

MICHAELA SENKOVA
(UNIVERSITY OF LEICESTER)

MALE INFERTILITY IN CLASSICAL GREECE: SOME OBSERVATIONS

This paper considers the range of written and material evidence documenting ancient Greek thoughts about male infertility. While modern science shows that infertility affects both men and women, it is generally believed that most ancient civilisations attributed infertility to women. Recent research into ancient Greek gynaecological texts caused the male function in reproductive processes to be overlooked and under-theorised. Did Greek men understand they might have a fertility problem, or was infertility exclusively associated with women in their minds? How could a Greek man tell he was infertile? Did his infertility affect his standing in the community, socially or legally? Medical texts and archaeological evidence of religious rites demonstrate that the biology of procreation as understood by the ancients was strongly embedded in myth and ritual, whereas philosophical and political sources reveal how the attribution of gender roles might have influenced ancient Greek beliefs about fertility. In investigating ancient views on these issues, striking conclusions are reached: namely, that the social awareness of, and actions taken in response to, male fertility problems were considered more widely in ancient Greece than was previously thought.

Key words: *Reproduction, Fertility, Ancient medicine, Ancient cult, Ancient philosophy*

Procreation has always been an important landmark in human life, but a large number of circumstances might make it impossible for many; so much so that today we consider the failure to reproduce a significant health issue.¹ Today, we understand that factors such as age, lifestyle, genetic predisposition, environment and psychological well-being may all have a substantial effect on the ability to reproduce in both sexes.² Determining the

¹ It is estimated that despite regular periods of trying, up to 50% of couples will experience problems with conception at some stage during their sexual maturity, Davies et al. (2009: 1).

² Age is usually considered in relation to women, for whom it has become typical to

cause on either partner's side is, however, a complex matter. Medically, sperm analysis can identify problems with the reproductive capabilities of a man, yet many scientists agree that even in such circumstances the female factor cannot be disregarded, Tournaye (2011: 71). This raises questions as to how people confronted infertility in the past, before the scientific methods of the modern era were available. An in-depth examination of infertility in Classical Greece was recently offered by Flemming, who argued that even then it was already considered a serious medical issue, especially in connection with women (2013). Indeed, conception happens inside a woman; no wonder, therefore, that the ancients focused on their bodies.³ Also targeting the Greek Classical period of fifth and fourth centuries B.C., this paper looks beyond women. It reviews examples of behaviour that suggests possible reactions to male fertility issues. In particular, formulaic enquiries to ancient deities and arguments made before a jury at the Athenian law-courts both offer some insight into what implications infertility could have for one's life. These testimonies, combined with systematised observations provided by medical and philosophical treatises, reveal that the ancients fully understood that some men are unable to reproduce, and consequently developed measures that were believed to help those affected. Close reading of the evidence forms the base for a new theory of compatibility of

judge their reproductive ability according to their 'biological clock'. This term relates to the aging of a woman's supply of eggs, with which she was born and which mature during her lifetime in a process called ovulation. Because men retain the ability to produce sperm throughout their life they should, theoretically, be able to father children into old age. The quality of sperm, however, decreases with age as does that of women's eggs. Similarly, lifestyle is an issue that affects equally both men and women, and includes aspects such as smoking, alcohol and drug consumption, but also poor diet and low levels of physical activity. All these factors decrease the quality of men's sperm and women's ability to ovulate. For discussion see e.g. Davies et al. (2009), Seli (2011), Zhang (2011).

- ³ A Number of 'scientific' treatises from the Hippocratic Corpus present theories explaining the pathological characteristics of women's bodies and the treatments for them (*Barrenness; Diseases of Women; Diseases of Young Girls; Excision of Fetus; Generation; Nature of the Child; Nature of Women*). Such theories, presumably authored by men, were founded on ideals about women that were grounded in deep-seated cultural beliefs, philosophical thought, myth and ritual, set against a limited amount of observation. Ideas such as the wandering womb (e.g. *Diseases of women* 1.2, but also Plato *Timaeus* 91c) and the comparison of a womb to a jar (e.g. *Generation* 9) are two specific examples. The Corpus further recommends a culturally accepted way of life, namely an early marriage and regular sex, and equally importantly childbirth as essential for women's health (*Diseases of Young Girls; Generation* 4). Ancient Greek gynaecology represents a fruitful area of research; for discussion see King (1994 and 1998), Flemming (2013), Hanson (2007).

partners, which explains how the Greeks may have thought about the issues surrounding reproductive potentials of men.

A starting point in examining infertility in men is a brief summary outlining Greek observations about the male body both in contemporary medicine and philosophy. Medical texts, written by ‘professional’ doctors, represent an important source in which we can look for references to men’s reproductive qualities.⁴ For Classical Greece the most notable of these is a collection called the Hippocratic Corpus.⁵ Despite its extensive treatment of reproductive processes and potential difficulties that might arise when trying to conceive, only two works from this vast collection refer directly to men in the context of reproductive failure. These are a discussion of the traditional lifestyle of Scythians, an ancient tribe occupying vast areas east of the Black Sea (cf. Herodotus 4.1–8), in the *Airs, Waters and Places* (20–21), and one entry in the *Aphorisms* (5.63):

They [Scythians] grow up flabby and stout for two reasons. First because they are not wrapped in swaddling clothes ... nor are they accustomed to horse riding as children which makes good figure. Secondly they sit about too much ... People of such constitution cannot be prolific. The men lack sexual desire because of the moistness of their constitution and the softness and coldness of their bellies, a condition which least inclines men to intercourse ... they are weak in the sexual act when they do have intercourse. These reasons suffice as far as the men are concerned...

(*Airs, Waters and Places* 20–21; trans. W. H. Jones)

Women, who have the uterus cold and dense do not conceive; and those who have the uterus humid do not conceive, for the semen is extinguished, and in women whose uterus is very dry, and very hot, the semen is lost from the want of food; but women whose uterus is an intermediate state between these temperaments are fertile.

Similarly with males. Either because of the rarity of the body the breath is borne outwards so as not to force along the seed; or because of the density of the body the liquid

⁴ The term ‘professional doctor’ is problematic when considering ancient Greece because there is little or no evidence of any medical qualifications *per se*. Modern scholars tend to describe the ancient practitioners as regular craftsmen, who would travel from town to town offering their services at a fee, their reputation serving as their qualification. For discussion see Nutton (1985, 1992 and 2013). Indirect evidence for this can be seen in the statement of Plato that rhetorical rather than professional skills secured employment for doctors in the Athenian Assembly in his day (*Gorgias* 455b).

⁵ Written by multiple authors, the credibility of these texts as describing views of the fifth and fourth centuries B.C. can be questioned because many are believed to have been written as late as the second century AD, Nutton (1985: 24). Nevertheless, the Corpus represents the most comprehensive body of work that is directly associated with the medical tradition of Hippocrates of Cos, a famous physician of the fifth and fourth centuries B.C. See Smith (1979).

does not pass out; or through the coldness it is not heated so as to collect at this place; or through the heat this same thing happens.

(*Aphorisms* 5.62–3; trans. W. H. Jones)

Both passages provide a conjectural account of why male infertility occurs. While the *Aphorisms* gives way to a perception of fertility as something outside of human control that depends merely on the constitution of the body, the *Airs, Waters and Places* offers more detail on lifestyle factors that could lead to the loss of reproductive ability in men. Philosophical sources take a similar approach. Aristotle's detailed treatment of procreation in the *Generation of Animals* and the *History of Animals* explicitly states that both men and women can be infertile (*Generation of Animals* 746b 15; *History of Animals* 10.1). Reasons for this are listed as sterility from birth caused by prenatal "deformities in the regions employed for copulation", age, obesity and disease (*Generation of Animals* 746b 20–32). Unlike the Hippocratic writers, however, Aristotle clearly mentions that some of these 'deformities' could be treated (*Generation of Animals* 746b 34), even if he provides no clues as to what this treatment might be. A simple formula for testing the quality of men's semen (*Generation of Animals* 747a 4–6), and advice to wives in doubt as to the reproductive potential of their husbands (*History of Animals* 10.5.1–20), are the only practical additions to his otherwise theoretical approach.

Considering both the Hippocratic writings and Aristotle's philosophy of procreation, one starts to see a pattern emerge: neither source offers any practical solution for the men affected. Unlike women, whose health depends on their ability to reproduce (see n. 3 above), men are given no medical attention at all. This appears striking because the male factor is never disregarded in ancient reproductive beliefs. On the contrary, two theories of conception survive from Classical Greece, both of which consider a man's contribution to be indispensable. First, the so called 'one-seed' theory of Aristotle argues that the man provides all relevant rudiments necessary for the creation of new life, which the woman only nourishes in her womb (*Generation of Animals* 727b). Second, the so called 'two-seed' theory of the Hippocratic Corpus sees both male and female parts are essential. This concept rationalises both the creation of women and any possible resemblance between the mother and offspring (*Generation* 8). Indeed, neither of the texts mentioned above suggests that a man's input into conception is irrelevant, so it appears safe to argue that the omission of treatment advice for male infertility might be due to the fact that the Greeks felt no need to problematise it medically, Flemming (2013: 7 n. 23). In other words, while the Greeks of the Classical period considered women's bodies as pathological

and hence felt the need to treat them, non-procreation in their eyes had no direct effect on the general well-being of a man.⁶ In light of this argument, the identification of particular cases of male infertility in Classical Greece is not an easy task. There are, however, circumstances in which we may see indirect evidence of the matter that will help us understand and problematise the behavioural patterns of the ancients. These include, in particular, ritual practice and evidence from legal disputes.

When studying ancient Greek responses to issues outside the scope of their understanding, including those with a biological undertone, one cannot overlook the importance of the belief in supernatural intervention, e.g. Edelstein & Edelstein (1945). It was part of Greek custom to consult relevant gods at times when one was facing life challenges that appeared outside human control. Fertility represents such a challenge, and evidence of divine consultations as means of dealing with the problem is found both in literary sources and in archaeology. Like medicine and philosophy, however, supernatural assistance with fertility is also preoccupied with women.⁷ Actual male appeals, however, exist, and Attic tragedy of the fifth century B.C. offers examples of how instances of men approaching the gods with requests that their wives may provide children may have worked in action:

Ion: Have you come to the oracle with your husband or alone?

Creusa: With him ... he wished to learn one word from that shrine...

Ion: Have you come for the sake of harvest, or for children?

Creusa: We are without children, though married for a long time.

(Euripides, *Ion* 299–305; trans. R. Potter)

⁶ These views seem to have remained unchallenged until the second century AD, when Soranus proposed lifelong virginity as healthful, regardless of gender (*Gynaecology* 1.30–2). For discussion see Hanson (2007).

⁷ A number of deities is exclusively associated with women's biological processes in Greek cultural thought. Sometimes these deities can be identified through an explicit epithet such as Eileithyia or Lochia, but more often the connection is seen through dedications signifying women's motivations. Some votives, such as spindle-whorls or loom-weights, do not necessarily imply the idea of procreation. Others, however, clearly indicate a concern for female reproductive processes. Major shrines of Artemis, for example, such as those at Athens, Eleutherna and Ephesos, have yielded collections of moulded breasts and vulvae, and epigraphic evidence that is directly connected to women's bodies. For discussion see Cole (1998) and, especially for Artemis Brauronia, Linders (1972). Even the dominant Greek healing deity Asclepius appears to have been a point of help for women as attested in treatment records, collectively known as *lamata*, from his Epidaurian shrine (*JG IV*² 1 121 I and II; *JG IV*² 1 122 XXV and XXXI).

They call me Jocasta, for so my father named me, and I'm married to Laius. Now when he was still childless after being married to me a long time in the palace, he went to and questioned Phoebus, and asked for us to have sons for the house...

(Euripides, *Phoenician Women* 12–18; trans. E. P. Coleridge)

There are no explicit references to infertility as such here, and we cannot tell which partner was the cause of the childlessness. Yet these examples show that men occasionally took action in response to reproductive failure, though they would perhaps be wary of naming themselves as the party responsible.

Archaeological evidence for men's requests for fertility takes the form of votive offerings and inscribed enquiries, which appear in sanctuaries across the Greek world. These represent elements of an economic exchange between the supplicant and deity, and appear as means of making a plea or payment for divine favour, Foxhall (2013: 150); Osborne (2004: 5). Unlike the case of women (see n. 7 above), no known deities are exclusively responsible for male procreative functions in Greece of fifth and fourth centuries B.C., but anatomical votives in the shape of men's genitalia are common, e.g. Roebuck (1951: 122–123). These do not appear in such large numbers as their female counterparts, and establishing a clear link to male fertility is problematic because some may be indicative of entirely different biological problems from infertility.⁸ The Asclepieion at Corinth provides a good example of this: a great number of penises recovered from the site show the foreskin drawn tightly over the glans, identified as the pathological condition today called phimosis, Oberhelman (2014: 50). This means that, while it might be tempting to see anatomical votives of male genitalia as evidence of anxiety about reproduction, they might be symbolic of other areas of life. Be that as it may, the way in which men approach the supernatural can sometimes be more telling, such as in the case at the sanctuary of Zeus at Dodona. This shrine yielded a large number of lead tablets bearing various enquiries to the god dating from the sixth to the second century B.C., e.g. Eidinow (2013); Lhôte (2006). A catalogue of selected testimonia from the site was recently published by Eidinow (2013), but the majority still remain unpublished. Nonetheless, queries in which the supplicants ask about children are frequent in the available collection. A standardised formula by which men ask for children from a particular woman appears in four published requests and follows a set pattern: “[man's name] asks the god whether there will be children for him by [woman's name], the wife he has now?” Eidinow (2013: 90 no. 1; 92 nos. 4–6). Similar to the examples from Attic drama quoted above, these testimonies should not be interpreted

⁸ I am disregarding here non-biological meanings such as symbols of luck.

as simply placing the fault with one or the other partner. Nonetheless, the recurrence and phraseology of the Dodona requests suggests that the combination of particular partners might be held responsible for the childlessness. From this we can infer a new methodological attitude to infertility in Classical Greece, namely the theory of the compatibility of couples.

At the other end of the spectrum of evidence, some situations described in Attic law-court speeches provide different, but no less interesting clues to ancient approaches to understanding male infertility. In particular, Isaeus offers instances where the purposeful allegation of infertility could pass for credible evidence in disputes over the inheritance of property. His *Oration* 6 follows claims made for the estate of a certain Euctemon after he died aged 96. Among the claimants are his two alleged sons, who are no older than 20, and a significant part of the oration represents other claimant's effort to dispute their legitimacy. A part of the argument amounts to an accusation that Euctemon was infertile because of his age (6.23):

Euctemon ... announced his intention of marrying a sister of Democrates of Aphidna and recognising any children who should be born to her ... His relatives, knowing that no more children would be born to him at his time of life...

(Isaeus 6.22–3; trans. E. S. Foster)

Indeed, we have already seen that Aristotle lists old age as one of the reasons for male infertility, and that even modern science to some extent confirms this (see n. 2 above). Euctemon would have been at least 76 when he supposedly fathered the boys, and the speech reveals elsewhere that the youngsters were, in fact, not his own (6.20). The speaker must have been aware that using Euctemon's age as evidence would seem plausible to the jury. This incident therefore shows that the ancients understood that old men could not reproduce easily, and provides some information about the consequences this could have had for one's life, in particular from a legal perspective. There is, however, no evidence for advice or treatment of the problem in the texts.

Other orations offer more clues. Isaeus's *Oration* 2 focuses on a dispute over the inheritance of an old man, Meneclēs. Meneclēs was married twice, once when young and the second time as an older man. His second wife was the young daughter of a close friend, but they later divorced because they had no children and Meneclēs instead adopted her brother as his son. About twenty years later, Meneclēs' biological brother prosecuted this adopted son, the brother of Meneclēs' second wife, as having been adopted unlawfully. The argument is made that the adoption happened under the influence of the defendant's sister (2.1). In the speech, however, the defendant pleads his right to inherit and not only emphasises his dutiful conduct as adopted

son, but describes in detail the circumstances under which he was adopted. According to him, Meneclēs divorced his sister out of pity so that she could marry again and have children, after which he (her brother) was adopted because of the warm relations between the two families:

Meneclēs, with many expressions of praise for our sister, approached us and said that he viewed with apprehension his increasing age and childlessness: she ought not, he said, to be rewarded for her virtues by having to grow old with him without bearing children; it was enough that he himself was unfortunate ... he [Meneclēs], therefore, approached us and said that he thought it right, since fate had decreed that he should have no children by our sister, that he should adopt a son out of the family from which he would have wished to have a son of his own ... 'I should like, therefore,' he said 'to adopt one of you two...'

(Isaeus 2.7–11; trans. E. S. Foster)

Two pieces of information appear striking in this example. First, Meneclēs must have been at least one generation older than his adopted son and his second wife in review of his long friendship with their father. This follows the line of argument made earlier, that old men could experience difficulty in procreating. Secondly, however, and perhaps more importantly, the speech tells us that Meneclēs had been married before and still had no offspring. This information is crucial to understanding his divorce and subsequent adoption of a son, as it is an indirect admission of infertility – Meneclēs could not father children even when young. Indeed, the credibility of the story cannot be tested, but for the purpose of this paper it is irrelevant whether the events took place as described. The vital point is that such argument would be thought acceptable for presentation to the jury, which in turn suggests that people were aware of the possibility that some men would be infertile even in their prime. On this interpretation, the passage indirectly alludes to a form of socially acceptable treatment for male infertility. This treatment, however, lies not in medicalisation of the issue but in Greek socio-cultural values. That is to say, the creation of offspring was inextricably linked with fulfilling one's social duty, namely the continuation of the family line, Wilkinson (1978: 26). If one could not achieve pregnancy with one's wife, one had other, non-medical options to remedy one's social position: (a) one could change partners, as a result of the incompatibility described above, or (b) one could adopt, as in Meneclēs' case.⁹ While the first scenario does not guarantee a positive outcome, the second does.

⁹ Adoption itself acts as proof that men desired offspring for social reasons. The adoptee would in most cases be an adult at the time of adoption, securing the continuation of the family's place within the community. For discussion see Rubinstein (1993), Wilkinson (1978).

Conclusion

To conclude, there is no doubt that fertility was taken seriously in Greece of fifth and fourth centuries B.C. While the childlessness of a woman would have been seen as dangerous for her general health and therefore required medical attention, male infertility appears not to have been considered as a health hazard, so there was no need to problematise it further in the medical tradition. This viewpoint opened the way for Greek philosophers and medical practitioners to concentrate on women's bodies, which in turn allows us to understand that it was women that the Greeks blamed for reproductive failure. Instead, however, the evidence just presented indicates that men, equally with women, could be the cause of a childless union, and that the ancient Greeks were fully aware of this fact even if they appear reluctant to admit. Pleas at sanctuaries and legal adoption offered two possible means to which Greek men could turn when they suspected they might have a fertility problem.

Bibliography

Primary sources

- Balme, D. M. (Ed.) (1991). *Aristotle: History of Animals*, Loeb Classical Library. London – Cambridge: Harvard University Press.
- Goold, G. P. (Ed.) (1988). *Isaeus: Orationes*, Loeb Classical Library. London – Cambridge: Harvard University Press.
- Hanson, A. (Ed. et Trans.) (1975). Hippocrates: Diseases of Women. *Signs*, 1/2, 567–584.
- Henderson, J. (Ed.) (2010). *Hippocrates: Diseases of Young Girls*, Loeb Classical Library. London – Cambridge: Harvard University Press.
- Henderson, J. (Ed.) (2010). *Hippocrates: Excision of Fetus*, Loeb Classical Library. London – Cambridge: Harvard University Press.
- Henderson, J. (Ed.) (2012). *Hippocrates: Barrenness*, Loeb Classical Library. London – Cambridge: Harvard University Press.
- Henderson, J. (Ed.) (2012). *Hippocrates: Generation*, Loeb Classical Library. London – Cambridge: Harvard University Press.
- Henderson, J. (Ed.) (2012). *Hippocrates: Nature of the Child*, Loeb Classical Library. London – Cambridge: Harvard University Press.
- Henderson, J. (Ed.) (2012). *Hippocrates: Nature of Women*, Loeb Classical Library. London – Cambridge: Harvard University Press.
- Jones, W. H. (Ed.) (1931). *Hippocrates: Aphorisms*, Loeb Classical Library. London – Cambridge: Harvard University Press.
- Jones, W. H. (Ed.) (1957). *Hippocrates: Airs, Waters and Places*, Loeb Classical Library. London – Cambridge: Harvard University Press.
- Lamb, W. R. M. (Ed.) (1967). *Plato: Gorgias*, Loeb Classical Library. London – Cambridge: Harvard University Press.

- Lee, H. D. P. (Ed.) (1971). *Plato: Timaeus*, Penguin Classics. London: Penguin Books.
- Marincola, J. (Ed.) (2003). *Herodotus: Histories*, Penguin Classics. London: Penguin Books.
- Oates, W. J. & O'Neill, E., (Eds.) (1938). *Euripides: Ion*. New York: Random House.
- Oates, W. J. & O'Neill, E., (Eds.) (1938). *Euripides: Phoenician Women*. New York: Random House.
- Page, T. E. & Capps, E. & Rouse, W. H. D. & Post, L. A. & Warmington, E. H., (Eds.) (1948). *Aristotle: Generation of Animals*, Loeb Classical Library. London – Cambridge: Harvard University Press.
- Temkin, O. (Ed.) (1991). *Soranus: Gynaecology*. Baltimore: John Hopkins.

Secondary sources

- Cole, S. G. (1998). Domesticating Artemis. In S. Blundell – M. Williamson, (Eds.), *The Sacred and the Feminine in Ancient Greece*. (27–44). London: Routledge.
- Davies, M. & Webber, L. & Overton, C. (2009). *Infertility*. Oxford: Oxford University Press.
- Edelstein, E. & Edelstein, L. (1945). *Acslepius: A Collection and Interpretation of the Testimonies*. (2 volumes). Baltimore: The John Hopkins University Press.
- Eidinow, E. (2013). *Oracles, Curses, and Risk among the Ancient Greeks*. Oxford: Oxford University Press.
- Flemming, R. (2013). The Invention of Infertility in the Classical Greek World: Medicine, Divinity, and Gender. *Bulletin of the History of Medicine*, 87/4, 565–590.
- Foxhall, L. (2013). *Studying Gender in Classical Antiquity*. Cambridge: Cambridge University Press.
- Hanson, A. E., (2007). The Hippocratic Parthenos in Sickness and Health. In B. MacLachlan – J. Fletcher, (Eds.), *Virginity Revisited: Configurations of the Unpossessed Body*. (40–65). Toronto: University of Toronto Press.
- King, H. (1994). Producing a Woman: Hippocratic Gynaecology. In Archer, L. (Ed.), *Women in Ancient Societies*. (102–114). London: The Macmillan Press.
- King, H. (1998). *Hippocrates' Woman: Reading the Female Body in Ancient Greece*. London: Routledge.
- Lhôte, É. (2006). *Les lamelles oraculaires de Dodone*. Genève: Droz.
- Linders, T. (1972). *Studies in the Treasure Records of Artemis Brauronia Found in Athens*. Stockholm: Svenska Institutet i Athen.
- Nutton, V. (1985). Murders and Miracles: Lay Attitudes towards Medicine in Classical Antiquity. In R. Porter (Ed.), *Patients and Practitioners: Lay Perceptions of Medicine in Pre-industrial Society*. (23–54). Cambridge: Cambridge University Press.
- Nutton, V. (1992). Healers in the Medical Market Place: Towards a Social History of Graeco-Roman Medicine. In A. Wear (Ed.), *Medicine in Society*. (15–58). Cambridge: Cambridge University Press.
- Nutton, V. (2013). *Ancient Medicine*. Oxford: Routledge.
- Oberhelman, S. M. (2014). Anatomical Votive Reliefs as Evidence for Specialization at Healing Sanctuaries in the Ancient Mediterranean World. *Athens Journal of Health*, 1/1, 47–62.
- Osborne, R. (2004). Hoards, Votives, Offerings: The Archaeology of the Dedicated Object. *Archaeology*, 36/1, 1–10.
- Roebuck, C. (1951). *Corinth: Results of Excavations Conducted by the American School of Classical Studies at Athens, Vol. XIV: The Asklepieion and Lerna*. Princeton: American School of Classical Studies at Athens.

- Rubinstein, L. (1993). *Adoption in IV. Century Athens*. Copenhagen: Museum Tusculanum Press.
- Seli, E. (2011). *Infertility*. Chichester: Wiley-Blackwell.
- Smith, W. D. (1979). *The Hippocratic Tradition*. London: Cornell University Press.
- Tournaye, H. (2011). Diagnosis and Management of Male Infertility. In E. Seli (Ed.), *Infertility*: (71–82). Chichester: Wiley-Blackwell.
- Wilkinson, L. P. (1978). *Classical Attitudes to Modern Issues*. London: William Kimber.
- Zhang, L. (2011). *Male Fertility Patterns and Determinants*. London: Springer.

ms422@le.ac.uk

