

Harvey's Troubles with the Egg

European Association for the History of Medicine and Health Publications

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EVENING LECTURE SERIES

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Esther Fischer-Homberger



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Introduction



THE EVENING LECTURE has become a familiar feature in the recent tradition of the conferences of the European Association for the History of Medicine and Health. In such an event members of the Association profit from the experience, good scholarship and critical gaze of the invited lecturer who, at the same time, receives a testimony of the professional gratitude for their contributions to the field. The fourth conference, jointly organised with the International Network for the History of Public Health, discussed 'The Healthy Life: People, Perceptions, Politics', in 21 lively sessions held from 2 to 5 September 1999 in the pleasant Mediterranean town of Almuñécar (Spain).

On this occasion, our guest lecturer was a distinguished scholar, one of Erwin Ackerknecht's Swiss disciples, and one who, after a brilliant academic career and prolific writing in the 1970s and first half of the 1980s, had disappeared from the front line of the history of medicine and health. The endeavours of our organisation of the programme brought us the opportunity, having renounced her university chair, to enable her to re-introduce herself as a psychotherapist (her first qualification before she was lured by history of medicine). Women professors are not common in our field; in Western Europe, setting apart the pioneering role of Edith Heischkel (Heischkel-Artelt after her marriage to colleague Walter Artelt, 1906–76) and Erna Lesky (1911–86) at the University of Vienna, I think that the lead belongs to Esther Fischer-Homberger in Bern. It should not be forgotten that in the late 1970s women were entering the field for the first time in significant numbers, and some of them won their first positions in the masculine academic world (and I think of Johanna Bleker in Germany, Rosa Ballester and Elvira Arquiola (1947–95) in Spain, Elisabeth Fee and Regina Morantz in the USA or Virginia Berridge and Margaret Pelling in England, among others). I have not the exact figures of membership, but the participation in

our conferences is increasingly heading towards parity; the Almuñécar Conference counted 42% of women among its participants.

To select Esther Fischer-Homberger as the guest lecturer was a homage by the EAHMH to the generation of women professors whose teaching in the 1960s–1980s so greatly influenced all of us and who provide a living testimony of success in a masculine world. But our guest was also among the first to introduce feminist theories into her research and to produce analyses of gendered medical knowledge. Thus, her lecture fitted into the ‘perceptions and politics’ aspect of central concern to this conference and showed the increased value of feminist notions in the new world for the history of medicine and health that the EAHMH aims to foster. The fact that her lecture selected a seventeenth-century theoretical problem, in front of an audience principally orientated towards contemporary contexts, gave a supplementary interest to her views; as it is known, that our EAHMH seeks purposefully to attract researchers from the diverse chronological divides that tradition and academy keep apart.

*Esteban Rodríguez Ocaña,
President-Elect of the EAHMH and
President of the Organising Committee of the
4th Conference of the EAHMH*

Notes on the Author

Esther Fischer-Homberger



ESTHER FISCHER-HOMBERGER is interested in the history of how humans experience their world. After completing her thesis on the history of manic-depressive illness she worked at the Psychiatric Clinic in Burghölzli and at the Institute of the History of Medicine, University of Zürich. At that time, her chief interests were the history of psychiatry, of neuroses and of psychosomatic interrelations. As Professor for the History of Medicine at the University of Bern she published on the history of legal medicine and on the medical history of women. In 1984 she exchanged her academic chair for that of a psychotherapist. Her latest book contained papers on the history of eating disorders in psychoanalysis, of pain and of the heart. Her most recent papers are on the medical histories of trauma and of the embryology of descent.

Harvey's Troubles with the Egg

Esther Fischer-Homberger



This lecture is about the perceptions and politics of gender in William Harvey's book *On Generation*, published in 1651 in Latin. The quotations come from the translation by Gweneth Whitteridge.

1. Who gives Life?

WHERE DO CHILDREN COME FROM? Whose are they? To whom do they owe their existence? Who is responsible for them? Who does one recognise as one's parent or as one's child? Much depends on the answers to such questions, such as the definitions of identity, loyalties or heritage, as well as socio-economically highly relevant religious beliefs. And the answers given by the sciences concerned with the material basis of procreation and, above all, by embryology are, in our tradition, of special importance, given that they have the status of truth.

In legal, theological or historical contexts the biological basis of reproduction would not, of course, matter that much. In the realm of the mind, spiritual lineage would be considered even more relevant than mere physical parentage. Bodily procreation could produce life, but mental creativity could produce immortality. This belief is a cornerstone of the construction of a culture which places mind higher than matter, the works of a genius higher than mortal flesh-and-blood children and man higher than woman. The 'Genius' is an old tutelary deity of the man. However, once matter was recognised as the true basis of life, even the male genius had to be traced back to the body and its corporeal facts. In a surprising, or perhaps not so surprising way, this brought 'genius' back to its historical origins, as

well as to the bodily origins it had been designed to overcome. The idea of a fertile Genius itself derives from the notion of physical engendering. Latin 'genius' is related to the verb 'gignere' – to bring forth – and, thus, to 'genitals', 'generation' and 'gender'.

William Harvey was and still is acknowledged as a man of genius. 'The Doctor though living a Bachelor', Fuller wrote in 1662, left 'hopeful sons to posterity: his books'. Harvey's momentous book on the circulation of the blood, *Movement of the Heart and Blood in Animals*, Fuller called 'his son and heir'. The second offspring of Harvey's genius 'yet in its minority', as Fuller put it, is *On Generation*. It appeared in Latin, when Harvey was 73 years old. Yet, it is not a work of his old age. Harvey was already engaged in embryological studies as a student. But then he brooded for many decades over the topic, and the help of Sir George Ent, then President of the College of Physicians of London, was needed to deliver him of his burden. Indeed, Dr Ent, when he edited Harvey's work, felt (as he noted) like 'a midwife, producing into the light this noble issue of his brain, finished and perfected as you now behold it, though it stayed long in the birth.' Nobody was overly happy with this book, not even Harvey himself, who frankly admitted his difficulties with embryology, concluding: 'I confess openly that I am at a stand-still.' He even declared his ideas as a 'fable'.

It has been supposed that Harvey could not pronounce a satisfactory theory of generation because he did not have a microscope, and because 'cell theory' did not exist at the time. But since Geoffrey Keynes has ascertained that 'Harvey could have known of this instrument', it may be surmised that he did not want to look too closely at his material findings, namely the female 'egg', and in doing so, may have missed the opportunity to become the first man to talk about generation in terms of an early 'cell theory'. Still, being an honest and serious scientist, Harvey did not give up his embryological enquiries. Indeed, he had some soberly logical reasons to pursue them.

Harvey was an Aristotelian. Therefore, the heart held a central position in his concepts. Aristotle considered the heart as the seat of the 'innate heat' of movement and sensation, and also as the source of blood and seed – menstrual blood and male seed – which he declared to be the female and the male contribution to the generation of children. He taught that only the male organism, being warmer and, thus, more vital than the female one, was capable of concocting the raw blood to its most sublime form, the 'fully ripened' male seed; the seed able to form a child out of the female menstrua. Aristotle guaranteed the male a generative line of his own, a largely male lineage. He stated that the first structure arising after the male seed was

poured into the menstrea was the germ's heart; the heart which would in turn become the source of the next generation's seed – if the germ was male. The male heart, thus, would connect fathers and sons down from the earliest times into the distant future, just as the womb and the umbilical cord linked mothers and daughters down through the ages.

As an Aristotelian, Harvey would have shared the belief that the male heart was the source of male seed. But he could not hold this to be true once he had discovered the circulation of the blood and the pumping function of the heart. So, logically, he had to revise the question of the origin of the child. In keeping faith with Aristotle, Harvey opposed the views both of the Hippocratic authors and of Galen, who attributed seed to both sexes. He explicitly took up the controversy between the followers of the Stagyrte and the Pergamite, the 'philosophers' and the 'physicians', a controversy that had been going on since the late Middle Ages. But his embryological findings were a double scandal in the Aristotelian universe. First, Harvey was unable to demonstrate the generative power of the male seed by the scientific methods most accepted at that time as he could never find any traces of seed in the uterus of females after coitus. Secondly, he found something not provided for by Aristotle: a female contribution to generation, namely, pimples which would later become eggs in oviparous animals and embryos in the viviparous. He called them 'primordia' of life and, on the analogy of birds, 'eggs' (in both oviparous and viviparous animals).

Of course, Harvey could have surmised that life originated in the female body. Such an idea would have been wrong in our perception, but no more wrong than others of his ideas. But it would have comfortably explained his observations (a female egg and no male seed), and it would have brought him in accord with old images of the egg as the primary seed and origin of the cosmos, as mother of the universe, as a 'matrix' in the twofold sense of 'source' and 'uterus'. And last, though not least, it would have provided him with the material basis of generation he was looking for and, thus, could have been a good starting point for further research.

2. Male Anxieties

a. Males' Generative Uncertainty

BUT SUCH A PERCEPTION would have meant facing the old male anguish, which is the idea that males might not be indispensable for procreation. Aristotle's genetics had provided, for more than a millennium, a theory which guaranteed men a scientifically safe place in the chain of being. It had linked fathers and sons from generation to generation – just as umbilical

cords linked mothers and daughters – at the same time reducing the competing female contribution to generation to insignificance. Of course, when this piece of Aristotelianism broke down, the old images of a female lineage were likely to emerge anew, especially since Harvey called the female contribution to generation ‘egg’. These are images that tended to marginalise the male in respect to descent and parentage and give way to the thought that males might be dispensable in the business of generation. Indeed, Aristotle’s theory of generation seems designed to ward off precisely this concern.

Harvey certainly knew that his findings – a female egg and no male seed – eroded this Aristotelian rampart. Accordingly, male claims to authority over children and spouse were to lose their most important scientific legitimisation. Of course, Spallanzani, in 1785, was able to demonstrate at last the fertilising quality of male seed; and, in 1875, Hertwig could observe the fusion of an egg-cell and a sperm. But only in the course of the twentieth century could modern genetics give the generative usefulness of the male a solid material rationale, though the Aristotelian pre-eminence of the male generative potency, however, was never to be restored. And it was only in the last decade of the twentieth century that genetic analysis provided conclusive proof of parenthood. Until then fatherhood had in the end remained an uncertain matter. Of course, on the grounds of everyday experience, everybody agreed that children had fathers and that similarities had to do with kinship. But these suppositions were of no use in ambiguous and controversial cases. What the common people knew the learned could not prove. When a woman denied her non-marital contact with a man and her begetter held his tongue, the spouse found himself utterly helpless and unable to prove the contrary. Similarities did not clarify anything since they could not be satisfactorily explained until the age of modern genetics. Women’s place in the chain of succession has for ages been more secure than that of their male partners, fathers and sons. Until the eighteenth century science had to admit the possibility of generation without a male, of parthenogenesis and of spontaneous generation. Both Harvey’s discoveries (the egg and the lack of material proof for the fertilising function of the male seed) aggravated the situation. Harvey had to yield to the un-Aristotelian idea that female parthenogenesis might occur even in species with two sexes. An animated egg ‘is produced by a hen without the aid of the cock’, he writes, and ‘it seems probable that the female is a more efficient agent in generation than the male, for “in the universe likewise, the earth is held to be as it were of female nature and called mother”. Now the earth also produces many things spontaneously without any seed, and among

animals some females do procreate of themselves without a male (thus the hen generates a wind-egg), but males never beget anything without a female.' Another physical reason for the brittle fabric of the male's generative confidence is the difference between the actual generative labour of the sexes. Pregnancy and nursing usually result in more bonding between the parent and the child than a father's work. This may prompt men to install a system of beliefs, rules and laws designed to guarantee them a safe position within human communities and history and to fortify the male strain. To compensate and conceal the fragility of the male's specific social situation in this way is certainly what patriarchy attains. Looked at in this way, patriarchy is not primarily a system of male power to control women and the world at large, but a community which acknowledges the father as the origin (arche) of life and the male line as the socially, legally and economically decisive line of succession. Thus, Harvey's results divested the male descendency of its 2000-year-old scientific basis. The egg interrupted the Aristotelian line which, hardly affected by its passage through a female body, had, for hundreds of years, joined the fathers' hearts to the hearts of the sons.

b. Man but an Appendix of his Mother's Entrails

MALE IMAGINATION THEN FOUND ITSELF CONFRONTED by the frightening idea that it had once been merely a fatherless part of its mother's entrails. Harvey inquires: 'Before a man became of full stature, he was first a boy, for from the boy he grew up into a man; before he was a boy, he was an infant, and before an infant, an embryo. Next we must enquire what he was in his mother's womb before he was either an embryo or a foetus. Was he some rude and shapeless lump?' A threatening idea indeed to have started out as a rude and shapeless lump – or just an outgrowth – in one's mother's belly. A threat, in our context, above all to the male, since Harvey generally presupposes the foetus to be male. His scientific imagination mostly follows a father-to-son strain. A fertilised egg-pimple, he writes, for instance, 'will eventually turn into the shape of the copulating cock, be it a farmyard cock or a cock pheasant'. Due to of all sorts of anxieties, then, the great scientist's startling observations did not lead him to surmise the long-forgotten generative power of females or a long-denied doubt of the generative necessity of the male sex. He preferred to stay as Aristotelian as possible. So he reduced female potency by describing the mother more as a curator than as the creator of her eggs, and thus disassociated the individual from its generative contribution (which he did not in the case of the male). At the same time he made it clear that the material absence of the male

contribution to generation did not shed any doubt on its existence, but only proved its superior, immaterial creativeness.

With these concepts in mind, Harvey in fact did not need a microscope. But let us, today, given that we are talking about perceptions and politics, use a historical telescope. Let us look a bit closer at how Harvey managed to sail round the female contribution to generation which he himself had discovered, and observe how he restored the scientific foundation of the old male dream of owning a superior reproductive potency which made men indispensable to women and to their families, as well as independent of them.

3. Constructing Male Individuality

a. Re-Establishing Male Independence

i. The emancipated Egg

FIRST, AS NOTED ABOVE, Harvey made his 'primordium' of life detachable from the mother's body by calling it an 'egg'. Thus, he constructed the embryo as a more-or-less autonomous entity. The womb, then, is looked at as a bird's nest, an analogy reflected in the modern term 'nidation', denoting the embedding of the germ into the uterine mucosa. 'Both the engendering and the augmenting of the egg proceeds not from the womb but from an innate natural principle which is proper to it,' Harvey writes. Thus the chick in the egg grows and nourishes itself quite alone. Over and over again, Harvey emphasises the offspring's autonomy, often in explicit opposition to his teacher Fabricius. 'Although the egg while it is growing, is contained within the hen, and is conjoined to its mother in the vitellary by the peduncle and is nourished by her veins, yet it must not be said that it is part of the mother,' he writes, 'it lives and grows by its own proper power and intrinsic principle, just as fungi and the oak-grown mistletoe and the kinds of moss which grow out of trees, although they adhere to the trees and by their sap are nourished together with their shoots and leaves, yet they are not parts of those trees nor are they so called.' He also compares the eggs to 'those little animals which are begotten in our own bodies, tape-worms and round-worms and lice and nits and those worms which arise from plants and their fruits such as you may find in oak-apples, kermes berries, dog-roses and many others.' Even in their earliest stages, the egg-pimples 'grow of themselves, and regulate themselves, and live by their own command and not their mother's.' 'The egg, even while it is in the ovary, is immediately from its very first beginning like an emancipated child' and 'rolls around in its cavity free and independent (like an emancipated child).'

In a striking way Harvey identifies with the egg. All by itself it breaks 'off from the bunch in the vitellary, descends through the infundibulum, that is the slender funnel not provided with any motor fibres, and by opening a way for itself reaches the uterus and there nourishes itself and grows, and girds itself with albumen.' 'Rolling ... through the coils and compartments of the uterine process, it clothes itself all over with white ...'; 'it attracts the sticky moisture and draws it into itself and nourishes itself thereby, and grows, and wraps itself round with albumen, and fortifies itself with the membranes and the shell till at last it is perfected.'

ii. Autonomous Nursing

HARVEY DESCRIBES THE EMBRYO as self-nourishing. But here he is confronted with a particular difficulty. The viviparous embryo has of old been looked upon as a being which is fed by its mother through its umbilical cord and placenta. Unlike the egg it does not contain all the material necessary for its further development but roots in the mother's tissues like a plant. The question of nutrition has, over the ages, been much more important than it may appear to us; given that we seem to have forgotten about the experience of having nothing to eat and instead look at food as simply a supply of calories and nutrients. But nutrition has not always been considered a subordinate topic. Time and again nutrition has been closely associated with 'life' itself, and it has been difficult to distinguish generation from growth and nurturing – and from 'life' at large.

In this tradition, Harvey too writes: 'whatsoever is nourished, lives and contrariwise. Likewise, whatsoever is plentifully nourished, grows, while that which is too little fed diminishes.' Engendering, growth and nurturing necessarily merged as long as the 'cell theory' had not been established so as to allow a distinction between processes like coming into being, maintenance of life, growing, and multiplication of the cells. The relationships between generation, growth and nutrition deserve indeed some particular historical research. The closeness of generation and nutrition proved quite a threat to patriarchal genealogy, since nurturing belonged so much to the realm of womanhood. In response to this threat the fathers reacted in different and multiple ways. They tried to achieve control over women, to procure food in their own ways by hunting, stealing, growing food and by distinguishing themselves as bread-winners. Moreover, they endeavoured to prove that they were able to provide a kind of superior and more essential generative food than any mother.

Harvey makes use of this whole range of solutions. The aim of controlling women and nature at large is implied in his scientific identity.

Furthermore, Harvey maintains that the germ is equipped with his own food from the very beginning. Finding himself unable to demonstrate that all of the germ's nutrition comes from the father, he at least points out that blood – the first substance to be created by the male seed (existing even 'before it is poured out or coagulated', and the first to be seen in the course of the embryo's development) – blood, and not the mother, is in reality 'the author of life', even life itself. 'Blood like a tutelary deity is the very soul itself in the body.' Blood 'lives and is nourished of itself and in no way depends on any other part of the body as being prior to it or more excellent,' Harvey states, 'blood appears in the egg some time before any vestige of the body or of any of the viscera exists. And yet no drop of blood can reach the foetus from its mother (as is commonly believed happens in viviparous creatures).' Even if to generate then is to nourish, the father is more potent than the mother, since his food is superior to the mother's. Blood – full of life and soul almost like the seed which created it – can, in Harvey's frame of thought, be viewed as a superior, male milk.

'A lame and impotent conclusion', D'Arcy Power called this deduction of Harvey, commenting: 'Indeed he was himself dissatisfied with his conception of the vital principle, for in another essay after a discussion to show that the egg is not the product of the body of the hen, but is a result of the vital principle, he turns away from the subject with evident relief.' Still the idea that the germ produces its own food from its very first beginning was a cornerstone in Harvey's construction of the embryo's independence. Blood is not the only self-made nourishment of the egg. The amniotic liquid is another one. Harvey joins the authors who, in an Epicurean tradition, hold that the embryo feeds on the amniotic liquid or 'colliquament'. He disagrees with the scholars who take it as the embryo's sweat. 'For this liquid is of good flavour and like a kind of watery milk, and therefore almost all viviparous animals lap it up immediately after parturition and lick the new-born foetus clean, greedily swallowing the liquid, while they will not so much as touch the excrements of the foetus.' Apart from stressing the germ's autonomy in producing its own nurturing food, Harvey, unreflectedly assuming that food is always around, assumes that the germ is able to actively and powerfully look for more, if necessary.

In dealing with the embryo's rooting in its mother's tissue by means of its umbilical cord and placenta, he again explicitly contradicts Fabricius who 'thinks that all the blood is supplied to the foetus from the uterus through the veins, and that the vital spirits come from the mother through the arteries as if the mother's womb or placenta were the heart and first principle from which sensation and movement are purveyed to the foetus and from

whence the inflowing heat proceeded to each of the parts. Now all these things are manifest errors,' Harvey goes on, and sets out to prove once more 'that the embryo's life does not immediately proceed from the mother, nor the spirits come from her, that those arteries are moved by the power of its own heart and not by that of its mother.' 'The foetus enjoys its own life long before the conception in which it is formed and swims is tied to the uterus,' he argues, tying the uterine rooting of the umbilical cord not to the foetal body but to the surrounding 'egg'. Finally he claims the secundines to be his client's property. 'The secundines are an undeniable part of the conception and depend upon the foetus, borrowing from it their life and faculty for giving life.' Dealing with the fact that the germ starts out as an outgrowth of the female tissue, Harvey states: 'The egg is not the production of the womb but of the soul.' 'Now although I admit the action of the uterus to be in some sort the generation of the egg,' he adds, increasingly entangling himself in conceptual complications, 'I do not in any wise agree that the egg is nourished and given increase by the uterus.' Not the mother's womb, but the egg's own soul nourishes it, he repeats, and secondly, it is improbable 'that an external agent, such as is the uterus in respect of the egg, should form, nourish and augment all the interior parts of the egg in all their dimensions.' Thus, Harvey's mammalian embryo is as independent from its mother as the chicken in its egg. Indeed, the egg is an old paradigm for autonomy. According to Aristotle, it contained both a substance designed to build up the chick's body (the white) and a nourishing milk (the yolk). Others considered the white or both as the chick's food. Sigmund Freud was still imagining perfect autonomy realised in the egg.

Harvey unfolds the frightening aspects of a far-reaching foetal autonomy as well – frightening though not so much for the father's child as for the child's mother. Indeed, the way he imagines how it feels to be a woman and a mother does not make it tempting to be a female. Harvey compares the autonomous and self-sufficient foetus to all kinds of voracious threats to the living body. Describing its life style, he writes: 'In this like manner live the fungi of trees and the plants that grow upon them. This we frequently experience in our own bodies where cancers, sarcoses, meliceris and other tumours of this kind are nourished and grow as with their own proper vegetative soul, while in the meantime the natural parts grow thin and wasted. And that because those tumours seize all the nourishment for themselves and cheat the rest of the body of its nourishing juice, or of its natural virtue. For this reason they are called phagedaena [rodent ulcer] and lupus [wolf].'

iii. *Autonomous Hatching out and Being Born*

OF COURSE, HARVEY FOUND that hatching out and being born is also much more due to the child's efforts than to the mother's labour. 'I have found that the chick itself and not its mother breaks the shell. For how otherwise could eggs be broken which are fostered in stoves and warm ovens, as is done in Egypt and elsewhere, where there is no mother at hand to hear the voice of the supplicant chick and give assistance to its imploring cry?' 'Chicks, therefore, are born by their own desire and break forth from their eggs by their own efforts.' 'In the birth of viviparous creatures' too 'the chief cause of being born must be attributed to the foetus itself, I mean to its own endeavours, and not, as Fabricius would have it, to its weight. But the foetus itself with its head turned downwards, approaches the gates of the womb and opens them by its own strength and struggles out into the light. The assistance of the foetus in its own birth is most clearly to be seen not only in birds which by their own strength and without the help of the mother (as I said before) break the shell, but also in a great many other animals.'

It is worth noting that Dr Llewellyn's poem added to the English edition of Harvey's embryology in 1653 explicitly praises its emancipatory quality:

both the *Hen* and *Housewife* are so matcht,
That her Son *Born*, is only her Son *Hatcht*;
That when her *Teeming* hopes have prosp'rous bin,
Yet to *Conceive*, is but to *Lay within*.
Experiment, and *Truth* both take thy part:
If thou canst scape the *Women!* there's the Art.

b. **The male's Generative Superiority**

i. *The Egg is no Seed*

THE FACT THAT HARVEY CALLED his 'primordium' of life by the name of 'egg' hardly sounds remarkable to a modern ear. Indeed, it is essential to Harvey's construction of the genders. Until then the female contribution to generation, inasmuch as it was admitted to be more than just an Aristotelian lump of material, had usually been called female 'seed'. Politically, it was to prove an important decision thenceforth to call it the 'egg' and to reserve the term 'seed' for the male. It saved Harvey from being forced to announce that he had found the female, but not the male, contribution to generation and, in addition, it allowed him to say that the female body was unable to produce seed. Consequently, he disavowed the Galenists who held that females emitted seed from what they called 'female testicles' – which after him have

become the 'ovaries'. 'I wonder greatly how they can believe that from such imperfect and inconspicuous parts can possibly come a semen so elaborated, so concocted and so vital, that it can exceed that of the male in strength and spirit and generative potency, subjugate it to its own dominion and compel this male semen that is so concocted with quickening heat, refined in so many vessels and leaping with so much spirit, to submit itself at times to supply the place of the material, as they imply when they come to the controversy concerning predominance, that is, as to whether the seed of the male or of the female has the more imperious sway, and which of the two is to be the efficient agent and which the material and undergo the action.'

While he imagines the male seed to be full of life, fertility and soul, the egg is, in Harvey's perception, just an infertile, inferior living thing. As a consequence of this line of thought, it goes without saying, right up to this day, that the male and not the female germ is the active part in fecundation. Thus, the male seed does not have to bear the comparison with the obvious material findings in the female, and the notion of the 'seed', of old linked to fertility and reproduction, could represent the unobservable male contribution to generation and prevent its scientific neglect.

ii. Constructing the Soul

CONCEPTUALISING A 'SOUL' is obviously another way of science attempting to cope with the frailty of the male line due to a lack of evidence for the male seed's fertilising effects. Much of Harvey's arguments for the embryo's autonomy rest on the idea that embryos are endowed with souls. 'It is plain that eggs when they have reached perfection and have been made fertile and have broken off from the vitellary, are no more to be thought of as parts of the hen, but as emancipated children at their own disposal, governed and enlivened by their own proper soul.' Of course, the 'soul', by definition at the same time both vital and immaterial, fits exactly into the gap of observable causality with which Harvey was confronted. 'What I have said about the soul, seems to evince clearly that the egg is neither the work of the womb nor governed by it. For it is plain that the vegetative soul is inherent even in a wind-egg, because we see that even an egg of this kind is nourished, preserved, given increase and a vegetal existence, all which actions are infallible signs of the vegetative soul. They cannot proceed from the mother or from the womb, for with it the egg has no coherence or union, but rolls around in its cavity free and independent (like an emancipated child), and is perfected like the seeds of plants in the bosom of the earth by some internal vegetal principle.'

Harvey's egg needed just enough soul to make it independent from its

mother ('it cannot be that the animals which are born in the oak-galls should be made to live by the soul of the oak, although they live joined to the oak and seek their food out of its sap') and just not enough to permit it independence from its father. Even 'the first rudiments of the eggs in the cluster in the vitellary live by virtue of their own soul and not by that of their mother's, although they cohere to her through the intermediary of their veins and arteries, and are nourished by the food which she administers to them.' So, like Aristotle, Harvey distinguishes the higher animal soul from the lowest, nutritive and vegetative one. A vegetative soul he ascribes to the unfertilised female egg. To the male, however, the egg will owe its animal soul which brings it to 'perfection'. 'The egg, which was previously endowed with a vegetative potentiality, is now furnished in addition with the power of movement and sensation and passes from a plant to an animal, and at the same time the soul enters the chick,' Harvey writes.

Of course, arguing in terms of a 'soul' became less convincing the more science became materialistic. Harvey was clearly aware of this, though the contemporary intellectual situation still accepted theological logic. Still he looked for a material substratum of the animal soul which the male conveyed to the egg. Aristotle had considered the heart as the psycho-somatic articulation. Harvey, as mentioned above, put the blood at its place. Thus, he had to transfer 'the qualities which Aristotle attributed to the heart', to the blood, as Whitteridge puts it. And to prove that the blood, like Aristotle's heart, was the seat of the sensitive and motive animal soul – and thus a nutriment of an incomparably higher quality than the mother's milk and menstrea – he had to find that the blood carried within itself the power of sensitivity and movement. Indeed, in 1628 he had already described some 'obscure throbbing' (*obscuram palpitationem*) in the blood as well as in the 'spem of all animals' which 'leaves the body with a throb like some animal itself departing' (*Movement of the Heart and Blood*). Evidence for the sensory capacity of the blood was more difficult to find. But, in his book on Generation, Harvey confidently states 'that the blood acts above the powers of the elements and no one can ever praise sufficiently its wonderful and divine faculties. In it the soul doth first and principally reside, and not the vegetative soul alone, but likewise the sensitive and motive. So that the blood would seem to differ nothing from the soul, or at least, should be considered the substance whose act is the soul.'

When talking about the soul, Harvey takes the liberty of employing tautology which establishes a bond between father and child; the father equips the child with a sensitive soul which in turn proves the father's indispensability. And, since the notion of a 'soul' essentially transcends the

world of natural science, such a concept cannot and need not be verified. With this, Harvey outlines what could be called an embryology of identification. If the male 'I' imagines that a later child owes its ability to move and its sensibility to the male's power alone, he symbolically creates this child similar to himself (as an other 'I'). At the same time such a male 'me' identifies with a being which is not yet quite separated from its mother and endows it with the means to leave its dark abode. 'Lastly, because the pimple existing in the ovary receives its fecundity from coition and because there is as great a difference between pimples as there is between the males of different kinds, what shall we say that there is inherent in these pimples, by whose virtue they are distinguished from each other and from their mother? Of a truth, this must needs be the soul by which they are diversified both from one another and from their mother,' Harvey exclaims. 'Individuality', here, seems to be the offspring of men's particular difficulty in finding their own demarcations.

iii. Reaffirming a Divine Father

ANOTHER WAY OF DEALING with the frailty of the male line is constructing a divine father. The idea of male potency is amplified in the images of a source of life of even superior potency – be it called God or Nature. At the same time as he plays down the importance of female generativity for men and humankind at large, Harvey bows to the authority of divine creativeness and of Nature's generative power, both of which occasionally merge in the image of the sun. He does so particularly when having to deal with facts that seem to prove the importance of the female contribution to a child, such as many children's resemblance to their mothers.

'Because the offspring is of a mixed nature, the first efficient must needs also be a mixed thing. Since therefore the chick bears a resemblance to both its parents and is a mixed effect, its primary generating cause (which it resembles) must needs be mixed likewise. And from this arises the doubt as to whether the cock be the primary efficient cause in the generation of the chick, or whether there be not some other before him and greater than he. For it seems that the generation of all things is derived from heaven and follows the movement of the sun and of the moon. And so we must betake ourselves to a prior, superior and more excellent cause to which we may justly attribute foresight, intelligence, art and goodness, and such a one as is as much superior to its effect and workmanship as an architect is to his building, a King to his ministers or a craftsman to his own hands. And therefore it will be that male and female are both but an instrumental efficient subservient to the Creator of all things, the Father omnipotent.

And in this sense it is truly said that the Sun and a man beget a man. And therefore, in the spring, all things flourish and grow (that is, as the Sun draws near, the Sun who is the common father and begetter of all things, or at least the immediate and universal instrument of the supreme Creator in generation), and not only plants but animals also, and no less those which arrive spontaneously than those which are begotten by the male and the female working together. The cock and the hen, therefore, become chiefly fruitful in the springtime, as if the Sun, or the Heavens, or Nature, or the Soul of the Universe, or Almighty God (for all these words represent but the same thing) were a superior and more divine cause in generation than they.'

iv. Generative Warmth and Destructive Fire

BUT WHY SHOULD THE WARMTH OF THE SUN be more fertile than that of a 'brooding hen'? And how could the idea that men were warmer than women be upheld in the age of weighing and measuring – measuring temperatures as well? Harvey answered these questions by sharply distinguishing between heat and heat. He distinguished between, on the one hand, the fertilising warmth of the sun and the 'innate heat' (which enables the male to concoct his fertilising seed) and, on the other hand, the fire of the common housewife's hearth. This was all the more difficult for him as blood, which for Aristotle had only been the raw material which women contributed to the making of children, had precisely in Harvey's own theory become the seat and embodiment of vital warmth, life, even soul. This could again have resulted in a revaluation of women as beings rich in blood and, therefore, in vital essence, a superior soul and heat, as the guardians of the kitchen fire able to bake life in their oven-like bellies. It could have revitalised the idea that women were the actual creators of life. So Harvey had to be careful.

'In earlier writings Harvey was careless in his characterization of the internal heat, often comparing it to ordinary flame or fire, he now wished to distinguish the two carefully,' Everett Mendelsohn notes. Indeed in *On Generation* Harvey comes back to Aristotle's idea that 'it is not the substance of the seed, nor its fire that renders the seed fertile, "but the natural principle which is in that spirit and corresponds to the element of the stars."' 'From this the physicians may also understand that the geniture of the male is the fashioner of the foetus because it is swelling with the spirit of fertility and divine power.' Later he writes: 'Aristotle says: "There is something in the seed of all creatures which makes that seed fertile, that is the thing called heat. It is not fire, nor any such power, but spirit and the nature which is in that spirit corresponds by analogy to the element of the stars. Wherefore fire does not generate any animal, nor is anything living seen to be constituted

by fire. But the heat of the sun and of animals although it be of a different nature, even that also contains a vital principle. Wherefore it is clearly apparent from what has been said that the heat contained in animals is not fire, nor does it take its origin from fire.” And this ‘innate warmth’ is ‘not, indeed, our cooking and destructive fire, but natural and celestial fire, life-giving, engendering and preserving, whom the heathens worship by the name of Jove and call the Father of all men and things, not his lame brother Vulcan [remember that Vulcan was Juno’s, parthenogenetic, as Hesiod tells us, son], whose beneficent gift we daily use in multifarious ways to our great advantage, but the animal spirit, and divine author of all living things.’

v. Male Parthenogenesis: Handicraft and Mental Work

THIS, DOMESTICATION AND SUBORDINATION of animals and women to men is intertwined with a deep awe towards a divinity reigning over the universe at large. The veneration of such a superior creative power was often tinged with the curiosity and rivalry of sons and disciples wishing to participate in the father’s or the master’s power. God or Nature, then, resembled a superior, perhaps unequalled artisan. Thus, the male transfers the generative power of the uterus into God’s (or Nature’s) hand – at the same time trying to get it into his own hands by either subordinating women to male control or by aiming to discover the secret of female fertility. Both gestures serve his wish to attain generative independence from and superiority over women. For centuries knowledge and power have served men’s hope one day to be able to produce the ‘magnum opus’, the homunculus, until finally the labour could be done in twentieth-century laboratories.

Whenever Harvey tries to understand the making of a child without having to sacralize the mother, he does so in terms of contemporary technology – as Aristotle had done and as has been done to this day. Aristotle compares the male creating a child out of the female menstrual blood with the work of a carpenter who makes a chest out of wood or of a swordmaker who manufactures his swords out of iron. Taking up the Aristotelian tradition, Harvey elucidates the difference between preformation and epigenesis by the difference between a sculptor’s and a potter’s way of working: the sculptor ‘cuts and divides the material that is already prepared and by paring away what is superfluous leaves the image remaining, as the sculptor is wont to do; the potter shapes the same image out of clay by adding to and augmenting and so fashioning the clay that at one and the same time he provides, prepares, fits and applies the material.’ Harvey describes how the divine creator, like a master potter, directs the making of a chick: ‘let there be a white mass of homogenous material and let

it be divided into parts and grow, and while it is growing let the parts be sketched in and their divisions indicated, and let this part be made harder and thicker and whiter, and this one softer and more coloured; and so it is done.' The Englishman also readily takes up Galen's and Fabricius's comparison of Nature's construction of the embryo to the building of a ship: 'Like a shipwright, she first lays down the keel for a foundation and then sets up the ribs and the sternum as a deck, and just as he builds a boat so does Nature frame the trunk of the body and the limbs.'

To understand embryogenesis in terms of handicraft in turn enables technicians to imagine themselves as autonomous authors of children. Thus, it seems that men could experience the work of their hands as analogous to the female production of a child. The male's hand, then, with its ability to compose and shape all sorts of material, seems sometimes to be analogous to the female womb. This thought was apparently familiar to the ancients. According to the Egyptologist Manfred Lurker, there is an Egyptian tradition which regards the hand as a symbol of cosmogonic powers. Ptah, the Egyptian 'former of the earth' formed the cosmic egg on a potter's wheel with his hands, just as Chnum formed the body of a child (and the Hebrew God formed Adam, by the way). Schu and Tefnut arose from the seed issuing from a God's hands. This hand stands for the divinity's female element, Lurker writes, which became a more separate part later in historical times. He also mentions a divine couple represented as 'Atum and his hand'. But the artisan needs not only his hands. He needs his mind as well and an idea of what he intends to create. The Aristotelian 'form', the idea which is able to give the menstrual blood the shape of the father, originated in the hot heart of the male. In the seventeenth century, mind and ideas became increasingly associated with the brain.

Let us come back to the seventeenth century, to Harvey and, more specifically, to the famous frontispiece of the Latin edition of Harvey's *De Generatione*. It shows Zeus, the father of all Gods, on his throne, holding in his hands an egg-shaped box half opened so as to release innumerable living beings into the world. The Father-God's egg is reminiscent of typical representations of Pandora's box, which has also been viewed as an image of the uterus, though not a life-giving but a deadly one. Zeus does not look as if he had made the abundant contents of his box with his own hands. Rather his hands seem to realise what his royal mind has decided: namely to liberate all living beings from the all-too-narrow egg and to let them populate his lovely civilised world – ready, as it seems, to be inhabited. Indeed, not only the male's hand, but even more so the male's mind, has of old been creative, and is in this sense another important analogue of the womb. Here we are back to the male's



Frontispiece of Harvey's *De Generatione* (Amsterdam, 1651).

genius. Father Zeus himself gave birth to his daughter Athena from his head, supported by 'lame brother Vulcan' who with his axe did a midwife's job.

In this line of thought, Harvey articulated an idea which was obviously important to him, maybe the heart of his book. He established a particular relationship between the womb and the brain. Thus, what might have sounded like a metaphor at the beginning of this lecture turns out to have been meant literally. Harvey's books are literally his children. Harvey indeed asks 'whether the conception of the womb be like the conception of the brain, so that fecundity be acquired in the same way as knowledge?' And he adds: 'there is no lack of arguments to prove it'. For he finds anatomical resemblances between the uterus and the brain. Furthermore, he finds that the uterus sometimes moves like an animal in exactly the same way he had observed it in the intestines or the testicles and scrotum. 'But whether in hysterical conditions, such as the ascent, descent and torsion of the womb, the uterus palpitates with this kind of movement, or from agitation of mind, and whether the brain is similarly moved in thinking or not, these are questions I hold to be as hard to answer as they are worthy to be asked.' 'Does a female conceive in her womb in the way in which we see with our eyes or think with our brain?' Harvey thinks so, and thereby seems to view the uterus as an imitation of the brain and not the other way round. Thus he ingeniously managed to procure a material basis to the belief that mind is not only more valuable, but also prior to matter, and that the mortal flesh-and-blood children a woman would produce are just reproductions of what a man's genial brain is able to create. Thus, Harvey's books became his children even more so than a woman's offspring could ever be called her own.

Nature, Harvey thinks, designed the womb like the brain. Nature 'wished to use an organ similar for a work that is similar.' He asks 'whether, like the movements and animal operations which take their origin from the conception of the brain and we call appetites, natural movements also and the operations of the vegetative faculty (especially generation) depend upon the conception of the womb.' 'Just as appetite or desire springs from the conception of the brain and this conception in turn from some external object of desire, so also from the male as being the more perfect animal and, as it were, the most natural object of desire, the natural conception arises in the uterus of woman, even as the animal conception is made in the brain.' 'It happens in the same way as Art, which is the eidos or form of the future work, produces its like when it is acting and begets it in the material. And the same thing happens in all other works of the hands and engenderings achieved by Art. So that what instruction effects in the brain, namely Art, its analogue is bestowed on the uterus by coitus with the male, and that is formative art,

whereby several foetuses either like or unlike are procreated by the single act of copulation. For if the productions and first conceptions of Art which are only the imitation of natural things, are made in this way by the brain, how much more probable is it that the exemplars of animal generation itself and conception are in like manner produced by the uterus? And because Nature, whose every work is admirable and divine, has instituted such an organ, namely the brain, by whose sensitive faculty and virtue the conceptions of the rational soul exist in it, that is desires and arts and the principles and causes of so many and so varied productions, whereof man by the motive faculty of his brain is the author through imitation, why should we not think that this same Nature that framed the no less admirable structure of the womb and gave it a similar constitution to execute the office of conception, designed it also to a like function, or at least to one that is analogous to it, and wished to use an organ that is in every way similar for a work that is similar? 'Whosoever shall weigh with himself how the brain of the artist, or the artist by virtue of his brain, accurately portrays things which are not present with him will not, I think, deem it a most absurd and monstrous thing that a woman should become the artificer of generation, being impregnated by the conception of a general and immaterial idea. I know full well,' Harvey adds here, 'that some clever scoffers will ridicule these things, thinking nothing true but for my part, I have invented this fable because I see that nothing more remains in the uterus after coitus, to which I might ascribe the reception of the principle of generation, than in the brain after sensation and experience, which constitute the principle of Art, and because I find that the constitution of both is alike.'

4. Who bestows Immortality?

THUS, THE POET-DOCTOR MARTIN LLEWELLYN concludes his poem in praise of Harvey's *Generation* with the following words to which I have nothing to add:

Live Modern Wonder, and be read alone,
 Thy Brain hath Issue, though thy Loins have none.
 Let fraile Succession be the Vulgar care;
 Great Generation's selfe is now thy Heire.

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