應) had great impacts in the construction of embryological thought in early China, while such a concept cannot find a counterpart in ancient Greece (even though it requires further investigation for the case in ancient Roman). The concept of ‘resonance’ built a link for the embryo to make sympathetic interactions with the outside world. It produced the long-influential doctrine of ‘internal transformation’, which

677 MWD 4:148 (十問). Translated by Harper (1998): 400–401.

678 See Faraone, C.A. (1999), Lo, V. and Re’em, E. (2018).

advocated the techniques of transforming a girl into a boy or a boy into a girl through drugs and rituals. It also produced the long-influential doctrine of ‘foetal education’ that teaching the next generation should start as early as possible from the time of conception.

The concept of ‘resonance’ refers to a sort of correspondence in the universe under the principle of ‘like-to-like’: things of the same kind (*lei* 類) follow each other. In early Chinese thought, myriad things were classified into five categories according to the five phases. If two things belong to the same category of a certain phase, they could have sympathetic interactions. In *Huainanzi*, resonance is something that human intelligence cannot understand. ‘That things in their [various] categories are mutually responsive is [something] dark, mysterious, deep, and subtle. Knowledge is not capable of assessing it; argument is not capable of explaining it.’⁶⁷⁹ In modern words, as John Major explained, the concept of resonance can be understood as ‘a kind of sympathetic vibration in the force field of *qi* that pervades the cosmos.’⁶⁸⁰

In a world of resonance, there are all sorts of correspondences and interconnections. One can easily be attracted and affected by another. As a result of resonance, certain features can be compelled to appear by other, similar features. For example, since clouds and dragons belong to the same category, three-dimensional clay dragons (or sometimes two-dimensional paintings of dragons) were once widely believed to be able to attract rain.⁶⁸¹ In *Chunqiu Fanlu*, there are ways to attract rain: ‘It is possible to pray for water on any day of four seasons. To make the dragon, you must use pure clay. When the dragon is accomplished, it can be used [for praying].’⁶⁸² This principle of attraction is called *mutual movements of the same kind* (*tonglei xiangdong* 同類相動). ‘Hence things are attracted by the same kind, which is the reason why dragons are used to attract rain.’⁶⁸³ To a certain degree, praying for rain by using clay dragons might be regarded as a sort of ‘magic’. James Frazer distinguished two types of magic: contagious magic and sympathetic magic. Sympathetic magic is also called homoeopathic magic or imitative magic, which is caused by the

679 *Huainanzi* 6: 194 (覽冥訓) [Major, J.S. (2010): 216]. Blanc, C.L. (1985).

680 Major, J.S. (2010): 207.

681 *Huainanzi* 4: 141 (墜形訓); 16: 953 (說山訓).

682 *Chunqiu fanlu* 74: 436 (求雨).

683 *Chunqiu fanlu* 57: 359 (同類相求).

principle of similarity: ‘like produces like’ or ‘an effect resembles its cause.’⁶⁸⁴ Michael Loewe noted that praying for rain by using dragons can be regarded as a similar type of sympathetic magic. He commented that ‘it is an example of sympathetic magic of an imitative type, which seeks to bring about material results by a display of phenomena similar to those that are desired.’⁶⁸⁵

The concept of ‘resonance’ is highly related to ‘correlative thinking’, exemplified in yin-yang and the five phases. There are great disputations among scholars on whether the ‘correlative thinking’ should be regarded as a special product of Chinese thought.⁶⁸⁶ Marcel Granet made the concept of ‘correlative thinking’ well-known through the perspective of anthropology.⁶⁸⁷ After Granet, the concept of ‘correlative thinking’ was widely used as an analytical tool for the study of early Chinese philosophy, politics, religion, science, and medicine.⁶⁸⁸ John Major also argued that ‘correlative thinking and *ganying* resonance operate in the cosmology of *Huainanzi* to organize the world into a highly regular and predictable system.’⁶⁸⁹ David Hall and Roger Ames further argued that correlative thinking was absolutely a defining feature of early Chinese thought in general.⁶⁹⁰ However, Angus Graham criticized Granet for taking correlative thinking as characteristic of Chinese thought and pointed out that this type of thinking is universal and trans-cultural.⁶⁹¹ He pointed out that correlative thinking extended easily into what might be thought of as sympathetic magic, *sumpatheia*, as often discussed by Greeks and Romans.⁶⁹² Michael Puett also argued that ‘correlative cosmology should not be interpreted as a general ‘Chinese’ way of thinking, nor should it be understood as part of a shift from ‘religion’ to ‘philosophy’.’⁶⁹³ I agree with Angus Graham and Michael Puett on this point. ‘Correlative thinking’ should not be taken as a special Chinese way of thinking. Similarly, the concept of ‘resonance’ can possibly find counterparts in other cultures.

In general, the Chinese concept of ‘resonance’ follows a ‘like-to-like’ principle. In the Hippocratic writings, the like-to-like principle (τὸ ὅμοιον εἰς τὸ ὅμοιον) governs the differentiation

684 Frazer, J. (1980): vol.1, 52-55.

685 Loewe, M. (1987); (1994):142.

686 Nylan, M. (2010): 398-414.

687 Granet, M. (1934).

688 e.g. Needham, J. (1956); Porkert, M. (1973).

689 Major, J.S. (1993): 31.

690 Hall, D.L. and Ames, R.T. (1995): 126-133. Wang, A.H. (2000): 2. Ekstrom, M.S. (ed.) (2000).

691 Graham, A.C. (1986): 39; (1989):319-200.

692 Graham, A.C. (1989):345-350.

693 Puett, M. (2002):145-200.

of bodily parts in the early development of the embryo, in a way the dense to the dense, the rare to the rare, and the fluid to the fluid, etc.⁶⁹⁴ The similar idea is that things of the same kind can attract and influence each other. However, the like-to-like principle in Hippocratic writings does not reflect a counterpart of the concept of ‘resonance’ due to a lack of long-distance correspondence and sympathetic interactions. In early Chinese thought, the like-to-like principle emphasizes that things follow each other depending on whether they belong to the same kind or not. It is more about long-distance correspondence and sympathetic interactions.

Now, I want to argue that the concept of resonance had great influences on embryological thought in early China. In *Taichanshu*, the growth of the embryo is assumed to follow the same principle of resonance. External long-distance influences are believed to be able to attract certain good or bad features in shaping the embryo, which can determine the appearance, the morality, and the temperament of the unborn child. This is called ‘internal transformation’ (*neixiang chengzi* 内象成子). Hence, pregnant women must take care of their behaviours and regimens.

*In the third month it first becomes suet, and has the appearance of a gourd. During this time it does not yet have a fixed configuration, and if exposed to things it transforms. For this reason lords, sires, and great men must not employ dwarves. Do not observe monkeys. Do not eat cong (onion) and jiang (ginger); and do not eat a rabbit boiled dish. [I] you wish to give birth to a boy, set out bow and arrow, [I] the male pheasant, mount a male horse, and observe the male tiger. If you wish to give birth to a girl, wear hairpins and earrings at the waist, and wear a pearl belt. This is called ‘inner imaging to complete the child.’*⁶⁹⁵

More importantly, the author of *Taichanshu* proposed a creative theory of shaping the sex of the embryo through artificial interventions. It is suggested that sex determination is not unpredictable, but rather controllable. It is believed that the sex of the child can be controlled and changed through external influences under the principle of resonance. According to the author’s classification, bow, arrow, the male pheasant, the male horse and the male tiger all belong to the same kind of male (*yang*) category, so they have the ability to attract masculine features. In contrast, hairpins, waists and pearl belts all belong to the same kind of female (*yin*) category, so they have the ability to attract feminine features. The mechanism is exactly the same as praying for rain by using clay dragons.

694 *Nat. Puer.* 17.1, Li VII 496. For Greek history of the principle of ‘like-to-like’, see Müller (1965).

695 MWD 4:136. Translated by Harper (1998): 379.

Similar rituals are employed in praying for a male or female child. In the process, one thing can be used to attract certain features in another if they belong to the same 'kind'. Because it is possible to attract similar features by things of the same 'kind', this provides a hope especially for people who hope to seek a male child.⁶⁹⁶ In later gynaecological works, there is usually a topic on how to transform a female into a male in the womb.

There are certain rules for the cultivation of the embryo: (1) the embryo has no fixed configuration and it is subject to external influences; (2) the mother is a medium to connect the embryo with the world; (3) under the principle of resonance, what the mother contacts will be reflected in the images of the child; (4) it is necessary to follow different rules in different months in order to keep harmony with seasons. The general guidance for pregnant women consists of three parts: what she should not see, what she should not hear and, especially, what she should not eat. If a pregnant woman has contact with dwarves, monkeys, rabbits, onion or ginger, it is believed that the bad features of these things will attract similar features to appear in the coming child, such as dwarfism, hyperkinesis, polydactyly and cleft palate syndrome.

It is a cross-cultural phenomenon that pregnant women have forbidden taboos,⁶⁹⁷ but in each culture these taboos have different roots and different meaning. Similar taboos can also be found in some other early Chinese texts. In *Huainanzi*, it is even further suggested that the child will acquire four eyes if the pregnant woman sees deer. 'If a pregnant woman sees rabbits, the child will have the cleft palate. If she sees deer, the child will have four eyes.'⁶⁹⁸ In *Lunheng*, it is also said, 'If a pregnant woman eats rabbit meat, the child will have cleft palate at birth.'⁶⁹⁹ Many ancient Chinese gynaecological texts suggest that a pregnant woman should not eat rabbit meat in order to avoid cleft palate in children.⁷⁰⁰

Apart from regimens and activities, it is important to take care of emotions as well because emotions can possibly bring influences on virtues. Under the idea of resonance, it is believed that the emotions of the mother can attract similar virtues in the child. For cultivating a Sage King, the

696 For different methods of transforming a female into a male, see Lü, Y.H. (2010): 81-100.

697 Frazer (1980): 145-157.

698 *Huainanzi* 16:549 (說山訓).

699 *Lunheng* 2:53 (命義篇).

700 Lü, Y.H. (2010): 72-81; Guo, L.C. (1979): 75-76.

education should start as early as in the womb. Tairen 太任, the mother of King Wen 文王, is taken as the best example for *Taijiao* 胎教 (foetal education).

周后妃任成王於身，立而不跛，坐而不差，獨處而不倨，雖怒而不詈，胎教之謂也。

When Houren, the concubine of Zhou, was gestating King Wen in her body, she never stands like a cripple, never sits with crossed legs, never laughs too loudly, never looks arrogant, and never insults people in her anger. This is called ‘the education of the foetus’.⁷⁰¹

The story of Tairen is used again in *Lienü Zhuan* 列女傳(*Biography of Women*) to present the best virtues for women. It gives an explanation of ‘resemblance and transformation’ (*xiaohua* 肖化). It is said that the foetus can acquire certain features and certain virtues due to external influences from the mother’s behaviour.

古者婦人妊子，寢不側，坐不邊，立不蹕，不食邪味，割不正不食，席不正不坐，目不視於邪色，耳不聽於淫聲。夜則令瞽誦詩，道正事。如此，則生子形容端正，才德必過人矣。故妊子之時，必慎所感。感於善則善，感於惡則惡。人生而肖萬物者，皆其母感於物，故形音肖之。文王母可謂知肖化矣。

*When ancient women were pregnant with children, they never slept on one-side, never sat on one edge, never stood on one leg, never eat any meat not properly cut, and never sat on any bed not properly put. Eyes never watch any view that is evil. Ears never hear any sound that is lust. Let blind men tell poems at night and talk about proper things. In such a way, they give birth to beautiful children with great virtues. Therefore, at the time of pregnancy, you must take care of external influences. Being influenced by good things turn to be good; being influenced by bad things turn to be bad. People are born to resemble myriad things because their mothers are influenced by [myriad] things, thus they resemble in shape and sound. The mother of King Wen learns well about [these] resemblance and transformation.*⁷⁰²

The narrative structure in *Taichanshu* has another important feature for attention. It gives different suggestions on each month (lunar month) for the pregnant woman to follow. For example, in the fourth month, which is the time to form blood, the pregnant woman should eat rice and wheat to ‘clarify the blood and brighten the eyes’. In the fifth month, which is the time to form *qi*, the pregnant woman should eat beef and mutton to ‘nourish the *qi*’. In the sixth month, which is the time to form tendons, the pregnant woman should ‘go out to in the countryside and frequently observe running dogs and horses’. In the seventh month, which is the time to form bones, the

701 *Dadai Liji* 7: 76 (保傳). See also *Jiaoyi Xinshu* 10: 391 (胎教). My translation.

702 *Lienü Zhuan* 1-6: 14-15 (周室三母). My translation.

pregnant woman should ‘occupy heated place, do not become immobilized, avoid cooling food and drinks, and beautify the teeth’, etc.⁷⁰³ In a word, women should do different things in different months. In many later medical texts, the foetus changes its shape and size in different months, wherefore pregnant women are asked to observe certain rules in different months. These rules include different behaviours, different regimens, and different rituals.

Monthly guidance for pregnant women shares great similarities with political concept of ‘monthly ordinances’ (*yueling* 月令), even if there is no direct evidence of its influence. In the archaeological site of *Dunhuang Xuanqun* 敦煌懸泉, a governmental document on monthly ordinances was found, dated around 5 C.E.⁷⁰⁴ The basic idea of monthly ordinances is that a certain policy should be implemented in a certain month. The Emperor, as the Son of Heaven, should play certain music, make certain sacrifices, and decree certain policies according to the movements of the stars. By following the Way of Heaven, he leads his people to achieve the great harmony in agricultural production and political life. If not, there will be all sorts of problems, such as earthquakes, droughts, and flood. Personally, the Emperor shall also follow certain rules. During different months, he must move to live in different chambers of the palace, ride in different types of carriages, be drawn by different types of horses, carry different colored flags, wear different colored robes, use different types of jades, eat different types of animal meat, and use different types of sacrifice vessels.⁷⁰⁵

In Hippocratic writings and Aristotle’s works, we can hardly find a similar concept of resonance, even though some other Greek philosophers might be worthy of further investigations. The growth of the embryo was described more like a natural process, with details to be explained in later chapters. External influences might lead to some abnormalities or even dead fetuses, but nowhere can we find sympathetic interactions between the embryo’s moral characteristics and the outside environment. We can find a theory of shaping the sex of the embryo (in the gestation stage) through artificial interventions in early Chinese writings, but not in ancient Greek writings. In

703 MWD 4:136. Harper (1998): 380.

704 *Dunhuang Xuanquan Yueling Zhaotiao* 敦煌懸泉月令詔條: 3-8. See Yu, Z.B. (2002):25; Sanft, C. (2008): 125-208.

705 Lewis, M. E. (2006): 261. Miao, H. (1972) :123-186; Li, X. Q. (1994).

Hippocratic writings, there are regimens and practices (e.g. tying a testicle) that are prescribed for men and women to influence the sex of the embryo, but these are usually to be implemented before conception.

5.3 Abnormal Births

In this section, I will explore ancient understandings of abnormal births. I want to argue that abnormalities of the fetuses were explained very differently and there were different degrees of social and political implications in the two cultures. A monstrosity was normally thought to be caused by some other external reasons in Chinese thought, for example, a punishment from Heaven. As a result, abnormalities of the fetuses were frequently endowed with supernatural powers and were associated with significant warnings. They could be regarded as indications of coming misfortunes, such as natural disasters and political disorder etc. However, a monstrosity was normally thought to be caused by disorder during conception in Greek thought, even though there were different explanations of the details. In Hippocratic writings, a monstrosity is caused by superfetation or some other disorder. In Aristotle's works, a monstrosity is caused by the collapse of the form. Now, I will offer detailed explanations.

In many early Chinese texts, abnormalities in childbirth are associated with natural disasters, which are regarded as warnings for political failures. They have more political significances rather than medical significances. It was believed that an animal could be born from another species. When a dog was found to be born of a pig, it meant the rise of monsters, following which there would be great social disorder.⁷⁰⁶ Moreover, a change of sex could even happen at any time during life. It was believed that, in some extreme situations, women could change into men or vice-versa, which would be regarded as a significant warning to political rulers that they were losing the great harmony of *yin-yang* in the universe and in society. In *Lun Heng* 論衡, it is explained,

人受正氣，故體不變。時或男化為女，女化為男，由高岸為谷，深谷為陵也，應政為變，為政變，非常性也。

If a man has the righteous qi, the body has no change. At the time it may happen that males change

706 *Lüshi Chunqiu* 6: 151(季夏紀).

*into females, or females into males. Just like hills change into valleys, or valleys into hills. They correspond to political changes. When there are political changes, there must be an abnormal phenomenon. It is not the normal situation.*⁷⁰⁷

Sometimes, infertility would be taken as a sign of serious warning to the ruler. When Emperor Cheng 成帝 had failed to produce a male heir for many years, he made apologies several times for it, but he was still criticized fiercely by his minister Gu Yong 穀永 who took the childlessness as a punishment from Heaven for the emperor's political faults, along with other punishments such as earthquakes and solar eclipses.⁷⁰⁸ Overall, the study of abnormalities in reproduction was not undertaken for its own sake. It was driven by political necessity to predict, somehow, potential disasters for the country, so that the ruler could take some action to prevent or change the situation.

As a result, abnormal biological phenomena on earth were carefully recorded in historical books. For example, it was reported several times that a man was born from a horse, which indicated the overturn of a dynasty.⁷⁰⁹ Sometimes it was reported that an ox was born with a leg in its back. When the King heard about it, he disliked it very much. Several months later, the King contracted a disease and died within six days.⁷¹⁰ Sometimes it was reported that a girl was born with red and hairy skin; then there were murders at the court.⁷¹¹ It is recorded that, in the year 306 B.C.E., there was a girl who changed into a man in the country. Later, there was a disaster that Qin invaded two cities of the country.⁷¹² Several Emperors of the time were convinced that such abnormal phenomena were dangerous signs for their reigns. In the year 49 B.C.E., it was said that a hen changed into a cock in the royal palace. In the following year, 48 B.C.E., it was said that a hen changed into a cock in the home of the Prime Minister. The two events were regarded as warning signs for the future raising of Wang Mang 王莽, who later seized power because of his sister,⁷¹³ but for the opposite people they were taken as auspicious omens and justifications for the regime

707 *Lunheng* 2-7 (無形). My translation.

708 *Hanshu* 85-55 (穀永杜鄴傳).

709 *Shiji*, 15.3:725 (六國年表); *Hanshu*, 27.7:1469 (五行志); *Houhanshu*, 8.8:342 (孝靈帝紀); 17:3345 (五行).

710 *Shiji* 58-28 (梁孝王世家).

711 *Hanshu* 27-7 (五行志).

712 *Shiji* 44-14 (魏世家).

713 *Hanshu* 27.2.1-7.2.1 (五行志); *Houhanshu* 8-8 (孝靈帝紀).

change.⁷¹⁴ In the year 6 B.C.E., it was reported that a man changed into a woman in the county of Yu Zhang, which was regarded as a warning sign for the termination of a bloodline. After a few years, the western Han dynasty came to an end.⁷¹⁵ In the year 202 C.E., it was reported that a man changed into a woman in the county of Yue Gui, which was regarded as a warning sign for the end of the east Han dynasty.⁷¹⁶ The concept of ‘disasters and calamities’ continued to be influential from the third to the sixth centuries. The changing of sex was a central theme in the prediction of disasters and calamities. The abnormal phenomena might happen to chicks, oxen, dogs, sheep, fish, pigs, snakes, horses and humans. Abnormalities in worms and animals were called *nie* 孽 (disasters) or *huo* 眚 (misfortunes), while abnormalities in humans were called *ke* 疴 (diseases).⁷¹⁷

Now, we want to ask the question: why could abnormalities in childbirth be associated with natural disasters and political failures? We can give an answer to this question if we have a consideration of how ancient Chinese authors treated the abnormalities of astronomical phenomena. It was exactly the same situation when abnormalities of astronomical phenomena were used to make predictions of disasters and calamities in early China writings. It was assumed that all things under heaven have some sort of relationship with heavenly matters. Ancient Chinese authors viewed ‘the natural order and political order as resonating systems, with the ruler as a sort of vibrating dipole between them’.⁷¹⁸ Hence, the whole study of Heaven was closely related to politics. For this reason, signs in the sky have significant meaning for predictions. There had been a special imperial astronomical bureau since the Han dynasty to make observations of abnormalities in Heaven. The irregular appearances of eclipses, planetary conjunctions, and ominous stars were carefully observed and recorded by historians. Such phenomena of the sky were frequently associated with earthquakes, droughts, floods, plagues, famines, wars, and other disasters in the correlative cosmology.⁷¹⁹ When people observed such phenomena, they would expect disasters to occur somewhere. Hence,

714 *Hanshu* 99.2-69.2 (王莽傳).

715 *Hanshu* 27.1-7.1 (五行志).

716 *Houhanshu* 17-5 (五行).

717 e.g. *Hanshu* 27-7(五行志), *Houhanshu* 17-5(五行). For more discussion on the meaning of abnormalities and changes in animals, see Sterckx (2002), ch.6.

718 Sivin (1969): 7.

719 *Shiji* 27-5 (天官書), *Hanshu* 26-6 (天文志). Giacinto, L.D. (2013): 85-102.

abnormal appearances in the sky, for example eclipses, planetary conjunctions, and ominous stars, were regarded as warnings to a ruler who had failed to create a harmony between Heaven and Earth due to mistakes.

A further investigation can reveal that the early Chinese philosophical concept of *wuxing* 五行 is the key to understand why abnormalities in the sky and in childbirth could be associated with natural disasters and political failures. Around the third century B.C.E., *wuxing* acquired a new meaning of ‘the five powers’ or ‘the five phases’. Zou Yan 鄒衍, a man of recipes and techniques, used the term of *Wude* 五德 (*Five Virtues*) to describe cycles of dynastic succession. In his cosmology, the five virtues, in a sequence of wood, metal, fire, water, and earth, replaced each other successively by conquest and obtained the power to control the world for a period of time. He successfully persuaded the Emperor that the dynasty of Qin 秦, which was ‘in the virtue of water,’ received authority from Heaven to replace the dynasty of Zhou 周 by conquest, since Zhou 周 was ‘in the virtue of fire.’⁷²⁰ In the second century B.C.E., when the idea of cosmological correspondences began to be seriously advocated, *wuxing* was used as ‘five agents’ to predict disasters and calamities by Dong Zhongshu 董仲舒. He proposed the concept of ‘disasters and calamities’ (*zhaiyi* 災異), which meant the use of these abnormal phenomena to predict political changes. In his interpretation, the five agents, in the sequence of fire, earth, metal, water, and wood, engender each other successively by generation and cause related consequences in the form of disasters and calamities. In *Chunqiu Fanlu*, the phenomenon of musical resonance is used to prove the theory of mutual interactions and applied to construct a political theology.⁷²¹ In this political theology, the Emperor, as the Son of Heaven, plays the most important role in communicating between Heaven, Earth, and Humans and keeping them in order and in harmony with each other. Thus, the actions of the Emperor have great influence upon the harmony of the natural world. Under the theory of mutual interactions, auspicious signs will be ‘attracted’ to appear if the Emperor has great virtues. At the same time, disasters and inauspicious signs will be attracted to appear if the Emperor behaves badly. Hence ‘natural’ disasters, like earthquakes, are not caused by-itself, but

720 Gu, J.G. (1962).

721 *Chunqiu Fanlu* 57: 358-360 (同類相動).

caused by something else.⁷²² Under such an intellectual framework, no matter irregular appearances in the sky or abnormalities in childbirth, they were all taken as great warnings to the harmony between Heaven and Earth. Therefore, early Chinese embryological thought was largely influenced by the contemporary Chinese concept of *wuxing*, as a result of which abnormal births were largely associated with natural disasters and political disorder.

In Aristotle's works, by contrast, much less attention is paid to the phenomena of abnormalities in the sky. It is assumed that everything followed a certain rule, including the movements of the planetary bodies. An abnormal appearance in the sky was treated as simply a meteorological phenomenon in the atmosphere, since the Greeks believed that things in heaven were not subject to change.⁷²³ For Aristotle, the heavenly bodies are eternal and unchangeable. Shooting stars, comets and the aurora are explained by Aristotle as meteorological phenomena only.⁷²⁴ Abnormalities in childbirth received much less attention from a political perspective, even if they might be regarded as auspicious or inauspicious omens. There were great stories of abnormal births in Greek myths, in some cases the rulers are born disabled,⁷²⁵ but political relationship was much less correlated and less emphasized in the texts primarily studied in my thesis.

In Hippocratic writings, abnormal births, so called monstrosities, are sometimes thought to be caused by '*superfetation*', the idea that a woman can conceive twice, but the second seed can easily be corrupted in mixing with the previously arrived seed.⁷²⁶ The womb is also regarded as the main cause of '*superfetation*' (ἐπικυῖσκηται). The idea of '*superfetation*' is that a woman can conceive twice. In *Superfetation*, the term is defined as a second conception that may happen 'when the mouth of their uterus does not close after the first conception'.⁷²⁷ According to the text, the second conception is independent from the first, so the additional embryo can be planted in a different location inside the uterus: (1) if it is planted along with the first embryo in the central part of the uterus, then the added one will be born first, expelled by the original one; (2) if it is planted in one of the two horns, then the added one will normally come out later, especially when it has not yet

722 *Chunqiu Fanlu* 57: 358-360 (同類相動).

723 Lloyd (2004).

724 *Meteor.* 341b15, 359b28, 360a21. Dicks (1970): 208-210.

725 Rose, M.L. (2003).

726 *Superf.* 1, Li VIII 476.

727 *Superf.* 1, Li VIII 476.

reached the stage of differentiation and consists only of flesh.⁷²⁸ In *Superfetation*, it is clear that superfetation is different from the conception of twins. It is said that twins are conceived on the same day, contained in one membrane and born on the same day.⁷²⁹ In *Regimen*, it gives the condition that superfetation happens only when the womb and the seed are both naturally hot and dry, that is to say, absolutely dominated by fire (the male element). Because of the unbalanced environment, the newly formed embryo cannot survive long with a lack of moisture, while the previously formed embryo will be destroyed for the same reason.⁷³⁰

In Aristotle's writings, monstrosities are also produced by the wrong mixtures. 'Monsters come to be when the seeds are mixed up with each other and commingled either in the existing of the semen or in the mixing in the female's uterus.'⁷³¹ There is no doubt that a 'monstrosity' (τέρας) is a failure of Nature. The reason is that a 'monstrosity' involves the damage of the principle (διαφθειρομένης ἂν ἀρχῆς).⁷³² As a result, the general goal of producing a healthy human cannot even be achieved. Hence, it is proper to say that 'monstrosity is a failure of purpose in Nature'.⁷³³ It is said that there might be offspring with extra feet or extra heads or with two organs of generation, which are indeed a sort of 'deformity' (ἀναπηρία).⁷³⁴ In a broader sense, Aristotle claims that any product, which is unlike its parents, can be called a 'monstrosity' (τέρας).⁷³⁵ The reason is that if a normal offspring could be dissimilar from the parents, there would be a possibility to produce too many inherited features ad infinitum (τὸ ἄπειρον). 'Nature (φύσις), however, avoids what is infinite. It is because the infinite has no End (ἄτελές), whereas Nature always seeks an End (τέλος).'⁷³⁶ In such a sense, a monstrosity is called 'contrary to Nature' (παρὰ φύσιν).⁷³⁷ For example, animals with two generative organs, as a monstrosity (τέρας), are contrary to Nature.⁷³⁸ Hence, a monstrosity is not what Nature wants because it is contrary to Nature. I agree with Sophie Connell's argument: 'What Nature, however, can never intend is any increased likelihood of monsters and

728 *Superf.* 1, Li VIII 476.

729 *Superf.* 14, Li VIII 484.

730 *Vict.* 1.31, Li VI 506.

731 *Pr.* 10.61, 898a14-16. See also *Pr.* 878a19-22; *Pr.* 898a14-16.

732 *Ph.* 199b7.

733 *Ph.* 199b4-5.

734 *GA* 769b12-14, b27-31, 770b35-36.

735 *GA* 767b7-8, 770b3-7.

736 *GA* 715b13-16.

737 *GA* 770b10-11.

738 *GA* 772b22-32.

deformity. So, although they can be predicted, monsters are the result of pure chance. There is a natural grounding for them but we cannot have any proper knowledge of monstrosity itself other than that it involves the absence of teleology'.⁷³⁹

Occasionally, there is a special form of monstrosity in which a woman may have a 'mole pregnancy'. After she sleeps with her husband, she thinks that she has conceived. She resembles a normal pregnant woman with similar symptoms of pregnancy. After ten months, she is expected to deliver a child, but no child is born and her abdomen does not return to its normal size. She feels ill and continues to be so for three or four years. She reaches a crucial time when she is seized with contracting dysentery. Finally, with her life in danger, the woman produces a mass of flesh. It is called a 'mole' (μύλην). The mole has no life because it is not ensouled (ἔμψυχον). It is extremely hard and cannot even be cut up by means of an iron edge. Aristotle was very interested in this phenomenon. He described it in both *Generation of Animals* and *History of Animals*.⁷⁴⁰ He explained that the mole is cultivated when the father's seed does not mix with the mother's seed.⁷⁴¹

In summary, this chapter has explored main differences of embryological thought in the two cultures and the essential reason for the differences. I have made several arguments for uniqueness. Firstly, I have argued that the Chinese notion of *jing* has a strong connection with longevity and there was a strong emphasis on the importance of preserving *jing* through sexual cultivation. Secondly, the concept of resonance has a great influence on the embryological thought in early China. This influence can be reflected in the ideas of internal transformation and foetal education. Thirdly, there are very different explanations of the cause of abnormalities in the two cultures. Abnormalities in both astronomy and childbirth could have strong political implications in early China. They were frequently used as inauspicious omen for predicting disasters. In ancient Greece, by contrast, these abnormalities received much less attention from political perspectives. At this point, we see another important divergence of thinking between ancient Greece and early China.

739 Connell, S. (2018), 207.

740 GA 775b25-776a9; HA 638b8-14.

741 HA 638a18-26.

Chapter 6 The Way of Thinking

This chapter will focus on the way of thinking, or in other words, how did ancient people give proofs to proposed embryological theories? What evidence did they use to persuade their audiences? The emphasis on its intrinsic utility in much scholarship - that it just makes sense to explain through likeness, to illuminate the unknown through the known, and so forth - makes analogy an obvious target for comparative scrutiny. To what extent are its use, forms, and styles, cross-culturally operative, or more specifically determined? The answers to these kinds of questions will then have something to offer the wider philosophical investigation into the workings of these beliefs in scientific enterprises.

I want to argue that some beliefs, especially analogical reasoning, macrocosm and microcosm, and powerful numbers, played special significant roles in the formation of embryological knowledge in ancient Greece and early China. On this aspect, Greek and Chinese authors shared a very similar way of thinking, despite great differences existed. Hence, the focus of this chapter will be much on similarities of how embryological thought was expressed in the two cultures.

6.1 Analogical Reasoning

Analogical reasoning, broadly speaking, was a well-established tool of ancient philosophy and medicine. Since Geoffrey Lloyd's classic study of analogy in early Greek literature and thought, *Polarity and Analogy* (1966), the theme has been taken up, expanded, and adopted by other scholars studying a range of ancient authors and topics.⁷⁴² The role of analogical reasoning, and its associates - such as scientific modelling - have also been extensively explored in the philosophy of science more broadly, with a fresh approach emerging in more recent studies, one of which locates these communicative models in the wider world of 'scientific fictions', which do important explanatory and persuasive, even epistemological, work in science. Geoffrey Lloyd's recent work, *Analogical Investigations: Historical and Cross-cultural Perspectives on Human Reasoning* (2015), makes further deep and comprehensive research on this topic.⁷⁴³

742 e.g. Bartos (2012), Betegh, G. and Greogric, P. (2014).

743 Lloyd (2015).

When I use the term ‘analogy’, I will follow the broadest definition which regards it as an extremely general mode of reasoning; in Geoffrey Lloyd’s words, ‘any mode of reasoning in which one object or complex of objects is likened or assimilated to another’.⁷⁴⁴ Analogies normally share some common features. There are usually two objects, of which one is called the **Target Domain (T)**, with the other being referred to as the **Base Domain (B)**. The target domain is what the author wants to explain. The base domain is what the author uses to explain the target (or some other object). The target domain is generally unknown or incompletely known, perhaps consisting of obscure natural phenomena. The base domain is, or is assumed to be, better known, for example, something from everyday life. Analogy normally proceeds from the known to the unknown, or from the visible to the invisible. Hence, analogical reasoning is very helpful in understanding a new system or phenomenon by means of a more familiar system or phenomenon.

Analogical reasoning is a common method of expression in both ancient Greece and early China. Ancient Chinese authors have a wider range of subjects as the base domain. In *Zhanguoce*, for example, the author borrows sources from ‘a historical precedent’, a ‘similar set of actual or reported events’, a ‘folk-tale or fable’, etc.⁷⁴⁵ In many cases, it seems that Chinese authors prefer analogical arguments to any other kind of argument.⁷⁴⁶ However, analogical reasoning is not, as it was claimed, ‘an original product of Chinese intellectual history’. It is basically not true to say that ‘analogical reasoning is extremely rare in early Greek philosophical literature’.⁷⁴⁷ There is, in fact, a long-established western tradition of reasoning by analogy from the classical period to the Roman period, adopted by early natural philosophers, the Hippocratic authors, Plato, Aristotle, Galen, Seneca, etc. Aristotle may think that analogical arguments are not as good as demonstrative arguments because they are only useful for rhetorical purposes. In practice, however, Aristotle uses analogy much more frequently than syllogistic demonstrations in his scientific writings.⁷⁴⁸ For Greek authors, analogy cannot demonstrate the truth, but it is fruitful and strong in promoting new theories. Hence, it is extremely widely used in early Greek speculative thought.

⁷⁴⁴ Lloyd (1966):175.

⁷⁴⁵ Lloyd (1996): 76.

⁷⁴⁶ Cikoski (1975): 325.

⁷⁴⁷ Reding (1986): 41-42.

⁷⁴⁸ cf. Lloyd (1966): 408, 412, 414; (1968): 68-83; (1973). See also Wilson (1997). Olszewsky (2011).

Here, we shall first talk about the use of analogies in ancient medical texts in general. Similar to the Hippocratic writers, ancient Chinese medical writers also relied heavily on analogies to explain physiological and pathological phenomena and they frequently employed a series of similar or parallel analogies in order to form a picture of the entire system.

For example, in a passage in *Huangdi Neijing*, analogies are applied extensively to elucidate the functions of bodily parts. In order to emphasize the superiority of the heart, a medical writer describes the human body in the image of a bureaucratic system. To each internal organ is attributed the title of a governmental office, and the heart has the highest power of all. In answer to the question of how the bodily parts drive each other, the Chinese master says,

The cardiac system is the office of the monarch; consciousness issues from it.

The pulmonary system is the office of the minister-mentors;

oversight and supervision issues from it.

The hepatic system is the office of the General; planning issues from it.

The gall bladder system is the office of the rectifiers; decisions issue from it.

The shanzhong system is the office of the envoys; joys issue from it.

The splenic system and the stomach system are the office of granaries;

victuals issue from it.

The large intestine system is the office of transmission; transformation issues from it.

The small intestine system is the office of reception; transformed staff issues from it.

The renal system is the office that exerts great strength; skill issues from it.

The sanjiao system is the office for clearing channels; waterways issue from it.

The urinary bladder system is the office of the regions;

*the body fluids are stored in it, enabling transformation of qi to issue from it.*⁷⁴⁹

There is a cluster of sub-analogies. They share the same structure and make a perfect parallel with each other. As a whole, the passage gives a rather systematic explanation for the functions of the body. The target domains of the sub-analogies are in the same category of bodily parts, including the cardiac, pulmonary, gall bladder, *shanzhong*, spleen, large intestine, small intestine, renal, *sanjiao*, and urinary bladder systems. As a matter of fact, if the author likes, the analogy can further be extended and applied to other parts of the body (e.g. hands, feet, eyes, ears, hair, bones, blood, etc.). The base domains of the sub-analogies are in the same category of governmental offices, including the offices of the monarch, minister-mentors, General, rectifiers, envoys, granaries,

749 *Suwen* 8: 66 (靈台秘典論). Translated by Lloyd (1983):192-193. Unschuld P. and Tessenow, H. (2011): 155-159.

transmission, reception, regions, clearing channels, and the office that exerts great strength. In such a manner, the bodily system makes a perfect match with the bureaucratic system. It is about the body politics and ‘the social hierarchy of the visceral system’.⁷⁵⁰

In ancient Chinese medicine, the heart is significantly superior to any other organ. It plays the most important role in ordering the body. The body will be diseased when the heart fails in its function, as a country will be disordered when its ruler fails in his function. In the ancient Chinese language, the word for ‘treating diseases’, *zhi* 治, also contains the meaning of ‘regulating government’. It is believed that a good doctor should also know how to diagnose and cure the disease of a country. For example, there is an interesting story in *Chunqiu Zuozhuan* 春秋左傳. The marquis of Jin tries to get medical help from Qin. The ruler of Qin sends doctor He to him. After the diagnosis of the King, doctor He says that the disease is incurable because the marquis of Jin indulges in women too much. Doctor He further predicts that the country of Jin will fall into disorder soon because the disease of the country is more difficult to cure than the disease of the body.⁷⁵¹ The same story is repeated in *Guoyu* 國語. Wenzi asks doctor He, ‘Does medicine apply to a country?’ He answers, ‘A good doctor should know how to cure the disease of a country. An ordinary doctor should know how to cure the disease of a human. This is the responsibility of a doctor.’⁷⁵² In the story of doctor He, there is also an analogy between the bodily and bureaucracy systems, but the direction in which the analogy is made is the opposite to that in the *Huangdi Neijing*. This time, knowledge of the body is borrowed to elucidate the running of a country.

In ancient Greek literature, we can find similar political analogies. For example, in ps.-Aristotle’s *De Mundo*, the author makes an analogy of the Great King of Persia. The king resides in a splendid palace surrounded by walls. He is invisible to all, just as the god is invisible to all.⁷⁵³ Similar to Chinese medical authors, Aristotle also emphasized that the heart is significantly superior to any other organ. He insisted that the heart or the counterpart of the heart must be the part first formed in embryonic development because it is the first principle of the body.⁷⁵⁴ For Aristotle, the

750 Sivin (1995): 10.

751 *Chunqiu Zuozhuan* 10:1221-1223 (昭公).

752 *Guoyu* 14:473 (晉語九).

753 cf. Betegh, G. and Greogric, P. (2014): 576.

754 *GA* 740a2-4; 741b16-18; 742b35-39; 743b25-33.

formation of the heart bears significant meaning. It is a symbol for the beginning of a new life. Aristotle made an analogy for this. If a son wants to have his own family independent of his father, he first needs to set up a house of his own. In the same way, if an embryo is going to declare itself as a new life independent of its parent, it is necessary to form the heart in the first step.⁷⁵⁵

Greek medical writers tried hard to understand illnesses that reside in the cavities of the body. They did not make human dissections to reveal the hidden secrets of the body until the Hellenistic period.⁷⁵⁶ Before that, they frequently used analogies as a tool to explain the body. From the time of pre-Socratic philosophers onwards, it was well known that ‘the visible is the eye of the invisible’.⁷⁵⁷ Many Hippocratic physicians appealed to external phenomena and daily experience so as to illuminate internal structures and functions. In such a manner, they reconstructed an invisible internal world from objects that can be seen. As the author of *Ancient Medicine* suggested, ‘one should derive an understanding of these things from what is externally manifest’.⁷⁵⁸ There were several Hippocratic authors who followed this principle. The author of *Regimen* also advocated that men should understand ‘how to observe the invisible through the visible’.⁷⁵⁹ In his words, ‘By the visible it gets knowledge of the invisible, by the invisible knowledge of the visible’.⁷⁶⁰ It suggests that analogies may go in two directions: (1) from the visible to the invisible and (2) from the invisible to the visible.

Among all Hippocratic writers, the author of *Generation/Nature of the Child* was truly ‘a giant in the art of analogy’.⁷⁶¹ The first sentence of his treatise is that ‘all things are governed by *nomos*’.⁷⁶² The *nomos* of the human generation is the same as the *nomos* of other things. Even if the embryo cannot be observed directly by the eyes, the nature of the process can be inferred from other observable phenomena. It is the basis of his methodology that the invisible can be explored through the visible. The basic assumption is that the seen and unseen share the same *nomos*. From this point of view, embryological knowledge can be acquired from plants, chicken eggs and

755 *GA* 740a6-9;

756 Nutton (2013): 128-139.

757 Democritus, DK59b12a.

758 *VM* 22, Li I 17.

759 *Vict.* 11, Li 486.

760 *Vict.* 12, Li 488.

761 Jouanna (1999): 318.

762 *Genit.* 1.1, Li VII 470.1.

whatsoever it might be, so far as it is legitimate to compare them.⁷⁶³ In this way, the author solved the problem of how we can explore the embryo even if we cannot see it at all. He wanted to persuade audiences that his embryological theory was drawn from ‘what is clear’ (τοῖσιν εμφανέσι).⁷⁶⁴ For example, the moisture of the body turns to liquid and foams when it is agitated by movement, similar to the way in which all other liquids foam when they are agitated {B (Agitated Liquid: Foam) :: T (Agitated Moisture of the Body: Foam-like Semen)}.⁷⁶⁵ A man’s seed falling into the uterus extinguishes a woman’s warmth and pleasure, just like cold water pouring into the boiling water ends the boiling {B (Cold Water: End Boiling) :: T (Male Seed: End Pleasure)}.⁷⁶⁶ The male and female seeds will become concrete when they mix together, similar to how wax and fat will solidify when they mix together {B (Mixed Wax and Fat: Solidification) :: T (Mixed Seeds: Concretion)}.⁷⁶⁷ Milk will be produced when fatty material is pressed by the uterus, just as oil will come out when the skin of leather is pressed {B(Pressed Leather: Oil) :: T (Pressed Uterus: Milk)}.⁷⁶⁸

Moreover, the author of *Generation/Nature of the Child* introduced some rudimentary tests to recreate a circumstance which is similar to the condition of the embryo in the womb. These tests transform hidden matters into visible signs which can be more clearly deciphered and easily understood. The various uses of analogy have a common narrative pattern. The author of *Generation/Nature of the Child* usually first describes what he wants to argue for and then gives a test of a similar condition. If you can understand the tests, you are supposed to understand what happens to the embryo. For example, when he tries to explain the necessity of breath for the growth of the embryo, he borrows the test of burning wood. The growing embryo needs cold breath when it is warmed, just like the burning wood needs cold air when it is heated {B (Air: Wood) :: T (Breath: Embryo)}. They can be compared because they follow the same *nomos*: ‘For everything that is warmed sends out breath, and draws back fresh, cold air in return, from which it is nourished’.⁷⁶⁹ When he tried to argue that the size of the child is determined by the size of the womb, he used the

⁷⁶³ *Nat. Puer.* 29.2, Li VII 530.

⁷⁶⁴ *Genit.* 7.1, Li VII 478.

⁷⁶⁵ *Genit.* 1, Li VII 470.

⁷⁶⁶ *Genit.* 1, Li VII 474-476.

⁷⁶⁷ *Genit.* 6.2, Li VII 478.

⁷⁶⁸ *Nat. Puer.* 21, Li VII 512.

⁷⁶⁹ *Nat. Puer.* 12.2-4, Li VII 486-488.

test of a cucumber. The child cannot fully grow up in a narrow womb, just like a cucumber cannot finish blooming without sufficient space in a cup {B (Cucumber: Cup) :: T (Child: Womb)}. The *nomos* is the same: ‘If it has open space for its increase, it grows larger, but if it has only a narrow space, it grows smaller’.⁷⁷⁰ When he tried to explain the mechanism of differentiation in the embryo, he borrowed the test of separating sand. The seed and flesh are articulated in the same way as the separation of sand {B (Separation: Sand) :: T (Differentiation: Embryo)}. The *nomos* is the same: ‘each component in them moves to what is similar to itself’.⁷⁷¹ The author was very good at borrowing everyday examples to elucidate the obscure subject of embryonic formation.

Indeed, analogy was a common strategy for both Greek and Chinese authors. It is a way of thinking and reasoning that they used to persuade themselves and their audiences. However, a further investigation will reveal that the choosing of different images plays a significant role in the formation of different embryological knowledge. Greek and Chinese analogies have distinctive features for many reasons. I want to argue that the different understandings of the embryo in ancient Greece and early China were closely related to different applications of images in the process of analogical reasoning. Generally speaking, Greeks and Chinese understood the target domain of the embryo differently because they chose different images for the base domain. Interpretations of the embryo entailed radically diverging expectations about what it could and should be compared to.

The different choices of the base domain may lead to fundamental differences in one’s understanding of the subject. For the same target domain, it is quite possible to choose several alternative base domains. Sometimes one author might adapt several different base domains to emphasize different aspects of one thing. For example, Aristotle borrowed the image of plants to emphasize that all nourishment comes from the mother. At the same time, he borrowed the image of carpenters to emphasize that the father plays a more active role in shaping the embryo. In the analogy of carpenters, the semen works on the material, just like the carpenter works on the wood {B (carpenter: wood) :: T (semen: material)}.⁷⁷² In order to make a clear definition of ‘nature’,

770 *Genit.* 9.1-3, Li VII 482.

771 *Nat. Puer:* 6, Li VII 498.

772 *GA* 729b13-18; 730b5-10; 743a20-27.

Aristotle borrowed a wealth of analogical images⁷⁷³ (e.g. a modeller in clay,⁷⁷⁴ a painter,⁷⁷⁵ a house-builder,⁷⁷⁶ and a house-keeper.⁷⁷⁷). No matter what, the choice of the base domain will surely influence the understanding of the target domain.

In Greek literature, the embryo is frequently compared to plants. This phenomenon exists widely in a variety of different works. In this botanical analogy, the relationship between the embryo and the womb is just like the relationship between the plant and the land. In *Nature of the Child*, the author spent several pages to describe the growth of plants in order to illustrate the process of embryonic growth. From the author's point of view, 'the growth of things out of Earth and human growth are exactly parallel'.⁷⁷⁸ He emphasized from time to time that since all the nutrition of the embryo comes from the mother, the constitution of the child must depend on that of the mother, 'just like things growing in Earth are also nourished from Earth' {B (Plants: Earth)::T (Embryo:Womb)}.⁷⁷⁹ If there is a narrowness in the uterus, the foetus will be unable to grow properly, 'just like trees in Earth that lack an open space because they are blocked off by a stone or some other object grow twisted or are thick in one part and thin in another' {B (Plants: Stone):: T (Embryo: Blocks)}.⁷⁸⁰ In the growth of the foetus, the bones branch out to be hands, feet and nails when they are solidified, 'just like the very extremities of a tree branch out' {B (Plants: Branches):: T (Foetus: Hands)}.⁷⁸¹

Aristotle held the same view that the formation and growth of the embryo are directly influenced by the condition of the mother. The botanical analogy is even employed in his *Politics*, 'For children before birth are evidently affected by the mother just as growing plants are by Earth.'⁷⁸² In *Generation of Animals*, the botanical analogy is used to emphasize that it is the mother who provides the material for the embryo. 'Just as happens when seeds are introduced into a strange locality – the plants take after the soil, the reason being that the soil provides the material – i.e., the

773 Lloyd (1987): 187-188.

774 *GA* 730b27; *PA* 654b29.

775 *GA* 743b20; 764b30.

776 *PA* 668a16.

777 *GA* 744b16; *PA* 675b20.

778 *Nat. Puer.* 27, Li VII 528. For botanic analogy in Hippocrates, see Holmes (2017).

779 *Nat. Puer.* 22.1–26.5, Li VII 514-528. Lonie (1981):189; Lloyd (1966):345-360.

780 *Genit.* 9.1-3, Li VII 484.

781 *Nat. Puer.* 19.1-3, Li VII 506. See also *Nat. Puer.* 6, Li VII 498.

782 *Pol.* 1335 b18-19.

physical body – for the seeds.’⁷⁸³ Indeed, the embryo totally depends upon the mother for its nourishment. ‘The foetus’s growth is supplied through the umbilicus in the same way that a plant’s growth is supplied through its roots.’⁷⁸⁴ In this analogy, the umbilicus is compared to the roots. In another analogy, the vessel system is compared with the irrigation system. Just like in a garden, the blood-vessels of the mother provide irrigation for the nourishment of the embryo.

*The embryos are attached each to its umbilicus, and the umbilicus is attached to the blood-vessel; they are arranged one after the other along the stream of the blood-vessel as it might be along a runnel in the garden; and there are membranes and a chorion around each embryo.*⁷⁸⁵

Aristotle also made analogies of plants to explain the process of embryonic formation.

*The embryos that are in process of formation, either within the egg or within the uterus, are to begin with living life of a plant, since their first growth and nourishment they obtain through being fastened on to something.*⁷⁸⁶

The botanical analogy is not the new creation of Hippocratics and Aristotle. Many authors of Greek tragedy, notably Sophocles and Aeschylus, liked to describe the body of a virgin as an uncultivated field waiting for sowing. They emphasized the effort of the male who sows seeds and reaps fruits as an agricultural farmer. In such an analogy, the father’s role is much more important in generation. As it is stated in Sophocles’ *Trachiniae*, ‘We have had children now, whom he sees at times, like a farmer working an outlying field, who sees it only when he sows and when he reaps.’⁷⁸⁷ In Sophocles’ *Oedipus the Tyrant*, the miserable Oedipus sows his children in a place where his father once sowed him. He kills his father and does ‘a double sowing’ in his mother’s sacred womb.⁷⁸⁸ In Aeschylus’ *Seven against Thebes*, when Oedipus realized his guilt, he kills himself in shame and regret. ‘Father-murdering Oedipus, who sowed his mother’s sacred womb, whence he had sprung himself, with bloody root, to his heartbreak.’⁷⁸⁹ In Aeschylus’ *Eumenides*, Apollo makes a famous defense for Orestes’ matricide. In his explanation, a mother is not a blood relative, but ‘a

783 GA 738b34-35.

784 GA 740b9-11.

785 GA 746a16-18. PA 668a13ff, Plato, *Timaeus*. 77cff.

786 GA 753b26-30. GA 736b8-13.

787 Sophocles, *Trachiniae* 31-33.

788 Sophocles, *Oedipus the Tyrant* 1207-12, 1255-57, 1496-98.

789 Aeschylus, *Seven against Thebes* 750-55.

stranger' who takes care of the planted embryo.

*The mother of what is called her child is not the parent, but the nurse of the newly-sown embryo. The one who mounts is the parent, whereas she, as a stranger for a stranger, preserves the young plant, if the god does not harm it. And I will show you proof of what I say: a father might exist without a mother.*⁷⁹⁰

In Euripides' *Orestes*, Orestes uses such an analogy to defend his killing of his mother.

*My father begot me; your daughter gave me birth, being the field that received the seed from another; for without a father no child would ever be born. So I reasoned that I ought to stand by the author of my being rather than the woman who undertook to rear me.*⁷⁹¹

The container image even appears in Plato's works. In Plato's well-known *Timaeus*, the womb, as an indwelling creature desirous of child-bearing, wanders around the body until it is satisfied with the seed from a male. The job of husbands, in a sense, is to satisfy the womb, to plough the soil and to plant their seed. The text reads,

*They sow upon the womb, as upon ploughed soil, animalcules that are invisible for smallness and unshaped; and these, again, they mold into shape and nourish to a great size within the body; after which they bring them forth into the light and thus complete the generation of the living creature.*⁷⁹²

The container image can be even justified by some theories. It is reported that Anaxagoras has a theory that all parts of the body are present simultaneously in miniature form in the male seed. The bodily parts in the seed are invisible only because they are 'too small' (διὰ μικρότητα). 'Everything comes to be from things that are and are present, but that are imperceptible to us because of the smallness of their mass'.⁷⁹³ When the seed is planted in the womb, the miniature form will grow with the nourishment provided by the mother, but it keeps in the same shape. 'In the same seed there are hair, nails, veins, arteries, sinews, and bones, and although they happen to be invisible because of their microscopic size, as they grow, they gradually become distinct.'⁷⁹⁴

In these literatures, the womb is just like a soil field, waiting for the male to sow the seed. The

⁷⁹⁰ Aeschylus, *Eumenides* 657-664.

⁷⁹¹ Euripides, *Orestes*. 552-556.

⁷⁹² Plato, *Tim.* 91c-d. Wilberding (2015).

⁷⁹³ DK 59A52.

⁷⁹⁴ DK 59B10.

image of sowing the seed can also be found in medical texts. The Hippocratic author of *Generation* also compared an embryo developing in the womb with a plant growing to fulfil its container.⁷⁹⁵ Ann Ellis Hanson argued that the Hippocratic authors ‘shared with their society the notion that conception involved the casting of male seed deep into the woman’s womb, where it met the woman’s contribution and mixed with it.’⁷⁹⁶ In fact, the container image was also applied by Aristotle. In *History of Animals*, an inferior offspring is said to be ‘as if nourished in a poor container.’⁷⁹⁷ It is not a surprise to find the container image in Aristotle. No matter what, the female body is, by his definition, the place where the embryo is to be contained.

The botanical analogy contains a cluster of sub-analogies and these sub-analogies might appear in different texts. No single passage contains a coherent parallel of three sub-analogies. In order to make a better analysis of ‘the botanical analogy’, I would like to introduce the structure mapping theory of analogy proposed by Dedre Gentner in cognitive psychology. Gentner found a pattern in the analogical reasoning: The analogy ‘a T is (like) a B’ defines a mapping from the Base Domain (B) to the Target Domain (T). In other words, in every analogy between domains T and B, there are potential correspondences or similarities that could be mapped from B to T during the process of analogical reasoning. Assuming that the domain B has object nodes b_1, b_2, \dots, b_n , and predicates A, R, R’, and the domain T has object nodes t_1, t_2, \dots, t_n , there will be many possibilities of correspondences ($M: b_i \rightarrow t_i$). There are three steps for mapping: (1) Discard *Attributes (A)* of objects, e.g. Yellow (Sun): $A(b_i) \text{ -/- } A(t_i)$; (2) Try to preserve *Relations (R)* between objects (e.g. Revolve Around (Planet, Sun): $R(b_i, b_j) \rightarrow R(t_i, t_j)$); (3) (The Systematicity Principle) To decide which relations are preserved, choose systems of relations: $R' [R_1(b_i, b_j), R_2(b_k, b_i)] \rightarrow R' [R_1(t_i, t_j), R_2(t_k, t_i)]$.⁷⁹⁸ Joseph Little summarized six principles of the mapping theory: (1) structural consistency; (2) relational focus; (3) systematicity; (4) no extraneous associations; (5) no mixed analogies; (6) analogy is not causation. It is argued that scientists ‘draw’ analogies in accordance with these six principles regardless of audience or purpose.⁷⁹⁹

⁷⁹⁵ *Genit.* 9.1-3, Li VII 482.

⁷⁹⁶ Hanson (1995): 298.

⁷⁹⁷ *HA X* 635b13-15.

⁷⁹⁸ Gentner (1983):157-160. See also Hall (1989): 40-41; Volkov (1992): 21.

⁷⁹⁹ Little (2000): 74.

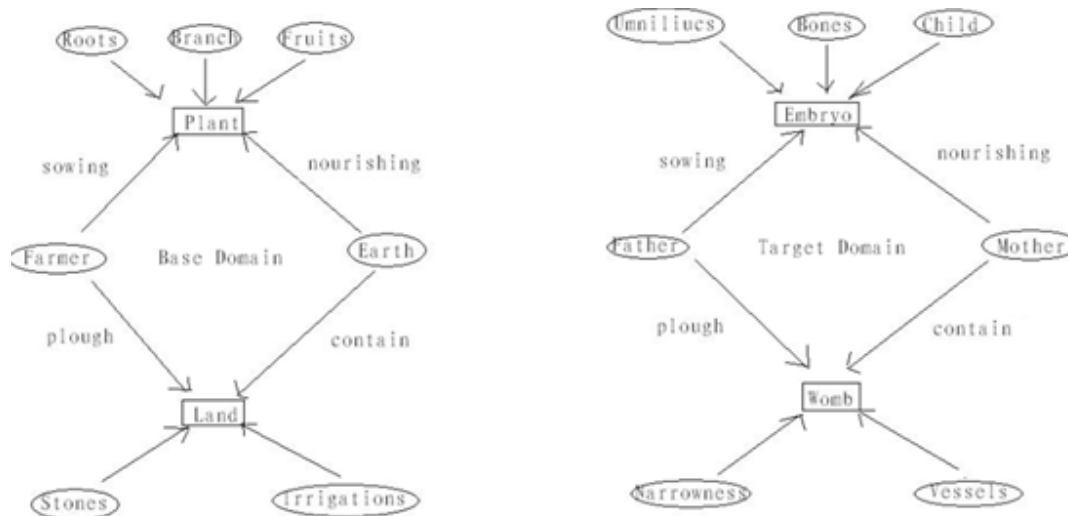


Figure: Botanical Images in Embryological Analogy

In fact, ‘the botanical analogy’ satisfies all of Gentner and Little’s requirements for the notion of structure mapping. It is quite easy to establish mapping between elements of the base domain (plant: land) and the target domain (embryo: womb). Therefore, when the Greek authors compared the embryo to plants, they used the familiar elements or relations from the base domain (plant: land) to interpret the unfamiliar elements or relations of the target domain (embryo: womb). In such a way, they built a new structure for the embryo based on the established structure of plants, which were believed to correspond with each other.

However, it is not granted that people must borrow the base domain of plants to explain the embryo. It is quite hard to find any text in early China that compared the embryo to plants. You might argue that the ancient Chinese were not interested in plants. As a matter of fact, the early Chinese character for women (女 *nǚ*) is a symbol of a kneeling human figure with a pair of large breasts, while the character of men (男 *nán*) is a symbol of a square land and a furrow ploughing the land. This difference indicates the social division of labours in that females should take care of households, while males should perform agriculture and planting. Shigehisa Kuriyama argued that botanical languages ‘appear ubiquitously in Chinese writings’.⁸⁰⁰ Physicians borrowed a lot of

⁸⁰⁰ Kuriyama (1999):186.

botanical terms to describe health and diseases (e.g. *ben* 本(origin), *gen* 根(root), *jing* 莖(stem), *ye* 葉 (leaf), *rong* 榮 (flourish), *hua* 華 (blossom), *se* 色 (colour), *ku* 枯 (wilts), *wei* 痿 (desiccate)). The human face is usually compared to flowers. In daily language, the beauty of women is frequently associated with the beauty of flowers. In medicine, it is believed that the body's essence would be reflected on a person's face. If a man is healthy, his face will be vibrant, like a blossoming flower. If a man becomes ill, he will turn pale, like a withered flower. For this reason, physicians examined the face of patients 'in much the same way that a gardener eyes the flourishing or decline of his plants.'⁸⁰¹ There is an interesting dialogue in *Huangdi Neijing*.

黃帝曰：一時遇風，同時得病，其病各異，願聞其故。少俞曰：善乎其問！請論以比匠人。匠人磨斧斤，礪刀削斷材木。木之陰陽，尚有堅脆，堅者不入，脆者皮弛，至其交節，而缺斤斧焉。夫一木之中，堅脆不同，堅者則剛，脆者易傷，況其材木之不同，皮之厚薄，汁之多少，而各異耶。夫木之蚤花先生葉者，遇春霜烈風，則花落而葉萎；久曝大旱，則脆木薄皮者，枝條汁少而葉萎；久陰淫雨，則薄皮多汁者，皮漉而淺；卒風暴起，則剛脆之木，枝折机傷；秋霜疾風，則剛脆之木，根搖而葉落。凡此五者，各有所傷，況於人乎！黃帝曰：以人應木，奈何？少俞答曰：木之所傷也，皆傷其枝。枝之剛脆而堅，未成傷也。人之有常病也，亦因其骨節皮膚腠理之不堅固者，邪之所舍也，故常為病也。

*Huangdi asks, 'People once encountered wind and got diseases at the same time, but their diseases were different. I want to know the reason.' Shaoyu answers, 'Good question! Let us think about carpenters. Carpenters shaped axes. They used axes to cut trees. The trees have yin and yang. Some are rigid. Some are loose. It is hard to cut the rigid part. It is easy to cut the skin of the loose part. When it comes to the joints, however, the axes might even be damaged. There are differences in firm and loose in one tree. The firm part is strong. The loose part is weak. Now, there are different trees. The thickness of skin is different. The amount of fluid is different. If a tree has early flowers, when it encounters spring frost and strong wind, the leaves will wither due to the decline of flowers. If a tree is fragile with thin skin, when it encounters long drought, the leaves will wither due to the lack of fluid in branches. If a tree has thin skin with abundant fluids, when it encounters long rains, the leaves will drop due to excessive water. If a tree is too rigid, when it encounters a storm, the leaves will drop due to the shaking of roots. For these five types of trees, they each have their own damage, not to mention humans!' Huangdi further asks, 'How to correspond humans to trees?' Shaoyu answers, 'When trees have damages, all happens in branches. If the branches are firm and strong, it is impossible to have damages. Humans always have diseases because the joints and the skin are not firm and strong. Evils hide in these places. Hence it is frequent to have diseases.'*⁸⁰²

In the dialogue, Shaoyu uses several analogies of trees to explain the results of different

801 Kuriyama (1999):187-191.

802 *Lingshu* 46: 279 (五變). My translation.

diseases by wind. The image of plants is borrowed to reconstruct the understanding of body and diseases. Indeed, ancient Chinese were good at making botanical analogies. They could make a further application of botanical analogies into the understanding of the embryo, but they did not make this choice. Greeks drew a picture of embryonic growth following the model of plants, but Chinese did not have this picture. Umbilicus, which is important in the botanical analogy as the roots of the embryo, is rarely mentioned in early Chinese literature. Furthermore, there is no Aristotelian concept that the embryo must go through a phase of plants with the nutritive soul.

I want to further argue that the adoption of a certain base domain depends upon its cultural circumstances and technical development. As I have mentioned, the base domain usually comes out of knowledge of everyday life. However, what is everyday life in one culture is not necessarily everyday life in another. For example, when Aristotle wanted to explain the different functions of the semen provided by the male and the material provided by the female, he frequently made the analogy of the coagulation of milk.⁸⁰³ In his analogy, the semen concentrates and fashions the material, similar to the way in which fig juice sets and curdles milk {B (fig-juice:milk) :: T (semen:material)}. Moreover, the semen dissolves and evaporates after the work, just as fig juice does. Fig juice undergoes a change; it does not remain as a part of the bulk which is set and solidified; and the same applies to the semen.⁸⁰⁴ It must be knowledge of everyday life in ancient Greece that fig juice can be used to set and curdle milk. However, ancient Chinese did not have knowledge that fig juice could be used to set and curdle milk. If a Chinese author made the same analogy by using fig juice, no one would understand it.

The Greek analogies of cooking might face similar difficulties in ancient China. Greek authors liked to use the image of cooking, which ‘in the broad sense of the term remained the preferred field of reference’.⁸⁰⁵ Ann Ellis Hanson also suggested that ‘analogies for gestation derived from cooking enjoy wide currency.’⁸⁰⁶ Indeed, Hippocratic authors favoured much the image of cooking in making analogies. In *Nature of the Child*, the heated embryo will form a membrane where it

803 GA 729a10-15; 737a12-17; 771b22-24.

804 GA 737a12-17.

805 Jouanna (1999): 319.

806 Hanson (1995): 302.

comes into contact with the air, just like the baked bread will form a crust where it comes into contact with the air {B (Crust: Baked Bread) :: T (Membrane: Heated Embryo)}.⁸⁰⁷ The concept of concoction (πέψις), literally ‘cooking’, is extremely important in Aristotle’s biology, particularly in his embryology.⁸⁰⁸ In order to emphasize that the semen and the material must have the appropriate proportions, Aristotle compared the relationship between the semen and the material with the relationship between fire and food {B (Fire: Food) :: T (Semen: Material)}. ‘The case will be the same as what happens when you are cooking: if there is too much fire it burns up your meat, if there is too little it will not cook it.’⁸⁰⁹ In order to explain the formation of bones, Aristotle compared the relationship between the bones and the womb with the relationship between Earthenware and the oven {B (Earthenware: Oven) :: T (Bones: Womb)}. ‘Bones (like earthenware) cannot be dissolved by fire; they have been baked as it were in an oven by the heat present at their formation.’⁸¹⁰

In most cases, the relation between the foetus and the womb is compared with the relation between the food and the oven {B (Food: Oven) :: T (foetus: Womb)}.⁸¹¹ These analogies are surely based on everyday life of cooking for ancient Greeks. However, ancient Chinese had different habits of cooking and different favourite foods. The Greek knowledge of cooking might not be understandable in the Chinese contexts. For example, most ancient Greeks probably knew how to cook bread, but most ancient Chinese did not know. More importantly, Chinese rarely used ovens for cooking. They preferred tripods. Even today, Westerners like to roast food, while Chinese still like to boil food. The habits of cooking and eating always had a great deal of variety in different cultures. Therefore, if a Chinese author would like to borrow the Greek analogies of cooking, it is necessary to change them into Chinese styles so that audiences can understand them.

Another important example is Aristotle’s analogy of the automata (τὰ αὐτόματα). Aristotle used analogy as an important tool in his exploration of embryology. He once borrowed plants, animals, and even technology as a model for developing embryos. On some occasions, he compared

807 *Nat. Puer.* 12.6, Li VII 488.

808 Lloyd (1996):83.

809 *GA* 767a20-23.

810 *GA* 743a18-20.

811 e.g. *GA* 719a30; 729a15; 730a15; 741b1; 757a15.

the developing embryo to physical objects (e.g. the automatic puppets). ‘As the parts of the animal to be formed are present potentially in the matter, once the principle of movement has been supplied, one thing follows on after another without interruption, just like it does in the miraculous automatic puppets.’⁸¹² In this analogy, the semen provides the principle of movement for the developing embryo, similar to the way in which the external agent activates automatic puppets { B (the external agent: the automatic puppets) :: T (the semen: the developing embryo)}. The automatic puppets have a mechanism of self-movement that once triggered by an external agent allows movements to be passed from one to another by a series of physical gears.⁸¹³ Sometimes, Aristotle also applied the analogy of the automata to explain animal motions.⁸¹⁴ He compared the tendons and the bones of the body to the iron and the cables of the automatic puppets. The complex structure of the tendons and the bones builds a system of internal parts in the human body. There is a chain of causes and effects.

Similarly, Aristotle supposed that there should be a system of internal gears inside the embryo so that the internal movements could continue automatically when the father was no longer in direct contact with the material. ‘It is possible that A should move B, and B move C, and that the process should be like that of the miraculous automatic puppets.’⁸¹⁵ In Aristotle’s model, the semen provides the cause of movements in one way and drives the continuity of movements in the embryo in another way.⁸¹⁶ However, there is a problem. As Devin Henry pointed out, Aristotle should compare the father to the engineer who constructs the device rather than the operator who triggers its motion, because the father needs to be responsible for the mechanism that generates its internal motion.⁸¹⁷ The embryonic development does not follow the same pattern as automatic puppets which move in an uninterrupted sequence like the marvels. Henry suggested that none of the devices available at the time seem to have suited Aristotle’s purposes because what Aristotle actually needed for his analogy is ‘a pre-programmed automaton in the modern sense (one that owes its movements to the

812 *GA* 741b8-10.

813 Berryman (2003):245; Henry (2005): 4.

814 *MA* 701b1-10.

815 *GA* 734b9-19.

816 Berryman (2003): 249; Henry (2005): 31.

817 Henry (2005): 34.

execution of a computer programme).⁸¹⁸ Even if this conclusion is still susceptible to critique, it is clear that the use of analogy is limited to the level of technical development of the time. Aristotle could only borrow the image of automatic puppets for his purpose at a time when computers were a long way from being invented. When Aristotle made the analogy of the automata, he must have assumed that some Greeks could understand what automatic puppets are. It is well known that some Greeks (e.g. Hero of Alexandria) were quite interested in research on automata and invented some complex mechanical devices.

6.2 Macrocosm and Microcosm

It is well known that embryology and cosmology had close links since early philosophers started to debate the question of ‘coming-to-be’, which was a common issue in both ancient Greece and early China. The study of cosmology provided a basic conceptual framework for the study of embryology, and vice-versa. It is also well known that there was a commonly held idea, in both the western and the eastern traditions, of the existence of a macrocosm and a microcosm.⁸¹⁹ This idea referred to perceived resemblances or correspondences between the cosmos (or Heaven and Earth) and the human body. It can be regarded as a special kind of analogy. The human body, as the largest individual unit of a being, corresponds to the largest entity in existence — the cosmos (or Heaven and Earth). In return, the cosmos corresponds to the human body as well. In this section, I will examine the close relationship between cosmology and embryology and I will explore how the idea of macrocosm and microcosm was applied in the construction of embryological knowledge in the ancient worlds.

On the Greek side, we know that the idea of macrocosm and microcosm was widespread.⁸²⁰ Almost all early natural philosophers were fascinated with questions of origins. Under the aegis of ‘embryology’ in the broader sense, concerning ‘the generation of everything’ or ‘coming-to-be’ (γίγνεσθαι), they put forth all sorts of theories about basic element(s), mechanisms of change, and so on. They surely held various opinions, since debates among the monists and the pluralists lasted

818 Henry (2005): 39-40.

819 Sivin, N. (1995b); Lloyd, G. (1996b).

820 Perrigo (1922); Baldry (1932); Wilford (1968); Lloyd (1996): 190.

throughout the era. In their thinking, the generation of the universe was similar to the generation of a human life. That was one reason why the natural philosophers usually had a strong interest in embryology. More importantly, when they gave explanations to the basic element(s), they frequently adopted embryological arguments. Anaximander (c. 547 B.C.E.) combined his cosmogony with the prevailing embryology. Since he regarded the universe as animate, he drew an analogy between the development of the matrix of the universe and the development of the embryo in animals, saying that the universe is generated from a kind of world-egg (γόνιμον, a germ). He regarded moisture and heat as the generative powers employed in the genesis of the universe and of living creatures alike.⁸²¹ Empedocles (c. 492–432 B.C.E.) also connected his cosmogony with embryology and related the generation of animal life in this world with the cosmic cycle.⁸²²

If embryology was borrowed to construct cosmology by early natural philosophers, then to a certain degree embryology is constructed from cosmology in the Hippocratic writings. In *Nature of the Child*, ‘like-to-like’ is a general principle that governs the universe, which the formation of the embryo must naturally follow.⁸²³ In *Fleshes*, the generation of a human resembles the generation of the universe.⁸²⁴ In *Regimen*, cosmology is widely used in the arguments, under at least two aspects. The first aspect is that the universe and the human are generated from the same elements, fire and water, which are ‘different in power but working together in their use.’⁸²⁵ The two elements, fire and water, are sufficient to compose all things throughout the universe ‘unto their maximum and the minimum alike.’⁸²⁶ They contain different qualities: fire is hot and dry, while water is cold and moist.⁸²⁷ Generation and destruction are just simply ‘mingling and separating’ the two elements in the process of constant change, therefore ‘of all things nothing perishes, and nothing comes into being that did not exist before.’ In such a sense, ‘becoming’ and ‘perishing’ are the same thing.⁸²⁸ The human body is also composed of fire and water, as is the soul.⁸²⁹ Both the body and the soul

821 DK 12A10; DK 12A27; Guthrie (1962): 90-92.

822 DK 31A72; Guthrie (1969): 201-211.

823 *Nat. Puer.* 17.1, Li VII 496.

824 *Carn.* 2-14, Li VIII 584-602.

825 *Vict.* 1.3, Li VI 472.

826 *Vict.* 1.3, Li VI 472.

827 *Vict.* 1.4, Li VI 474.

828 *Vict.* 1.4, Li VI 474-476.

829 *Vict.* 1.7, Li VI 480. *Vict.* 1.25, Li VI 494.

are nourished and increased by the diet, so it is necessary that the diet contain both, fire and water.⁸³⁰

The second aspect is that the process of generation imitates the mechanics of the universe. In the formation of the embryo and the parts of the body, the hottest and strongest fire governs all things, ordering all things according to nature.⁸³¹ This process imitates the smooth operation of the universe in the internal workings of the embryo by creating three groups of ‘circuits’: ‘...those towards the hollows of the moist, the power of the moon; those towards the outer circumference, toward the solid enclosure, the power of the stars; the middle circuits, bounded both within and without.’⁸³² In this rehearsal of the revolution of the universe, the active fire controls two opposite movements at the same time, making dry from moist and moist from dry, just like potters spinning a wheel, shifting forwards and backwards at the same time.⁸³³

Aristotle’s embryology is even more wedded to his cosmology. In his works, there is an ambition to comprehend the whole universe, including humans, animals, plants, and all other beings, no matter how big or how small. There are four causes co-operating throughout the cosmos as the highest principle in generating everything: the final cause, the motive or efficient cause, the formal cause, and the material cause. The universal principles should be applied in the generation of humans and most other animals. Aristotle’s most unique embryological theory, as he repeatedly emphasized again and again, is that the father provides the formal cause (the form), the motive cause (the principle of movement), and the final cause (the purpose), while the mother provides the material cause (the body).⁸³⁴ Moreover, Aristotle even thought that the development of the embryo is indirectly influenced by some heavenly bodies.

*The moon is a ‘principle’ on account of its association with the sun and its participation in the sun’s light, being as it were a second and lesser sun, and therefore is a contributory factor in all process of generation and perfecting. As we know, it is heat and cooling in their various manifestations which up to a certain due proportion bring about the generation of things, and beyond that point their dissolution; and the limits of these processes, both as regards their beginning and their end, are controlled by the movements of these heavenly bodies.*⁸³⁵

830 *Vict.* 1.7, Li VI 480.

831 *Vict.* 1.10, Li VI 486.

832 *Vict.* 1.10, Li VI 486. Schluderer (2018).

833 *Vict.* 1.22, Li VI 494.

834 *GA* 715a5-8.

835 *GA* 777b16-31.

On the Chinese side, we can easily find the idea of macrocosm and microcosm in combined embryological and cosmological discussions. Early Chinese natural philosophers also used embryology to make cosmological arguments. *Guanzi* has a special chapter named *Shuidi* 水地 (*Water and Earth*), in which it is argued that water and earth are the truly basic materials in the formation of the world. For such a purpose, embryonic growth is used as an example of the importance of water. Water plays such an important role in the formation and development of the embryo because the embryo follows the same pattern as the universe.

*Man is water. When the vital essence and vital force of male and female unite, water passes between them and assumes form. At the third month the resulting fetus begins to suck. What does it suck? The answer is the five tastes. What do these five tastes produce? The answer is the five viscera. The sour produces the spleen, the salty produces the lung, the acrid produces the kidneys, the bitter produces the liver, and the sweet produces the heart. After the five viscera have been formed, they produce the five constituents of the body. The spleen produces the membranes, the lungs produce the bones, the kidneys produce the brain, the liver produces the skin, and the heart produces the flesh. After the five constituents of the body have been formed, the nine apertures are developed. The spleen develops to form the nose, the liver develops to form the eyes, the kidneys develop to form the ears, the lungs develop to form the mouth, and the heart develops to form the lower apertures. By the fifth month the fetus is fully formed; in the tenth month it is born. At birth, the eyes see, the ears hear, and the mind thinks. What the eyes see is not limited to the sight of mountains and peaks. They may also examine what is indistinct and minute. What the ears hear is not limited to the sound of thunder and drums. They may also examine a sigh or a baby's cry. What the mind thinks about is not limited to understanding what is coarse and gross. It may also examine what is fine and subtle. Thus together they provide an understanding of the essence of all that is important.*⁸³⁶

In *Taichanshu*, the cosmological five phases were applied to the construction of embryological knowledge.⁸³⁷ It shows that embryonic development is closely linked with the five phases from the fourth month to the eighth month. In each month, the embryo is bestowed with the power of a particular phase. When the author used water, fire, metal, wood and earth to describe different phases of the embryo, he drew upon the contemporary philosophical, cosmological and political meaning of the five phases. At the same time, he associated them with blood, *qi*, tendons, bones, and skin separately, which is strong evidence that he must have known something about the contemporary classification of myriad things according to the five phases. For example, in *Huangdi*

836 *Guanzi* 39: 815-816 (水地). Translated by Rickett (1998): 103-104.

837 MWD 4:136. See Harper (1998): 379-380.

Neijing, the five phases (water, fire, metal, wood and earth) are associated with marrow, blood, skin, tendons, and flesh, respectively.

Taichanshu is not the only text to associate water, fire, metal, wood, and earth with certain periods of time. In the astrological chapter of *Huainanzi*, the five phases were presented in a cosmological cycle of seventy-two days and were associated with five colours.

The whole year shifts by six days and begins again with renwu.

At the winter solstice, [the cyclical day] jiazi receives control.

[The phase] wood is used in all affairs, and the smoke of fires is bluegreen.

After seventy-two days, bingzi receives control.

[The phase] fire is used in all affairs, and the smoke of fires is vermilion.

After seventy-two days, wuzi receives control.

[The phase] earth is used in all affairs, and the smoke of fires is yellow.

After seventy-two days, gengzi receives control.

[The phase] metal is used in all affairs, and the smoke of fires is white.

After seventy-two days, renzi receives control.

[The phase] water is used in all affairs, and the smoke of fires is black.

After seventy-two [more] days, the year comes to an end,

and gengwu takes control.

The year shifts by six days so that the number may extend [to the full count of 366].

After ten years, [the sequence] begins again with jiazi.⁸³⁸

If we compare the two texts, it is quite easy to see that *Taichanshu* follows the same narrative pattern as the *Huainanzi*. Water, fire, metal, wood, and earth are each the dominant power for a certain period of time, alternatively in the cosmological cycles and the embryological cycles. There is a strong correspondence. Even if the author of *Taichanshu* did not compare the embryonic movements directly to the heavenly movements, I suggest that he must have been influenced to some extent by his contemporaries. Just as Heaven goes through phases of water, fire, metal, wood, and earth, the embryonic growth goes through similar phases as well. Hence, monthly embryonic growth in *Taichanshu* holds significant cosmological meaning. The two subjects, cosmology and embryology, come together following the same principles.

In *Huainanzi*, there is also a chapter on monthly embryonic growth. The author of this chapter employed the idea of macrocosm and microcosm in various ways. He used monthly growth of the

838 *Huainanzi*, chapter 3, 105(天文訓). Translated by Major, J.S. (2010): 128.

embryo as evidence for his argument that the human body resembles Heaven. In this text, embryology and cosmology are perfectly combined. The embryonic development strictly follows the development of the universe and there is a long list of one-to-one correspondences. It also explains the reason for abnormalities and disasters.

The Quintessential Spirit is what we receive from Heaven; the physical body is what we are given by Earth. Therefore, it is said, 'The one generates the two; the two generate the three; the three generate the myriad things. The myriad things carry the yin and embrace the yang and, through the blending of vital energy, become harmonious.' Therefore, it is said: 'In the first month, fertilization occurs. In the second month, a corporeal mass develops. In the third month, an embryo forms. In the fourth month, the flesh is produced. In the fifth month, the muscles form. In the sixth month, the bones develop. In the seventh month, the foetus forms. In the eighth month, the foetus starts to move. In the ninth month, its movements become more pronounced. In the tenth month, the birth occurs.' In this way, the physical body is completed and the five orbs are formed. Therefore, the pulmonary orb regulates the eyes; the renal orb regulates the nose; the choleric orb regulates the mouth; the hepatic orb regulates the ears; and the splenic orb regulates the tongue. The external ones are on the outer side; the internal ones are on the inner side. They open and close, expand and contract, and each has its conduits and connections. Therefore, the roundness of the head is in the image of Heaven; the squareness of the human feet is in the image of Earth. Heaven has four seasons, the five phases, nine regions, and 366 days. Humans have four limbs, five orbs, nine apertures, and 366 joints. Heaven has wind, rain, cold and heat; humans have taking, giving, joy and anger. Therefore, the choleric orb parallels the clouds; the pulmonary orb parallels the air; the hepatic orb parallels the wind; the renal orb parallels the rain; and the splenic orb parallels the thunder. In this way, human beings form a triad with Heaven and Earth, and the mind is the ruler of this. Therefore, the ears and eyes are the sun and moon; the blood and vital energy are the wind and rain. In the sun there is a three-legged crow; in the moon there is a speckled toad. When sun and moon err in their periodic motions, fireflies have no light, wind and rain are not appropriate to the season, and destruction occurs and disasters arise. When the five asterisms err in their periodic movements, provinces and states meet with calamity.⁸³⁹

We can see the combination of analogical reasoning with correspondence between microcosm and macrocosm. There is a cluster of sub-analogies. They share the same structure and make a perfect parallel with each other. The sub-analogies can be carried on following the same pattern. The text demonstrates how the human body (microcosm) forms a perfect correspondence with Heaven (macrocosm). A very similar text was attributed to the teaching of Laozi 老子 in the writing *Wenzi*.⁸⁴⁰ Despite slight differences, the text in *Wenzi* is almost the same as the saying in *Huainanzi*.

839 *Huainanzi* 7-7: 320-321 (精神訓). Translated by Major, J.S. (2010): 241-242.

840 Wang, Liqi. (2000), 115-116. van Els (2018), 165-166.

Hence, the two texts probably come from the same source.

In fact, the idea of microcosm and macrocosm exists throughout ancient Chinese non-medical and medical texts. The medical text *Huangdi Neijing* is full of cosmological analogies as well. In *Huangdi Neijing*, the principles of yin-yang and the five phases govern the body, diseases, and generation. The process of generation obeys the same principle that governs the whole universe. There is a special chapter which gives a full answer to the question of why the human body is a microcosm in reflection of the macrocosm. It also explains why sometimes a human cannot produce a child.

黃帝問於伯高曰：願聞人之肢節以應天地奈何？伯高答曰：天圓地方，人頭圓足方以應之。天有日月，人有兩目；地有九州，人有九竅；天有風雨，人有喜怒；天有雷電，人有聲音；天有四時，人有四肢；天有五音，人有五藏；天有六律，人有六府；天有冬夏，人有寒熱；天有十日，人有手十指；辰有十二，人有足十指，莖垂以應之，女子不足二節，以抱人形；天有陰陽，人有夫妻；歲有三百六十五日，人有三百六十節；地有高山，人有肩膝；地有深谷，人有腋脇；地有十二經水，人有十二經脈；地有泉脈，人有衛氣；地有草蓂，人有毫毛；天有晝夜，人有臥起；天有列星，人有牙齒；地有小山，人有小節；地有山石，人有高骨；地有林木，人有募筋；地有聚邑，人有臑肉；歲有十二月，人有十二節；地有四時不生草，人有無子。此人與天地相應者也。

Huangdi asks Bogao, 'I would like to learn the limbs of the human body. How could it correspond to Heaven and Earth?' Bogao answers, 'Heaven is round and Earth is square. Hence, the human body corresponds with round head and square feet. Heaven has the sun and moon; the human body has two eyes. Earth has nine regions; the human body has nine apertures. Heaven has the wind and rain; the human body has joy and anger. Heaven has thunder; the human body has sound. Heaven has four seasons; the human body has four limbs. Heaven has five tones; the human body has five depots. Heaven has six pitches; the human body has six palaces. Heaven has winter and summer; the human body has cold and hot. Heaven has ten days; the human body has ten fingers. The stars have twelve in number; the male has ten feet fingers plus two testicles to correspond, while the female do not have the two testicles, so they pregnant with a child for compensation. Heaven has yin and yang; the human has husband and wife. The year has 365 days; the human body has 365 joints. Earth has high mountains; the human body has shoulder and knee. Earth has deep valley; the human body has armpit. Earth has twelve rivers; the human body has twelve vessels. Earth has spring water; the human body had guard qi. Earth has small grass; the human body has little hairs. Heaven has day and night; the human has awake and sleep. Heaven has stars; the human body has teeth. Earth has small hills; the human body has small joints. Earth has mountain stones; the human has large bones. Earth has wood; the human body has tendons. Earth has gathered soils; the human body has fat flesh. The year has twelve months; the human body has twelve channels. Earth has sometimes in four seasons when no grass can grow; the human has sometimes when no child can be produced. This is how the human body corresponds

In this text, we can see that the sub-analogies are most comprehensive. The target domain of the sub-analogies are all in the same category: of the bodily parts or bodily activities, including the round head, the square feet, eyes, nine apertures, four limbs, five depots, six palaces, ten fingers, testicles, 365 joints, shoulder and knee, armpit, twelve vessels, hairs, teeth, bones, tendons, flesh, twelve channels, joy, anger, sound, awake and sleep, etc. The base domain of the sub-analogies are all in the same category of the ‘heavenly’ matters or ‘heavenly’ activities, including round heaven, square earth, sun, moon, nine regions, four seasons, tones, pitches, 365 days, high mountains, deep valley, rivers, spring water, small grass, stars, small hills, mountain stones, wood, gathered soils, months, wind and rain; thunder, day and night, etc. If we look into the texts carefully, we can find some slight but interesting differences. In *Huangdi Neijing*, there are 365 joints corresponding to 365 days of a year. In *Huainanzi*, the joints of the human body increase to 366 since the author claimed that a year has 366 days. It shows that a link between macrocosm and microcosm could be made quite casually.

Since the human body resembles Heaven, the human body should contain similar features to those of Heaven, in order to satisfy the principle of correspondence. Some features are clearly attributed to the human body in order to suggest a perfect match. For example, it is required by the dominance of the heavenly domain, and its already established constitution, that the human body should have 366 joints in order to make a match with 366 days. Since there are four seas in four directions of Earth, it is derived that there should be four seas inside the human body, including the sea of marrow (brain), the sea of blood (*chong mai* 冲脉, the thoroughfare vessel), the sea of qi (*dan Zhong* 膻中, the heart enclosing network), and the sea of water and grains (stomach).⁸⁴² Since heaven goes around in a cycle, it is derived that the *qi* inside the human body should go around in a cycle.⁸⁴³ It is reasonable to assume that many Chinese medical concepts were originally derived from the requirements of making a perfect match between microcosm and macrocosm, such as the concepts of ‘four seas’, ‘five depots’, ‘six palaces’, ‘nine apertures’, ‘twelve vessels’, ‘365

841 *Lingshu* 71: 402 (邪客). My translation.

842 *Lingshu* 33: 234 (海論).

843 *Lingshu* 76: 440 (衛氣行).

joints’, ‘cyclical movement of *qi*’, etc. It was probably for the same reason that in *Taichanshu* the embryo must go through different phases of water, fire, metal, wood, and earth in different periods of time.

Interestingly, we can find similar analogical reasonings in the opposite direction. For the universe, there could be a requirement of making a perfect match with the human body. For example, the Roman author Seneca thought that Earth was constructed based on the model of the human body. Hence, knowledge of the human body can be helpful to understand the outside natural world.

I believe that Earth is regulated by nature, and indeed according to the model of our bodies, in which there are veins and arteries - the former reservoirs of blood, the latter of breath. In Earth too there are some routes through which water runs, others through which breath does; nature has indeed created them so much in the likeness of human bodies that our ancestors named them ‘veins’ of water.⁸⁴⁴

6.3 Powerful Numbers

This section will deal with the application of mathematical numbers in embryological discussion. I want to argue that, despite the differences of detail, there was a common belief in the power of mathematical numbers in both Greek and Chinese cultures. This belief had great influences on the construction of knowledge concerning the embryo and its development in the ancient worlds. I will give four examples to explain the belief in numbers and its influences on embryological theories.

My first example is about the question of whether the internal organs should be double or single. In Greek writings, there seems to be a belief that all the internal organs must be double. For example, Aristotle insisted that ‘the structure of the body is double’, e.g the kidneys, the liver, the spleen. Some viscera appear to be single, such as the heart and the lung, but in fact ‘all of them are double’.⁸⁴⁵ The uteri are also said to be double under this assumption. The word ‘*uteri*’ (μήτραι), indeed, means ‘a double womb’. Plato stated that the ‘*uteri*’, in its plural form, has ‘a desire to bear young’.⁸⁴⁶

844 cf. Roby (2014):167.

845 *PA* 669b13ff.

846 *Timaeus*, 52d.

The concept of ‘double uteri’ provides the best explanation for the phenomenon of twins. In Aristotle’s works, the conception of twins is exactly explained by the concept of ‘double uteri’. Aristotle rejected the explanation that semen is divided into different regions of the uterus in the conception of twins.⁸⁴⁷ Aristotle argued that, just like the testes, the uteri are double. The double uteri can be found in crustacea and cephalopods, as well as in large insects. The womb of some animals appears to be single just because of its smallness of the body.⁸⁴⁸ He concluded that ‘the uterus is always double without exception, just as in males there are always two testes without exception’.⁸⁴⁹ Throughout the centuries, he explained, human have been able to produce twins because the uterus has two chambers.⁸⁵⁰

In Hippocratic writings, the conception of twins, to a high degree, is determined by the condition of the womb. It is commonly supposed that the womb has several cavities. When the sperm comes, it is divided into several chambers and therefore forms several children.⁸⁵¹ Hippocratic authors usually referred to the human womb in plural. In both *Nature of the Child* and *Regimen*, it is argued that twins result from one act of intercourse, during which the seed is divided into different chambers of the womb.⁸⁵² However, the two authors still had some differences in their understandings. In *Nature of the Child*, it is thought that the womb has several chambers: ‘the womb contains a number of pockets (κόλπους), crooked in shape, at varying distances from the vagina.’⁸⁵³ For this reason, the womb is usually described as plural.⁸⁵⁴ In *Regimen*, it is thought that the womb has only two chambers that must grow equally, open equally and dry equally after menstrual blood on either side of its mouth to conceive twins; otherwise twins are unable to be formed.⁸⁵⁵

The concept of ‘double uteri’ had a long influence on ancient Greek medicine. Even if Galen advanced more in anatomy than his precursors, he still adhered to this belief.⁸⁵⁶ In the Middle Ages, people even divided the uterus into seven cells: three on the right for males, three on the left for

847 GA 771b28-33.

848 GA 716a3-6; 717a7-11, 716b32-33.

849 GA 716b32-33.

850 Staden (1989): 165; Dean-Jones (1994):68-69.

851 *Nat. Puer.* 31.1, Li VII 540; *Vict.* 1.30, Li VI 504. Such views were also attributed to Empedocles (DK 21A81) and Democritus (DK 68A151). For Greek theories on multiple births, see Lonie (1981): 252-255.

852 *Nat. Puer.* 31.1-3, Li VII 540; *Vict.* 1.30, Li VI 504-506.

853 *Nat. Puer.* 31.1, Li VII 540.

854 *Genit.* 2.3, Li VII 472.

855 *Vict.* 1.30, Li VI 506.

856 Goss (1962): 77-83.

females, and one in the middle for hermaphrodites.⁸⁵⁷

The concept of ‘double uteri’ has never appeared in early Chinese texts. When early Chinese encountered multiple births, they did not use ‘the double uteri’ as an explanation. It was because there was a belief in the single organs. In early Chinese writings, there is a belief that all the internal organs must occur in singular forms. Each of the depots is single. The kidney seems to be double, but it is actually single.

*The thirty-sixth difficult issue: (1) Each of the depots is a single [entity], except for the kidneys which represent a twin [entity]. Why is that so? (2) It is like this. The two kidneys are not both kidneys. The one on the left is the kidney; the one on the right is the gate of life. (3) The gate of life is the place where the spirit-essence lodges; it is the place to which the original influences are tied. (4) Hence, in males it stores the essence; in females it holds the womb. (5) Hence, one knows that there is only one kidney.*⁸⁵⁸

According to this theory, there is only one kidney in the left side of the body. The one in the right side of the body should be called ‘the gate of life’ (*mingmen* 命門) rather than the kidney. It has the function of storing the seminal essence in males, but it has a different function of fastening and supporting the womb in females. Under this logic, since all the internal organs are single, the uterus must be single as well.

My second example is about the number seven and the number eight. We can find that the two numbers, seven and eight, play an important role in both Greek and Chinese cultures. There are many assumptions involving these numbers in ancient embryological discussions.

On the Greek side, the number seven plays a critical role in the Hippocratic writings.⁸⁵⁹ Anything containing the number seven is luckier than the others. Among all the numbers, the author of *Seven Months’ Child* attributed special importance to the number seven. In the seventh month, foetuses grow ‘into the onset of perfection’. In seven years after birth, all kinds of things happen to human bodies, e.g. in children the teeth fall out and others grow in. In the examination of crisis, a doctor should attend all the odd days, and the even ones to the fourteenth, the twenty-eighth, and

857 Malley (1964):32; Kudlien (1965):415-423.

858 *Nanjing* 36 (三十六難). Translated by Unschuld (1986):382. *Nanjing* 39 (*sanshijiu nan* 三十九難). Unschuld (1986): 399.

859 George (1982): 204-217.

the forty-second.⁸⁶⁰ In *Epidemics II*, it is also said that the embryo completes its formation in seven months. ‘What moves in seventy (days), is completed in three times (seventy)’.⁸⁶¹

The belief in the number seven can also be seen in the Hippocratic text *Fleshes*. It is claimed that ‘the period of life of man is seven days’ (ὁ δε αἰὼν ἐστὶ τοῦ ἀνθρώπου ἑπταήμερος). The author of *Fleshes* argued that the embryo will exhibit all parts of the body in seven days. He told a story of his own direct observation of the aborted embryo of a prostitute for proof. When the embryo came out, it was ‘just like a piece of flesh’. The author said that he put it in water and made a careful examination, finding that a seven-day embryo contains all parts of the body.

*The period of life of man is seven days. To begin with, when the seed arrives in the uterus, in seven days it has all the parts the body is to have. You might wonder how I know this: well, I have learned much in the following way. The common prostitutes, who have frequent experience in these matters, after having been with a man know when they have become pregnant, and then destroy the child. When it has been destroyed, it drops out like a piece of flesh. If you put this flesh into water and examine it in the water, you will see that it has all the parts: the orbits of the eyes, the ears and the limbs; the fingers, the legs, the feet, the toes, and the genital parts, and all the rest of the body is distinct. ...It is to the extent that these women have instructed me that I know about these things.*⁸⁶²

Furthermore, the author of *Fleshes* argued that a person will die without eating or drinking in seven days. Most acute diseases come to a crisis and either die or recover in seven-day periods. Moreover, children lose their milk teeth and acquire new teeth in seven years. Hence, the author claimed that there is ‘a necessity of nature that compels each of these things to be ordered by seven’.⁸⁶³

By contrast to the lucky number seven, number eight was regarded to be unlucky. It was widely believed in ancient Greece and Rome that a seven months child can survive, while an eight months’ child can never survive.⁸⁶⁴ In *Seven Months Child*, it is said that the foetus comes to ‘the onset of its final formation’ at the seventh month. It gains much strength and reaches its ‘complete maturity’. Sometime the foetus gains so much strength that it compels birth to occur.⁸⁶⁵ In most

860. *Sep.* 9, Li VII 446-452.

861. *Epid.* 2.3, 17, Li V 116.

862. *Carn.* 19, Li VIII 610.

863. *Carn.* 19-12, Li VIII 598-614.

864. Hanson (1987): 590.

865. *Sep.* 1, Li VII 436.

cases, a seven months' child will die because it is too small and feels the change of labour more forcefully than other fetuses do, and it is overcome by 'a forty-day period of distress' after it has left the uterus. In occasional cases, however, a seven months' child may survive because it has already been provided by the uterus with 'a portion of everything' which is necessary for surviving and it escapes from 'the strains' that will happen in the eighth month.⁸⁶⁶ By contrast, an eight months' child can never survive. The author argued that all women reported that 'those children born in the eighth month do not survive, whereas the others do'.⁸⁶⁷ Children would experience two crucial sufferings: first, the stresses in the eighth month; second, the suffering of childbirth.⁸⁶⁸ It is impossible for children to withstand two distresses in immediate succession, so no eight months' child can survive.⁸⁶⁹

Many other Hippocratic authors agreed that an eight months' child cannot survive. In *Fleshes*, it is thought that a seventh-months child ($3 * 10 * 7 = 210$ days) and a ninth-months child ($4 * 10 * 7 = 280$ days) can survive because they have precise numerical relationship to seven-day periods. However, a child born at eight months never survives.⁸⁷⁰ In *Epidemics II*, it is thought that there are pains in the eighth month.⁸⁷¹ Infants can survive if they are born in the seventh month, or the ninth, or tenth, but never the eighth.⁸⁷² When such a belief was widely spread and generally accepted, it became a common assumption. Even if an eight-months' child survives, parents think the child is not an eight-months' one but that they made a mistake when calculating previously.⁸⁷³ If an infant died, the parents might regard it as an eight months' child and they may thus be relieved from feelings of guilt since the death of an eight months' child was inevitable.⁸⁷⁴

Aristotle rejected the belief that an eight months' child could never survive. "Indeed, eight months' babies alive, though less often than the others."⁸⁷⁵ He thought that seven months' children can usually survive, even if they are born early in an imperfect state.⁸⁷⁶ In *History of Animals*,

866 *Sep.* 2, Li VII 438.

867 *Septim.* 3, Li VII 442.

868 *Septim.* 2, Li VII 438. *Sep.* 5, Li VII 444.

869 *Oct.* 10, Li VII 452.

870 *Carn.* 19, Li VIII 610-612.

871 *Epid.* II 3.17, Li V 118.

872 *Epid.* II 6.4, Li V 134.

873 *HA* IX 584b1-19.

874 Hanson 1987:600.

875 *GA* 772b8-11.

876 *GA* 774b35-775a4.

Aristotle said that animals that are born after seven months' gestation are weak and imperfect and many have ears and nostrils undivided, but there is a chance for them to survive.⁸⁷⁷ He further explained why Greeks had the impression that an eight months' child could never survive.

*As for the five ponies, around Egypt and in certain place where the women are good at bringing to birth, and bear and deliver many with ease, and where once born they can live even if they are born deformed, there the eight-month ones live and are reared, whereas in the places around Greece few survive in all, and the majority perish; and because of this assumption, even if one survives the women think the child is not an eight-month one but that they made a mistake when calculating previously. The women suffer most during the fourth month and the eighth, and if they abort at the fourth or eighth month they too perish as a rule, so that not only do the eight-month children not live but in their destruction the mothers are at risk.*⁸⁷⁸

On the Chinese side, both the number seven and the number eight play a critical role in *Huangdi Neijing*. Number seven is important because it is closely related to female physiology. Life of a female is dominated by cycles of seven, from the appearance to the disappearance of monthly affairs. It explains why a female cannot produce a child if too young or too old.

*Qi Bo: 'In a female, at the age of seven, the qi of kidneys abounds. The [first] teeth are substituted and the hair grows long. With two times seven, the heaven gui arrives, the controlling vessel is passable and the great thoroughfare vessel abounds [with qi]. The monthly affair moves down in due time and, hence, [a woman] may have children. With three times seven, the qi of the kidneys has reached its normal level. Hence, the wisdom teeth emerge and [females] grow to their full size. With four times seven, the sinews and bones are firm and the hair has grown to its full extent. The body and the limbs are in a state of abundance and strength. With five times seven, the yang brilliance vessel weakens; the face begins to dry out; the hair begins to fall off. With six times seven, the three yang vessels weaken [in the upper sections]. The face is all parched, the hair begins to turn white. With seven times seven, the controlling vessel is depleted and the great thoroughfare vessel is weak and [its contents are] diminished. The heaven gui is exhausted. The way of the earth is impassable. Hence, the physical appearance is spoilt and [a woman can] no [longer] have children.'*⁸⁷⁹

By contrast, the number eight is important because it is closely related to male physiology. Life of a male is dominated by cycles of eight, which dominate the producing process for the essence (*Jing*). It explains why a male cannot produce a child if too young or too old.

In a male, at the age of eight, the qi of the kidneys is replete; his hair grows and the [initial] teeth are substituted. With two times eight, the qi of the kidneys abounds; the heavenly gui arrives and the essence qi flows away. Yin and yang find harmony. Hence, he can have children. With three times eight, the qi of the kidneys has reached its normal level. The sinews and the bones are firm and strong. Hence, the wisdom teeth

877 HA IX 584a36ff.

878 HA IX 584b1-19.

879 *Suwen* 1:3-4 (上古天真論). Translated by Unschuld, P. and Tessenow, H. (2011): vol.1, 36-39.

emerge and [men] grow to their full size. With four times eight, the sinews and the bones prosper in abundance. The muscles and the flesh are full and strong. With five times eight, the *qi* of the kidneys weakens; the hair falls off and the teeth wither. With six times eight, the yang *qi* weakens and is exhausted in the upper sections. The face dries out and the hair on the head and on the temples shows streaks of white. With seven times eight, the *qi* in the liver weakens; the sinews can no longer move. Heaven *gui* is exhausted. {The [remaining] essence is diminished} The kidney depot is weak and the physical body is completely exhausted. When eight times eight, the teeth and the hair go. The kidneys rule the water; they receive the essence from the five depots and six palaces and they store it. Hence, when there is abundance in the five depots, [essence] can flow away. [At this age] now the five depots are all weak and the sinews and the bones have become sluggish. Heaven *gui* is used up entirely. Hence, the hair on the head and the temples turns white and the body and the limbs are heavy. [A male of that age] no [longer] walks upright and no [longer] has children.⁸⁸⁰

The exact substance of *Heavenly Gui* (*tiangui* 天癸) is unclear, but it is generally supposed to be something that can promote the generation of the seminal fluid. The *Heavenly Gui* plays a key role for the functions of some essential matters related to generation, including the *qi* of the kidney, great thoroughfare vessel, controlling vessel, monthly matter, *jing* and *qi*. All these matters are closely related to generative functions.

It is worthy of emphasizing that the text also provides a model of two-sex body in which the female physiology is radically different from the male physiology. The female body follows a pattern of growth in cycles of seven years, while the male body follows a slightly different pattern of growth in cycles of eight years.

Female Physiology	Male Physiology
<i>Cycles of Seven</i>	<i>Cycles of Eight</i>
<i>Qi of Kidney</i>	<i>Qi of Kidney</i>
<i>Heavenly Gui</i>	<i>Heavenly Gui</i>
<i>Controlling Vessel</i>	---
<i>Thoroughfare Vessel</i>	---
<i>Monthly Matter</i>	<i>jing</i> and <i>qi</i>

880 *Suwen* 1:3–4 (上古天真論). Translated by Unschuld, P. and Tessenow, H. (2011): vol.1, 39–41.

My third example is about the heavenly number ten. In early Chinese writings, the number ten is regarded as the heavenly number (*tianzhi dashu* 天之大數) and it is used to explain why births happen in the tenth month. However, the reason of births was explained very differently in ancient Greece. On this point, we see a great difference of understandings in the two cultures.

If the formation of the human body follows the way of Heaven, why are humans born in the tenth month rather than in the twelfth month? The basic answer from *Chunqiu Fanlu* is that the Heavenly number contains ‘ten’ in total, including heaven, earth, yin, yang, wood, fire, earth, metal, water, and human.⁸⁸¹ ‘The number of heaven ends with ten.’⁸⁸² Since the human body contains all features of heaven and earth, it must go through all ten phases of a cosmic cycle in its formation.

天之大數，畢於十旬。旬天地之間，十而畢舉；旬生長之功，十而畢成。十者，天數之所止也。古之聖人，因天數之所止，以為數紀。十如更始，民世傳之，而不知省其所起。知省其所起，則見天數之所始；見天數之所始，則知貴賤逆順所在；知貴賤逆順所在，則天地之情著，聖人之寶出矣。是故陽氣以正月始出於地，生育長養於上。至其功必成也，而積十月。人亦十月而生，合於天數也。是故天道十月而成，人亦十月而成，合於天道也。

*The big number of Heaven completes in a cycle of ten. In the cycle of Heaven and Earth, everything is raised up in ten. In the cycle of birth and growth, everything is accomplished in ten. Ten is where the number of Heaven stops.Hence the qi of Yang comes from Earth in the first month and plays the role of generation and nourishment. It achieves its goal in no less than ten months. Humans are also born in ten months, which is in accord to the number of Heaven. Therefore, the way of Heaven finishes in ten months. Humans are accomplished in ten months by following the way of Heaven.*⁸⁸³

Thus, the heavenly number ‘ten’ can explain why humans are born in the tenth month. At the same time, it helps us to have a better understanding of why it is said in *Taichanshu* that the embryo goes through the five phases of water, fire, metal, wood, and earth from the fourth month to the eighth month.

何謂天之端？曰：天有十端，十端而止已。天為一端，地為一端，陰為一端，陽為一端，火為一端，金為一端，木為一端，水為一端，土為一端，人為一端，凡十端而畢，天之數也。天數畢於十，王者受十端於天，而一條之率。每條一端以十二時，如天之每終一歲以十二月也。十者天之數也，十二者歲之度也。

What is called the endpoints of Heaven? [The Master] says: Heaven has ten endpoints and stops

881 *Chunqiu Fanlu* 81: 465 (天地陰陽); 53: 352 (基義).

882 *Chunqiu Fanlu* 24:217 (官制象天); 81:465 (天地陰陽); 53:352 (基義).

883 *Chunqiu Fanlu* 43:323-324 (陽尊陰卑). My translation.

at the ten endpoints. Heaven is one endpoint; Earth is one endpoint; Yin is one endpoint; Yang is one endpoint; Fire is one endpoint; Metal is one endpoint; Water is one endpoint; Earth (as a phase) is one endpoint; Human is one endpoint. Therefore, it finishes at ten endpoints, which is the number of Heaven. The number of Heaven ends with ten. The King receives the ten endpoints from Heaven and follows each one of them. Each endpoint contains twelve branches, just as Heaven finishes a year in twelve months. Ten is the number of Heaven. Twelve is the dimension of a year.⁸⁸⁴

In *Huainanzi*, different types of animals have different lengths of pregnancy: for humans, it is ten months; for horses, twelve months; for dogs, three months; for pigs, four months; for apes, five months; for deer, six months; for tigers, seven months; for insects, eight months. It is all about mathematic numbers.

Concerning humans, birds, and beasts, they myriad creatures and tiny organisms, each has that from which it is born. Some are odd and some are even; some fly and some go on foot, but no one understands these instinctive responses. Only one who knows how to trace the Way can get to the source and root of it. Heaven is one, Earth is two, man is three. Three times three equals nine. Nine times nine equals eighty-one. One governs the sun. The number of the sun is ten. The sun governs man, so man is born in the tenth month [of pregnancy]. Eight times nine equals seventy-two. Two governs even numbers. Even numbers contain odd numbers. Odd numbers govern the chronograms. The chronograms govern the moon. The moon governs the horse, so horses are born in the twelfth month [of pregnancy]. Seven times nine equals sixty-three. Three governs the Dipper. The Dipper governs the dog, so dogs are born in the third month [of pregnancy]. Six times nine equals fifty-four. Four governs the seasons. The seasons govern the pig, so pigs are born in the fourth month [of pregnancy]. Five times nine equals forty-five. Five governs the musical notes [of the pentatonic scale]. The musical notes govern the ape, so apes are born in the fifth month [of pregnancy]. Four times nine equals thirty-six. Six governs the notes [of the pitch pipes]. The pitch-pipe notes govern the deer, so deer are born in the sixth month [of pregnancy]. Three times nine equals twenty-seven. Seven governs the stars. The stars govern the tiger, so tigers are born in the seventh month [of pregnancy]. Two times nine equals eighteen. Eight governs the wind. The wind governs insects, so insects undergo metamorphosis in the eighth month.⁸⁸⁵

However, the Greeks had a very different understanding of the same issue. Why do births happen in the tenth month? The author of *Nature of the Child* argued that births are caused by a lack of nutrition. He demonstrated that it is impossible for pregnancy to last longer than ten months because the foetus grows so large that the mother is no longer able to provide adequate nourishment. Driven by ‘the desire for more nutrition’ (ζητέον οὖν πλείω τροφήν), the frustrated foetus agitates

884 *Chunqiu Fanlu* 24: 217 (官制象天). My translation.

885 *Huainanzi* 4:143-144 (墜形訓). Translated by Major, J.S. (2010):162-163.

inside the womb and struggles its way out by itself. Finally, it ‘breaks the fetters’ (λυθὲν τοῦ δεσμοῦ) of the membranes and comes into the world.⁸⁸⁶ Birth is, therefore, regarded as ‘a failure in food supply’ (τὰ μὲν ἐλάσσω τροφήν). It is just like the incubation of a chick. When a chick uses up all the nutrition in the egg, it moves violently and breaks the shell to seek more food. Hence, birth can be regarded as a failure in food supply. For this reason, the pregnancy period normally lasts no more than ten months.⁸⁸⁷

*Here is my argument for the fact that a foetus is born when its nourishment runs out, unless some serious disorder befalls it. A chick is born from the yolk of an egg in the following way: the egg is warmed by its mother sitting on it, and what is inside the egg is set in motion by the mother. On being warmed, what is inside the egg possesses breath, and it draws in fresh, cold breath from the air through the egg, for the eggshell is rarefied enough that the air drawn in through it is sufficient for what is inside. The chick inside the egg increase in size and becomes articulated in a similar way parallel to the human foetus, as I have already explained. It is formed out of the egg yolk, but its nutriment and increase come from the egg white, as has already become evident to anyone who has turned their mind to the subject. When the nutriment coming from the egg runs out for the chick, the chick - not having sufficient material to live from - moves violently inside the egg in search of additional nutriment, and tears off its membrane. When the mother feels the chick's violent movement, she pecks and hatches it, and this happens in twenty days. It is clear that this is what happens, for when a fowl pecks open the eggshell, no moisture worth mentioning is left inside it, since it has all been taken up into the chick. The same thing happens with the foetus: when it has increased in size, its mother is no longer able to supply it with adequate nourishment, so that the foetus, in searching for more nutriment than is present, jumps about, tears its membranes, and being released from its attachment is immediately born; this happens in ten months at the longest.*⁸⁸⁸

Aristotle shared almost the same idea of a hungry child. In Aristotle's works, it is also the child's hunger which causes childbirth. As a child grows in the womb, more nourishment is needed, but less is supplied to the umbilicus. This occurs because the residues are collected in the breasts to produce milk in the later stage of gestation. The child must come out of the womb and will be nourished by the milk.⁸⁸⁹ Aristotle also depicted an image of a hungry child. He believed that birth labour is caused by the ligaments movement rather than the child's own will. Even so, the child must be alive in order to start the ligaments movement.⁸⁹⁰ In addition, male and female have some

886 *Nat. Puer.* 30.5, Li VII 534.

887 *Nat. Puer.* 30, Li VII 532; *Oct.* 13, Li VII 460.

888 *Nat. Puer.* 30, Li VII 536-538.

889 *GA* 776a31-776b4.

890 *HA* 638b8-14.

differences in birth. If the child is a male, the birth process is quick, but may meet difficulties. If the child is a female, the birth process is slow, but will be smooth.⁸⁹¹

My fourth example is about the date of birth. In early China, there was a belief that the date of birth could decide the fortune of the child. If a child is found to be born on an unfortunate date, the family might decide to kill or abandon the new-born. Along with the text of *Taichanshu*, there are two pictures of human figures placed sideways, which might be used to predict the child's fortune by the time of birth. The twelve earthly branches (*dizhi* 地支)—*zi* 子, *Chou* 丑, *Yin* 寅, *Mao* 卯, *Chen* 辰, *Si* 巳, *Wu* 午, *Wei* 未, *Shen* 申, *You* 酉, *Xu* 戌, and *Hai* 亥—are arranged clockwise in a cyclical way to indicate the twelve months of a year.⁸⁹² However, there is no clear indication which month is auspicious or inauspicious.

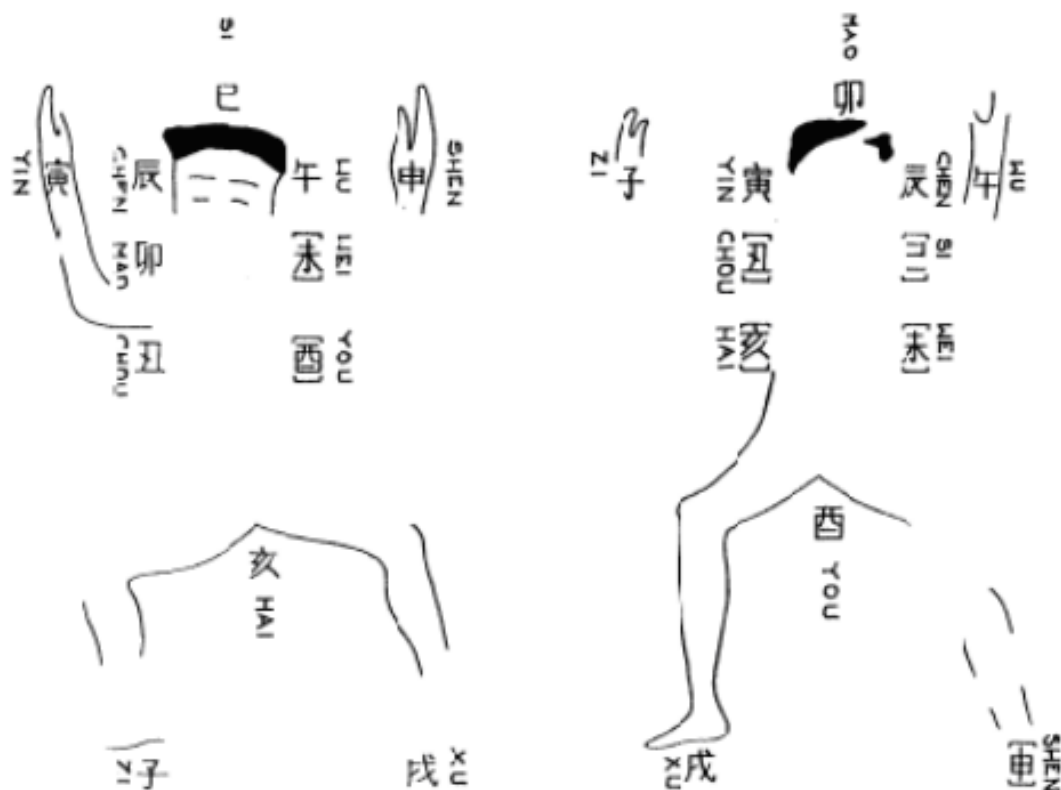


Figure: Predicting Fortune by the Date of Birth in the Manuscripts of Mawangdui

The idea of choosing proper days to do proper things had a long history that can be traced back

⁸⁹¹ HA IX 584a26-31.

⁸⁹² Donald Harper thought the branch signs indicated the day of birth, see Harper (1998): 372; Ma, J.X. (1992): 814–817. For calendars in early China, see Cullen, C. (2017).

to the oracle bones of divination. A more systematic form is produced in *I-Ching* 易經. Through calculation, diviners would tell people whether it is suitable to do something on a particular day. . The system of the ten heavenly stems (*tiangan* 天干) and the twelve earthly branches is constructed in as early as the late Shang dynasty (c. 1570–1045 B.C.E.) for recording days, divination and sacrifice.⁸⁹³ Two hermerological texts were found in the archaeological sites of Shuihudi 睡虎地 (dated before 217 B.C.E.).⁸⁹⁴ The two different copies are named *rishu* 日書 (*book of days*) A and B by researchers. They provide advice on whether it is auspicious to give birth on a certain day. It is also believed that the appearance of certain stars would influence the fortune of the child. Sometimes it is predicted that the child would become a slave; sometimes it is predicted that the child would be sick and poor all through their life; other times it is predicted that the child would die in ten days or in three months or in three years.⁸⁹⁵

Some early historical records confirm the importance of divination in childbirth. ‘People make divination to see whether it is fortunate or unfortunate in childbirth. They always do so before giving birth.’⁸⁹⁶ Some months are thought to be unfortunate, especially February and May. If a child is born in the same month as the birth date of the parents, it is also unfortunate. In these cases, the newborn might be killed immediately.⁸⁹⁷ In the historical record of *Shiji* 史記, a famous political leader, Lord Mengchang 孟嘗君 (also named Tian Wen 田文), was almost killed by his father at the time of his birth because he was born in the unfortunate month of May:

初，田嬰有子四十餘人。其賤妾有子名文，文以五月五日生。嬰告其母曰：「勿舉也。」其母竊舉生之。及長，其母因兄弟而見其子文於田嬰。田嬰怒其母曰：「吾令若去此子，而敢生之，何也？」文頓首，因曰：「君所以不舉五月子者，何故？」嬰曰：「五月子者，長與戶齊，將不利其父母。」文曰：「人生受命於天乎？將受命於戶邪？」嬰默然。文曰：「必受命於天，君何憂焉。必受命於戶，則可高其戶耳，誰能至者！」嬰曰：「子休矣。」

At the beginning, Tian Ying had more than 40 children. One of his low-status concubines begot a child namely Wen. Ying told her, 'Do not raise the child.' However, the concubine still gave birth and raised the child. When the child grew up, he was brought to meet his father Tian Ying by his mother and his uncle. Tian Ying was very angry to the child's mother, 'I asked you to abandon the child. How dare you raise him? Why did you do so?' Wen bowed down to his father and said, 'You

893 Keightley (2000): 37–53. Wang, A.H. (2000).

894 *Shuihudi Qinmu Zhujian* 睡虎地秦墓竹簡:1. Kalinowski (2010). Loewe (1994): 160–190. Raphals (2013).

895 *Shuihudi Qinmu Zhujian* 睡虎地秦墓竹簡:177–255. Rao, Z.Y. and Zeng, H.T. (1982) and Liu, L.X. (1994).

896 *Shiji* 127:67 (日者列傳).

897 *Houhanshu* 65:55 (皇甫張段列傳).

did not want to raise a child born in the May. What is your reason?’ Ying answered, ‘For these children born in May, when they grow up to the height of the door, they will bring misfortunes to the parents.’ Wen said, ‘A man’s destiny is up to the Heaven? Or up to the door?’ Ying came into a silence. Wen said, ‘If a man’s destiny is up to the Heaven, you should not worry about this. If a man’s destiny is up to the door, you can build a high door that no one can reach.’ Ying said, ‘As you say.’⁸⁹⁸

Ancient Greeks had a similar view, that each month is special and different from others, but for very different reasons. Aristotle also believed that birth should avoid bad timing, e.g. the spring, but for a very different reason.⁸⁹⁹ The month has its own particular power in the body, so women have menses monthly. Many patients can recover automatically at given times according to particular months and days in a year. Moreover, time is an important factor in the conception of fetuses, miscarriages, births, diseases, convalescences, and deaths. They are decided by the number of days, or months, or forty-day periods, or the period of a year.

Greek physicians also counted gestation in months, while the division into forty-day periods was also important. In *Seven Months’ Child*, the duration of pregnancy is divided into several ‘forty-day periods’. The reckoning is that the normal 10-month child is born after 7 forty-day periods.⁹⁰⁰ Some forty-day periods are more important than others, especially the first forty-day period, the sixth forty-day period, the seventh forty-day period and another forty-day period after birth. The first forty-day period is the most dangerous time. All women report that most miscarriages occur within the first forty-day period. Embryos surviving beyond this period are likely to escape the misfortune of miscarriages which occur at that time, for more miscarriages occur in the first forty-day period than in all the other periods.⁹⁰¹ The sixth forty-day period is the eighth month. It is in this period that the foetus becomes ill in the uterus. The foetus suffers ‘stresses’ during these forty days. Any foetus born within this forty-day period cannot survive.⁹⁰² During the seventh forty-day period, fetuses remain quietly and safely in the uterus until the final day of birth. This period equals the eleventh month and after the 280th day; children born after this period are called ‘ten-months children’ and ‘eleven-months children’. They are the most robust because they are furthest away

898 *Shiji* 75:15 (孟嘗君列傳). My translation..

899 *Pr.* 1.9, 860a18-22. It is because the spring is too cold, so it is not suitable for childbirth.

900 *Septim.* Li VII 446; *Oct.* 13, Li VII 452, 458.

901 *Septim.* 4, Li VII 442; 9, Li VII 448-450.

902 *Septim.* 3, Li VII 438-440; 4, Li VII 442; 5, Li VII 444; 9, Li VII 450.

from the time in which they suffered distress during the sickly forty days around the eighth month.⁹⁰³ After birth, children will experience another forty days in a sickly state. Many children are overcome by 'a forty-day period of distress' after they have left the uterus. Yet even the so-called 'ten-months children', who are supposed to be the most mature, die in many cases because of the distress.⁹⁰⁴

In summary, I have discussed how ancient authors gave proof for proposed embryological theories in this chapter. I have mainly discussed the great influences of three beliefs: analogical reasoning, macrocosm and microcosm, and powerful numbers. Firstly, I have argued that analogical reasoning is a common method of investigation in both ancient Greece and early China. I have also argued that the different understandings of the embryo are closely related to applications and choices of different images in the process of making analogies, while the adoption of a certain image largely depends upon its cultural circumstances and technical development. The systematic application of botanical analogies are most influential for the formation of embryological knowledge in ancient Greece.

Secondly, I have argued that the idea of microcosm and macrocosm had great influences in the construction of embryological knowledge and medical knowledge in both ancient Greece and early China. I have made a further assumption that many concepts concerning the embryo and the body were actually created under the requirement of making a perfect match with Heaven. The two subjects of cosmology and embryology obtained a close relationship in the ancient worlds. On the one hand, embryological analogies were used for cosmological arguments. On the other hand, cosmological analogies were used for embryological arguments.

Thirdly, I have argued that, despite the differences on the detail, there was a common belief in some powerful numbers in both Greek and Chinese cultures. This belief exerted great influences on the construction of embryological knowledge in the ancient worlds. I have given four examples. (1) On the Greek side, there was a belief that the internal organs must be double, so the double uteri were used to explain the conception of twins. On the Chinese side, by contrast, there was a belief that the internal organs must be singular, so the right kidney was described as the gate

903 *Septim.* 4, Li VII 442; 7, Li VII 446; *Oct.* 12, Li VII 458; 13, Li VII 460.

904 *Septim.* 2, Li VII 438; 9, Li VII 450; *Oct.* 10, Li VII 452.

of life to explain generative functions. (2) On the Greek side, number seven was regarded as a lucky number with great powers, so it was claimed that a seven-day embryo contains all parts of the body and a seven-months child can survive; number eight was regarded as an unlucky number, so it was believed that an eight months' child can never survive. On the Chinese side, number seven marks the special female physiology, while number eight marks the special male physiology. (3) In Chinese texts, the heavenly number ten was taken as the reason to explain why births happen in the tenth month. In Greek texts, the desire of nutrition was taken as the reason to explain why births happen in the tenth month. (4) In Chinese texts, the date of birth has special significance for fortune and misfortune. In Greek texts, the timing might be counted in months or in forty-day periods. There are also fortune and unfortunate days.

Conclusion

My thesis has made a comparative study of embryological thought in ancient Greece and early China, which aims to reveal the differences and similarities of understandings. The comparison is mainly based on some selected writings, namely the Hippocratic writings, Aristotle's works, the manuscripts of Mawangdui and *Huangdi Neijing*, with the supplement of some other texts. Many broad topics are covered, including the role of parents, the nature of seed, sex determination, embryonic growth, embryonic nourishment, etc. It is almost impossible to give an absolute conclusion; otherwise, there is always a high risk of over-generalization. Even so, in a general sense, it is still possible to answer the questions what similarities and differences can be found, what are the reasons for these similarities and differences, and what can be learned from such a comparative study.

For Differences

Shigehisa Kuriyama has revealed how the human body came to be conceived in radically different ways in different cultures.⁹⁰⁵ My thesis tries to reveal how embryological thought came to be conceived in very different ways in different cultures. From comparison, we find that ancient Greek and Chinese thinkers had very different understandings of the origin of life. There were differences from theories to practices, and great diversity among texts should never be underestimated.

If we consider the very general picture, we can find that there were different conceptual and philosophical frameworks. After a careful examination of ancient embryological writings, we can find that embryological speculations were always coloured by different preconceptions. Indeed, some related knowledge was obtained from experiences, such as women's testimonies. However, most knowledge was actually constructed within a certain conceptual and philosophical framework. This framework provided a tool for investigations and a perspective for explanations. As a result, it made up the foundation of ancient embryological thought. What is the most important reason for

905 Kuriyama, S. (1999).

the differences in understandings? It is essentially because of the different conceptual and philosophical frameworks. As a result of the different conceptual and philosophical frameworks, different authors reached very different explanations even if they faced with the same subject.

On the one side, many Greek concepts cannot find a counterpart in ancient Chinese thought. In Hippocratic writings, we can find great influences from some basic concepts like the four elements (fire, water, air, and earth), the four qualities (hot, cold, dry and wet), the four humours (blood, phlegm, yellow bile and black bile), etc. In Aristotle's works, we can find great influences from his hylomorphism and teleology. In Aristotle's doctrine of hylomorphism, everything must have its form (εἶδος) and its matter (ὕλη), so the embryo must have its form and its matter as well. The form comes from the father, while the matter comes from the mother. It makes up a special embryological theory and the concept of 'form' cannot find a counterpart in ancient Chinese thought. Aristotle's teleological thought had a great influence in the development of Greek biology and medicine. In Aristotle's doctrine of teleology, everything must have a goal or *telos* (τοῦ τέλους) because nature does nothing in vain, while such a teleology cannot find any counterpart in early China.

On the other side, many Chinese concepts cannot find a counterpart in ancient Greek thought. In Chinese embryological thought, we can find great influences from some basic concepts like *qi*, *yin-yang*, and the five phases (*fire, water, earth, wood, and metal*), etc. I have argued that Chinese writings generally had a much greater emphasis on the importance of preserving *jing*. In Chinese thought, *jing* is not only important for generation, but also important for keeping health and achieving longevity. In many Chinese texts, *jing* is commonly regarded as the fundamental reason to explain why some people have a longer life and why some people have a shorter life, even though there are different ideas on how to preserve *jing* through sexual cultivation. In Greek thought, however, we can hardly find a direct relationship between the seed and longevity.

I have also argued that the concept of 'resonance' had great impacts in the construction of embryological thought in early China, while such a concept cannot find a counterpart in ancient Greece (even though it requires further investigation for the case in ancient Roman). The concept of 'resonance' built a link for the embryo to make sympathetic interactions with the outside world. It produced the long-influential doctrine of 'internal transformation', which advocated the

techniques of transforming a girl into a boy or a boy into a girl through drugs and rituals. It also produced the long-influential doctrine of ‘foetal education’ that teaching the next generation should start as early as possible from the time of conception.

Moreover, I have argued that early Chinese embryological thought might be influenced by the contemporary Chinese concept of ‘*wuxing*’, as a result of which abnormal births were largely associated with natural disasters and political disorder. A monstrosity was normally thought to be caused by some other external reasons in Chinese thought, for example, a punishment from Heaven. As a result, abnormalities of the foetuses were frequently endowed with supernatural powers and were associated with significant warnings. They could be regarded as indications of coming misfortunes, such as natural disasters and political disorder etc. However, a monstrosity was normally thought to be caused by disorder during conception in Greek thought, even though there were different explanations of the details. In Hippocratic writings, a monstrosity is caused by superfetation or some other disorder. In Aristotle’s works, a monstrosity is caused by the collapse of the form.

Of course, there are many other differences, for example, different explanations of why a child is normally born in ten months’ time, etc. On these respects, we can see that embryological thought was conceived in very different ways in ancient Greece and early China. I suggest that the essential reason for differences relies on conceptual and philosophical frameworks.

For Similarities

From comparison, we can find that ancient Greeks and Chinese actually reached quite a lot of general understandings and similar ideas in the pursuit of knowledge. I will present a short summary of these similarities. (1) Despite the use of different terms, there were similar ideas about the nature of seed, which was regarded as the best residues of nutriment and thus was related to regimens in both cultures. In Greek thought, the σπέρμα is transformed from the ultimate residue (περίττωμα), explicitly blood, through the process of concoction. In Chinese thought, *jing* 精 is regarded as the essence of life. When drinks and foods come into the body, they become the refined *qi* in the five depots and finally change into the acquired essence. (2) Similar ideas can also be found for associating the seed with brain substances and spinal marrow. The generative power was

associated with the ability to produce seed. (3) There was a common awareness of the age factor in fertility. No matter in ancient Greece or early China, it was commonly suggested that couples should have children at a suitable age. Male and female individuals are unable to produce the suitable seminal fluid if they are not at a suitable age. It is difficult to have children if the parent's age is too young or too old. (4) Similar ideas can be found in the theories of sex determination. For example, the right / left doctrine commonly existed in both cultures, even though Greeks and Chinese made the opposite correlation of right and left with male and female. (5) There was a similar idea for the existence of a certain sequence in the formation process, in which the more important parts are formed in priority to the less important parts. In Aristotle, the heart is the first formed internal organ because the heart is thought to be the most important organ. In *Huangdi Neijing*, the brain is the first formed internal organ because the brain is thought to be the most important organ. (6) It was taken as common sense that births should happen at the tenth month.

Indeed, ancient thinkers could possibly reach the same conclusion after the same observation, but it should not be taken for granted. In some cases, these similarities were likely to be mere coincidences. In the history of science, many ideas appeared independently and many discoveries were found independently. Even so, it is still amazing that so many similar embryological ideas appeared independently in ancient Greece and early China. Apart from coincidences, it is possible to argue for a similar level of mentality, which was the reason why ancient Greeks and Chinese reached quite a lot of general understandings and similar ideas in the construction of embryological knowledge. In the investigation of ancient embryological writings, my thesis has a focus on the way of thinking. I have argued that, in many aspects, ancient Greeks and Chinese shared a similar way of thinking. This can be reflected in the following aspects.

Firstly, analogical reasoning was commonly adopted as a tool for the investigation of the embryo. Even though different choices of images could lead to very different understandings, analogical reasoning played an important role in the formation of embryological knowledge in both cultures. The embryo is not something that can be easily observed. When ancient people started to discuss and investigate the embryo, they were trying to explore what was unknown and mysterious. Analogical reasoning was adopted as the best tool for both Greeks and Chinese to make such an exploration, even though different choices of images could lead to different understandings of the

embryo. It is clear that some embryological knowledge was not obtained through observations, but through analogical reasoning. In such a way, ancient thinkers reached what could not be seen through what could be seen.

Secondly, there was a common idea of macrocosm and microcosm, which exerted great influences on the construction of embryological knowledge and medical knowledge. Cosmological arguments were commonly applied in embryological explanations. The two subjects had interactions in two ways. In one way, the origin of the universe was frequently compared to the gestation of a new baby. Greek philosophers frequently drew an analogy between the development of the matrix of the universe and the development of the embryo in animals, while Chinese philosophers used embryo as evidence for their arguments of the grand universe as well. In the other way, early cosmological knowledge provided some of the most basic conceptual frameworks for ancient embryology. The formation of the embryo generally follows the same manner as the formation of the universe – the same elements and the same principles.

Thirdly, there was a common belief in the power of mathematical numbers. The power of mathematical numbers can be reflected in the power of the number seven and the importance of the birth date. Some Hippocratic writings repeated the doctrine that an eight-months' child can never survive because it lacks the powerful number seven. The number seven is also important in Chinese thought and it is related to life cycles. In addition, the manuscripts of Mawangdui emphasized much about the dates and the numbers, which were associated with the future of the child and even the fortune of the whole family. There were beliefs about the proper date of births. Moreover, there were beliefs about double and single organs. On the Greek side, there was a belief that the internal organs must be double, so the uteri must be double and the double uteri were used to explain the conception of twins. The kidneys must be double as well, but the double kidneys had no generative functions. On the Chinese side, there was a belief that the internal organs must be single, so the kidney must be single and the uterus must be single as well.

Male and Female

My thesis pays great attention to the understandings of sex differences. After a careful investigation of embryological writings in ancient Greece and early China, we can find that there

were many common understandings and similar ideas about sex differences. In both cultures, it was mostly the roles of male and female in generation that were held to define sexual difference, even though ancient Greeks and Chinese had very different understandings of how the generative functions could be conducted through vessels, blood, semen, menstrual blood, uterus and kidneys etc. In general, there was a common awareness of the strong connection between sex and generation. For example, in *Huangdi Neijing*, there are four vessels particularly related to the female generative functions – the controlling vessel, thoroughfare vessel, vessel below the girdle and uterine vessel, and one vessel specifically related to the male generative functions – the superintendent vessel. In Aristotle, the male is defined as the one that generates ‘in another’, while the female is defined as the one that generates ‘in itself’. The overall constitutions and bodily structures of male and female are different in degrees in certain aspects (e.g., hot and cold, dry and moist, *yin* and *yang*, outside and inside); these can be regarded as quantitative differences. However, for the purpose of generation, male and female must have different bodily functions, which should be regarded as qualitative differences. Male and female are considered functionally different in many aspects, while the most essential difference is linked to reproductive functions.

There was also a common awareness of gender-specific diseases in both cultures, while most gender-specific diseases were closely related to generative organs or generative functions. It was much emphasized by Greek and Chinese doctors that sometimes male and female patients should be treated differently. In Hippocratic writings, the female-specific diseases were largely related to the uterus and the menstrual blood – the most important parts for a woman to play the role in producing children. In early Chinese texts, there were descriptions of both male-specific diseases and female-specific diseases, for example, the disease of a stony uterus and the problem of impotence. Indeed, these gender-specific diseases always have a close relationship with generative functions. Hence, knowledge of producing children was even classified under a sub-category of the art of the bed-chambers in early China. Moreover, there was a common recognition of diseases caused by unsatisfied sexual desires. Some diseases of the uterus and the menstrual blood were commonly thought to be caused by unsatisfied sexual desires. When desires or emotions were not peacefully satisfied, they could turn into physical and psychological diseases.

Indeed, there is no reason to deny that there was a reflection of sexual hierarchy in embryological

theories, especially in the Greek ones. The position of women was, without a doubt, lower than that of men in both societies, so it is not a surprise to find sexual hierarchy in embryological thought. For example, Hippocratic authors had explained that a female only come from ‘weak’ and ‘fluid’ seed. Femininity and masculinity essentially originate from the seed. The best type of men with the greatest masculinity is made of ‘purely male’ seed and this is the reason for him to be ‘brilliant in soul and strong in body’. Aristotle had explained that an embryo becomes a female by incidental only if it fails to become a male because of coldness or some other reasons. When the male principle fails to control the material, a female will be produced. Hence, a female is regarded as a ‘mutilated’ or ‘deformed’ male. However, apart from the sexual hierarchy, there is also a complementary relationship between male and female. In many ways, male and female have a division of labour. Female is complementary to male, while male is complementary to female.

In fact, the female’s role in generation was much emphasized. From comparison, we can find that Greek and Chinese authors shared many common ideas on the female’s role in generation. For example, there was a common explanation that the success of conception relies on both parents, while the failure of conception is usually caused by mismatching. For a successful conception, the mixture of seeds must be in great harmony. Failure might be caused by not achieving ‘a correct attunement’, or not standing ‘in the right proportional relation’, etc. There is an equal responsibility between the husband and the wife. We find suggestions to both men and women for promoting fertility through drugs, rituals and many other practices.

My thesis has argued that there was a common understanding of the female’s essential contribution to conception. The female seed was generally acknowledged in almost all the investigated embryological writings. It was generally admitted that some essential parts of the embryo came from the mother, which was used to explain the phenomenon of maternal resemblance as well. Women were not simply regarded as containers or suppliers of nourishments. The importance of women’s role in generation was never denied in any of the embryological writings as so far investigated. The menstrual blood, with a similar origin from the residues of nutriment, was sometimes regarded as the female seed in both cultures. I have argued that the menstrual blood should be treated as the ‘secondary seed’ in Aristotle. It is different from the ‘primary seed’ of the male one, but it is still a type of seed. When the embryo is formed, the ‘primary seed’ from the father

provides the soul (the form), while the ‘secondary seed’ from the mother provides the body (the matter). Therefore, Aristotle’s theory is different from the ‘two-seed theory’ in Hippocratic writings and it is also different from the ‘one-seed theory’ of other natural philosophers. I have also argued that there are at least two models of the seed in *Huangdi Neijing*. In one model, *jing* is the essence of life and it has two types—inborn essence and acquired essence. The embryo obtains the inborn essence from the father and the mother. In another model, the embryo obtains *jing* from the father and the menstrual blood from the mother, which shares a rather similar idea to that of Aristotle. In both cultures, there was a common recognition of the female’s indispensable and positive role in generation. The female can do many things that the male cannot do. No matter what, it is the mother who provides the space and the nourishment for the foetus.

My thesis has also argued that gestation was commonly regarded as a mutual, interactive and dynamic process. There are mutual affections between the foetus and the mother. The nourishment of the foetus totally relies on the supply from the mother, so the situation of the mother could largely influence the development of the foetus. There was a common awareness of the importance of proper regimens for pregnant women. It is not only because the supply of nourishment comes from the mother, but also because the health of the mother will largely influence the health of the foetus. It is required in both cultures that the mother must have a proper regimen and proper behaviours during pregnancy. The appropriate regimen for pregnant women was a significant subject for both Greek and Chinese physicians, even though they had different suggestions about what should be done and what should be avoided. At the same time, the foetus could affect the health of the mother in return, which might cure or cause some diseases. The relationship between the mother and the foetus could be mutually beneficial. On this respect, I am arguing that the female plays an indispensable and positive role in ancient embryological writings.

Moreover, my thesis has argued that the female should not be regarded a failure of Nature in Aristotle. For Aristotle, there is a purpose for human generation, which is to continue the human species. I have argued that the producing of females does not present a failure of nature to reach its general goal. At the universal level, it is ‘for the better purpose’ that the male and the female are separated from each other. At the individual level, it is a ‘coincidence’ that an individual acquires sexual characteristics in respect of the particular part, while it is a ‘necessity’ that an individual must

come to be either a male or a female in respect of the particular 'dynamis'. I have also argued that sex determination is something incidental in Aristotle. It is incidental for the embryo to be a male or to be a female. It means that, in a sense, the sex of the child is unpredictable.

In a final conclusion, my research has revealed three central findings through a comparative study of embryological thought in ancient Greece and early China. First, main differences of Greek and Chinese embryological thought are essentially caused by different conceptual and philosophical frameworks. Second, the great similarities of Greek and Chinese embryological thought can possibly be explained by a similar way of thinking, which is reflected through analogical reasoning, cosmological arguments, beliefs about numbers, etc. Third, there is a common understanding that male and female bodies have different generative functions, which is used to distinguish and explain sex differences and gender-specific diseases. Despite the existence of a sexual hierarchy, there is a common recognition of the female's essential contribution and the female's indispensable and positive role in generation.

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