The Harveian Oration

ON

WILLIAM HARVEY, OBSTETRIC PHYSICIAN AND GYNAECOLOGIST.

DELIVERED BEFORE THE ROYAL COLLEGE OF PHYSICIANS
OF LONDON ON OCTOBER 18TH, 1921,

BY

HERBERT R. SPENCER, M.D., B.S.LOND., F.R.C.P.,
OBSTETRIC PHYSICIAN TO UNIVERSITY COLLEGE HOSPITAL.

(With Special Plate of the Canterbury Portrait of Harvey.)

MR. PRESIDENT AND FELLOWS,—When you, Sir, did me the high honour of nominating me to give the Harveian Oration I was elated as an obstetric physician, depressed as the prospective orator. That you, Mr. President, should deem the obstetrical and gynaecological work of Harvey worthy of special commemoration was not surprising since, as a learned *alumnus* of Harvey's school and our chief historian of medicine, you are aware that sufficient attention has not been directed to that part of Harvey's life-work which can be appreciated best by an obstetric physician.

The compliment which you have conferred by your nomination is highly appreciated by myself and by my obstetric and gynaecological brethren. It is not so very long ago that one who, in the words of the learned and sympathetic Regius Professor of Physic, Sir Clifford Allbutt, "had been taken in the act of laparotomy and kept on doing it," would have been considered unfitted to give the Harveian Oration. Yet Harvey, the greatest Fellow of this College, performed operations, sometimes of considerable gravity, though he did not magnify the position of operations, which are indeed the most facile and least noble part of medicine. For three hundred years many of the chief practitioners of midwifery and gynaecology have held the time-honoured title of physician, and I find no worthy reason why they should call themselves surgeons, although, like Harvey, they are sometimes called upon by the nature of their work to perform operations.

Before proceeding to the main purpose of his oration, which was to depict Harvey as an obstetric physician and gynaecologist, the orator made a digression to give an account, founded on Miss Mary F. S. Harvey's recent book, *The Life, Correspondence, and Collections of Thomas Howard, Earl of Arundel, "Father of Vertu in England,"* of Harvey's activities as physician to the Earl's Embassy to the Emperor Ferdinand II at Vienna, and as picture-

buyer for Charles I. The Embassy was absent from England from April 8th to December 27th, 1636. The Earl, writing from Ratisbon on July 20th, said, "Honest little Harvey is going a little start into Italy, and I give him some employment . . . about pictures for His Majesty." Harvey was put into quarantine and "miserably vexed" in the lazaretto at Treviso. He had to lie out on the grass or sleep on a straw bed "in a little poore garden howse full of lumber, durt, and knatts without window or dore, open to the highway att midnight." Three days later he wrote, "I have a sciaticque in my right thigh and legg that much discourageth me and maketh me lame." Harvey at this time was 58 years old. He was not successful in buying pictures, but nothing damped his enthusiasm for research, for, according to Aubrey, "Harvey would still be making of excursions into the woods making observations of strange trees and plantes, earths, etc., and sometimes like to be lost. So that my Lord Ambassador would be really angry with him for there was not only danger of thieves but also of wild beasts."

Passing next to fulfil the injunction to commemorate past benefactors by name, the orator said that it was his duty "to enrol amongst the list of benefactors an obstetric physician, the late Dr. Lloyd Roberts of Manchester, who bequeathed a sum of £3,500 to the College and 1,800 medical books, including 50 incunabula and an almost complete set of the editions of *The Byrth of Mankynde*, the first book on midwifery to be translated into English." "In bequeathing these gifts," Dr. Spencer said, "Dr. Lloyd Roberts has set an example to other obstetric physicians, and I am but carrying out the injunction of Harvey in exhorting them to follow that example, so that our College, whose immortal Fellow wrote the first original English work on midwifery, shall have in its library the best collection of books dealing with the functions and diseases of women.

"That distinguished Fellow of the College, Sir Thomas Browne, in speaking of the value of the College library, specially recommended the work of the Paduan teachers—Vesalius, Spigelius, Bartholinus, Fallopius, and Fabricius—adding, 'Be sure you make yourself master

of Dr. Harvey's piece, *De Circulatione Sanguinis*.' The other great work of Harvey is the *De Generatione Animalium*, containing the chapter *De Partu*."

"It was the activity of anatomists in research on the female generative organs which aroused Harvey's interest in obstetrics and gynaecology, and, bearing in mind the value of the tradition of a medical school in moulding the character and the work of a physician, I need make no apology for briefly reviewing the obstetrical and gynaecological writings of the school of Padua, whither Harvey went to study in the year 1600."

Frontispiece of the first (Latin) edition of Harvey's *De Generatione Animalium*, published in London, 1651. The inscription on the egg which Jove is opening is "Ex ovo omnia."

PADUAN TEACHERS IN THE SIXTEENTH
CENTURY:

THEIR CONTRIBUTIONS TO OBSTETRICS AND GYNAECOLOGY.

Padua was at this time the most distinguished university in Europe. Thither flocked the eager students, especially of medicine, to learn from the most celebrated teachers in the world. Since the memorable siege of Maximilian in 1509, when its citizens, men and women, had performed prodigies of valour, it had enjoyed profound peace, sheltered by the wings of the dreaded Lion of St. Mark. Besides its admirable teachers Padua had other attractions. It was a healthy town, and was a very cheap place to live in. Montaigne, who visited it in 1580, found that he could live well and in good company for 7 crowns a month, fire and lighting only excepted, and gives the low cost of living as one reason why so many students and others resided there; Evelyn, who visited it in 1646, also notes that provisions were remarkably cheap.

From contemporary prints, one of which is reproduced here, we can see what the University building—the "Gymnasium omnium Disciplinarum"—was like. The handsome façade of this Renaissance building was repaired during Harvey's student days, as we learn from a memorial tablet dated 1601. Over the gateway was the stemma of a Doge of Venice,* and beneath it the Lion of St. Mark. Both these have since been taken down and—to the detriment of the appearance of the building—replaced by the Royal Arms of Italy. There still remains, however, the legend, "Sic ingredere ut te ipso quotidie doctor evadas," an injunction which Harvey so faithfully obeyed. Passing through the gateway, we come to the courtyard with its celebrated cloisters in two tiers. In these cloisters, with their vaulted roofs, the "stemma" of distinguished students were painted, amongst them that of Gulielmus Harveius. Aubrey has given us a portrait of Harvey in his younger days. He was "of the lowest stature, round-faced, olivaster (like wainscot) complexion; little eye, round, very black, full of spirit: his hair was black as a raven, but quite white 20 years before he dyed. . . . He was always very contemplative, and said he did delight to be in the dark as he could then best contemplate." He was indeed one of those of whom Cicero speaks *quibus vivere est cogitare*, and one can picture him deep in study in the cool and shadowy cloisters of the University, even as later he had caves made in the earth near his house at Combe in Surrey, in which in summer time he delighted to meditate.†

Among the teachers at Padua who influenced Harvey was Galileo, who had been appointed professor of mathematics in 1592, and continued to hold the office for eighteen years. Galileo had been a medical student, and was a critic of the Aristotelian philosophy; it was by the beats of his pulse that he timed the oscillations of the swinging lamp at Pisa which led to the enunciation of his pendulum law and the construction of the astronomical clock. Francesco Barberini, the nephew of Pope Urban VIII (at whose instance Galileo was tried by the Inquisition), showed Harvey much attention at Rome, and probably pointed out to him the Baldachino in St. Peter's, on the pillars of which Bernini carved, in the stemmata of the Barberini family, the face of a woman expressing the emotions of the various stages of labour. Galileo was

the first to give lectures in the Italian language. We learn from Aubrey that Harvey was "pretty well versed in mathematiques, and had made himself master of Mr. Oughtred's *Clavis Mathematicae* in his old age; and I have seen him perusing it and working problems not long before he dyed, and that book was always in his meditating apartment." It is not improbable that he received his first lessons in exact observation and sustained argument in the lecture room of Galileo.

Of those Paduan teachers who wrote on obstetrics and gynaecology, Vesalius (1514-1564), the Reformer of Anatomy, is first in time and importance. He gave the first adequate description of the pelvis, and described also the form, position, connexions, and muscles of the uterus and its changes during pregnancy. Fallopius (1523-1562) described the oviducts or tubes known by his name, although they had been observed by Herophilus, Rufus, Soranus, and Galen. Realduus Columbus (1494-1559), a practical obstetrician as well as anatomist, gave the first correct description of the lie of the foetus. Aranzius (1530-1589) in his *De humano foetu liber* (1571) gave a detailed description of the uterus, placenta, and membranes. He was the first to describe deformity of the pelvis, and to state that the placenta was not always attached to the fundus uteri, and that as the placenta ("jecur uterinum") intervened between the foetal and maternal vessels there could be no communication between them.

Hercules Saxonia, Professor of Practical Medicine at Padua, where he taught from 1590 to 1607, wrote on conception and diseases of women; but Fabricius ab Acquapendente, who succeeded Fallopius at Padua, was Harvey's special teacher and guide. He made many researches in comparative embryology. He studied the placenta in various animals, delineated the decidua, and figured the cord around the neck of the foetus. Eloy says of him, "The degree of doctor of medicine with which he was honoured did not prevent him from publicly performing surgical operations." He taught for about fifty years at the school of Padua, and died there in 1619, universally regretted, at the age of 82. He refused fees, and put the presents his patients sent him into a cabinet labelled "lucris neglecti lucrum." He built an anatomical theatre at Padua at his own expense, which generous act prompted the signory of Venice to build a much more spacious amphitheatre in his honour.

Casserius (1545-1616), a servant of Fabricius, who was educated and advanced by him to be his pupil and assistant, employed two distinguished artists, Edoardus Fialettus and Franciscus Valesius, to draw and engrave his preparations. When he died in 1616 he was succeeded in the chair of anatomy by Spigelius, whose work *De formato foetu* (quoted by Harvey) was published by Crema in 1626, the year after his death.

Mercurialis (1530-1606) was born in 1530, about ten years before Mercurius (Scipione Mercurio), with whom he is sometimes confounded. He taught at Padua for eighteen years, was created a Knight of St. Mark, and amassed a fortune of 120,000 golden crowns. His most celebrated book is *De arte gymnastica* (1569), but many others were published by his pupils. He wrote an important work, *De morbis muliebribus*, which was published in the collection of all the ancient and modern works on obstetrics and gynaecology, entitled *Gynaecia*, the third and most complete edition of which was published by Israel Spachius in 1597, three years before Harvey went to Padua.

Mercurius ("Scipione Mercurio") was born in Rome about 1540 and died in 1616. He studied medicine at Bologna and Padua; he devoted himself to theological studies, and entered the Dominican monastery at Milan.

Padua. Façade of the University building early in the seventeenth century. The inscription over the entrance reads "Gymnasium omnium disciplinarum," and that higher up "Sic ingredere ut te ipso quotidie doctor evadas." (From Guzzoni's *L'Italia Ostetrica*, 1911.)

* The stemma is that of the Cigognas, who conferred many benefits on the university. Pasquale Cigogna, Podesta of Padua, and Doge of Venice from 1585 to 1595, was descended from an apothecary who was called up to the Great Council after the Chioggian war in 1380. (Letter from Professor Guzzoni of Modena, and Haslitt's *Republic of Venice*.)

† The Earl of Arundel had similar caves made in the grounds of his house at Albury; on one occasion a cave collapsed shortly after he and Oughtred, the mathematician, had left it.

but continued to occupy himself with the study of medicine; finding his monastic life did not afford him sufficient opportunities for the practice of medicine, he quitted the monastery and travelled in France and Spain in 1571 and 1572, as physician to a German officer, Hieronymus de Ladrone. On his return to Italy he practised with great success in Padua and settled in 1601 in Venice, where he lived for fifteen years. He wrote *La Comare o Ricoglitrice*, the first Italian work on midwifery. It contains chapters on Caesarean section on the living patient, which operation he introduced into Italy. It is illustrated by drawings, one of which is reproduced here. He relates that in his travels in France he had seen two women in Toulouse who had been delivered by Caesarean section, one of whom had since been happily delivered nine times. To commend the operation to his countrymen he wrote that it was as well known in France as bleeding for headache in Italy. This passage was erroneously rendered by Welsch, who published a German translation of *La Comare* in 1653, "so gewöhnlich in Frankreich als das Aderlassen in Italien"—"as common (or usual) in France as blood-letting in Italy"—whereas Scipione Mercurio only said it was as well known. This error has been often repeated by subsequent writers and has been used to throw doubt on Mercurio's accuracy. In this work Mercurio is the first author to mention contraction of the pelvis as an indication for Caesarean section. It contains a description and illustration of the "hanging-legs" position for delivery in cases of contracted pelvis, which Walcher published in 1889 as something new, and also a description of the operation of bimanual version, generally associated with the name of the late Dr. Braxton Hicks. It was long thought that *La Comare* was published in the beginning of the seventeenth century; according to Haller the first edition was published in 1604; and others have given 1601 as the date of publication. Research, however, has shown that the first edition was actually published in 1596 (the second and third parts being dated 1595). This edition is extremely rare, only four copies being known to exist—three in Italy and one in this country; its title-page is reproduced. It is interesting to find that the first Italian book on midwifery was a *cinque cento* production, and was published by a Paduan obstetrician four years before Harvey went to that University. It can hardly have failed to arouse Harvey's interest, must have had an effect in popularizing Caesarean section on the living, and may have been the stimulus to Harvey to emulate the Paduan obstetrician by writing his *De Partu*, which was the first original English work on midwifery.

I hope I may be pardoned for referring to these great

teachers of the Paduan School. It was under the influence of these men, who had shown their interest in the subjects of embryology and midwifery, that Harvey was led to write his great work on generation and labour. In order to appraise this work it is necessary to consider the position of obstetrics at the end of the sixteenth and the beginning of the seventeenth century.

OBSTETRICS IN THE SIXTEENTH AND SEVENTEENTH CENTURIES.

Italy was the first country in Europe to encourage anatomical research. At the School of Salerno in 1238 it

it was ordered that every five years a human corpse should be dissected before the students of medicine and surgery, and in 1442 two corpses were annually provided free of cost for dissection in the University. In Mundinus's work on Anatomy written in 1316 is the first description of the dissection of the human body since ancient times. The progress of anatomical study in Italy was favoured by the ancient Lex Regia, which enacted that no pregnant woman should be buried until the foetus had been cut out of the womb, and by the ritual of the Roman Catholic Church, which prescribed "if a pregnant woman die the foetus shall be cautiously extracted as soon as possible, and, if alive, shall be baptized"; which led to a great extension of the operation of Caesarean section on the dead, especially during the frequent epidemics of plague.

The common belief that the Church in Italy obstructed anatomical research as, for instance, by the celebrated Bull of Boniface VIII (1303), has been disproved by Filippo Lussana, professor of physiology in the University of Padua, who shows that the Bull of excommunication was directed against those who for gain disembowelled corpses and boiled them so that the bones could be buried in their native land, and not against dissection by doctors, for Benedict XIV

expressly states in his "Institutione" dealing with the Bull, "Quamobrem membrorum incisio minime interdicatur quae adeo necessaria est medicinae facultatem exercentibus." In Curatulo's work, *L'arte de Juno Lucina in Roma*, many instances are given of the favour extended by the heads of the Church of Rome to anatomical research, even to the extent of leaving their own bodies for the purpose, and the good influence exerted on the practice of midwifery is shown by the celebrated Bull of Sixtus V (1588) in which he expressed the Church's *detestatio criminis abortus* and punished it with excommunication.

France in the person of Ambroise Paré had begun to progress in midwifery even before Italy. But in England the Art of Obstetrics was neglected. There was no

LA COMARE ORICOGITRICE DI SCIPIONE MERCURI CITTADINO ROMANO,

Medico della Magnifica Communità di Lendenara,

DIVISA IN TRE LIBRI.

Nel primo si tratta del parto naturale dell'huomo, e dell'officio della Comare, che in esso è necessario.

Nel secondo del parto preternaturale, illegittimo, e vicioso, e di quei modi con i quali può la Comare aiutare con le madri, come le creature.

Nel terzo delle principali infermità, che accadono & alle Impagliate & a s' fanciulli, e de i rimedij loro.

Al molto Ill. & Eccell. Sig. Bartolomeo Malmignati Dottore dell'una, e l'altra legge, emio Signore.

CON PRIVILEGIO.

IN VENETIA,

Appresso Gio. Battista Cioti. M D XCVI.

Title-page of the first edition (1596) of Scipione Mercurio's *La Comare*. The author's name is here printed "Scipione Mercuri," but in the title-pages of the second and third books (dated 1595) "Scipione Mercurio."

original work on midwifery in the English language; only translations of Rhodion, Guillemeau, and Paré were available.

The ordinary practice of midwifery was in the hands of midwives, who, although practising as specialists since the dawn of history, had failed to develop the science or advance the art or dignity of their calling. They were mostly recruited from an uneducated class, and their characters were not beyond reproach. Harvey's friend, Percivall Willughby, gives many instances of their shortcomings and misdeeds. They were bitterly opposed to the doctors, who were only called in to difficult and operative cases, which were often rendered fatal by the ignorance and brutality of the midwives. The doctors, on the other hand, having little experience of normal cases, were apt to intervene too soon, especially when instruments, hooks and (later) forceps, were employed.

Only in France, where the modern development of midwifery began, had midwives attained any considerable position. In 1598 the first of the great French midwives, Louise Bourgeois, obtained her diploma. She was the first to describe prolapse of the umbilical cord, face presentation and its treatment, and expression of the placenta. She attended in her confinements Marie de Medicis, wife of Henry IV and mother of Henrietta Maria, the wife of Charles I, to whom Harvey makes many references in his work *De Generatione Animalium*.

The grievous practices of many of the midwives in England are related in great detail by Willughby; but he gives a testimonial in favour of the practice in London, where "the young midwives be trained seven years first under the old midwives before they be allowed to practice for themselves." In 1616 Peter Chamberlen II made a petition to King James that some order might be settled by the State for the instruction and civil government of midwives; but nearly three hundred years were to elapse before the desirable result was obtained through the persistent efforts of the Obstetrical Society of London (Midwives Act, 1902).

In England the position of midwifery was degraded and the study of anatomy was in an inactive state when Harvey went to Padua, where both subjects were being assiduously studied. The obstetrical and gynaecological writings of ancient and modern authors had just been published in the *Gynaecia*; the circulation of the blood, "the greatest physiological discovery of all times," was as yet unknown; the compound microscope had not been invented, and thus neither the ovum nor the spermatozoon could be seen. The ovary was still called the *testis muliebris*, but the ovarian follicles, although observed by Spigelius, were not well known till De Graaf published his observations in 1672, and the spermatozoon was discovered in 1675 by a medical student, Louis Ham, a pupil of Leeuwenhoek's, who published the observation in the *Philosophical Transactions* in 1677. Thus, when Harvey wrote his book on the generation of animals he was dependent on naked-eye observations and experiment. In the preface to that book Harvey approves the opinion of Aristotle as to the necessity for observation and personal experience. He wrote:

"No man can be truly called *prudent* or *knowing* who doth not by his own experience followed by manifold remembrance, frequent sensation and diligent observation know these things to be so. For without that we think only, or believe, and such knowledge as that is to be reputed other men's rather than our own. Wherefore fond and erroneous is that method of seeking

truth in use in our times; while most men diligently enquire not what the truth is, but what other men say it is; and inferring universal conclusions from particular premisses and thence shaping to themselves irrational deductions they transmit to us things like truth for truth itself.

"Hence it is that sophisters and half-knowing men, polling other men's inventions saucily impose them upon us for their own (shifting only the phrase and order and adding some impertinences of their own), and render Philosophy (which ought to be clear and perspicuous) obscure, intricate and confused. For whoever they be that read authors and do not by the aid of their own Senses abstract true representation of the things themselves (comprehended in the author's expressions) they do not resent true *Ideas*, but deceitful *Idols* and *Phantasms* by which means they frame to themselves certain *shadows* and *Chimaeras*, and all their theory and contemplation (which they count *Science*) represent nothing but *waking men's dreams* and *sick men's phrensies*."

Harvey had a great admiration for the ancient writers, but said that only the ignorant will grant that they had "engrossed the whole truth." He had little faith in "bookwrights, who conceive it plentiful satisfaction of minde to them that they finde it in Books and have their memories well loaded with sage sentences; for they that are thus philosophers *ex traduce*, by descent and derivation,

are just as wise as their libraries." He appealed to observation of Nature and experiment. His statement, "Nature herself must be our adviser; the path she chalks must be our walk," is an indication of the course he followed in his chapter on labour.

THE EMBRYOLOGICAL, GYNAECOLOGICAL, AND OBSTETRICAL WORK OF HARVEY.

Harvey was engaged during many years in almost daily observation and dissection of eggs and the uterus and embryo of animals and man. The results of his patient researches added greatly to our knowledge, and justify the remark of Frederick Ruysch that Harvey, "who is to be considered amongst the greatest of true philosophers," advanced the history of generation by his personal observations more than his predecessors by their united labours.

One pregnant generalization, "*ex ovo omnia*" or "*omnia animalia ex ovo*," resulting from his researches is placed in the forefront of his *De Generatione*

Animalium, and it is, to use a favourite expression of Harvey, "strange" that a distinguished writer should have failed to find the aphorism in the work, since "*ex ovo omnia*" appears on the remarkable frontispiece, here reproduced, of the Latin edition published in London (with illustrations of the "*animalia*"), and on the second page appears the statement "*omnia animalia . . . ex ovo*." The mistake was probably due to the writer's having read one of the Amsterdam editions in which the plate does not bear the legend.

Harvey was a supporter of the doctrine of epigenesis, as opposed to preformation of the embryo, and although he failed to discover the true nature of the ovum and regarded the uterus itself as an "exposed ovum," yet he is to be numbered amongst the "ovists" as opposed to the "animalculists," who were misled by incorrect observation with the compound microscope, while Harvey formed a correct judgement based on accurate observations with the naked eye. Harvey had only the aid of a simple lens ("perspective") to aid him in observing the minute changes occurring in the early stages of development; but the care he took is remarkable. He would place his specimens in water in a silver basin (no doubt to get reflected light), and took care to arrange for brilliant illumination of the

Caesarean section. From the first edition (1596) of Scipione Mercurio's *La Comare*. The incision is made to the right of the middle line, in order to avoid the spleen.

object, as, for example, in his observation of the *punctum saliens*.

"If you are desirous to make discovery of this observation towards the declining of the third day, you may, if you be extremely intent, by the assistance of a clear and great light, or by the *Sun beams*, or a *Perspective*, make a shift to discern it. For else this purple streak is so exceedingly nice, and fine, and the motion of the *Punctum saliens* is so imperceptible, that you will only loose your labour."

Harvey was the first to locate the origin of the embryo in the "cicatricula," and refuted Fabricius's opinion as to its origin in the *chalazae*, the function of which as ligaments for the yolk Harvey was the first to discern. He showed by many direct observations and convincing arguments that the *chalazae* had nothing to do with the embryo, and casts a little ridicule on his master Fabricius's view in the words, "How improbable a thing is it that every egg should have two seeds or rudiments for the constitution of only one chicken."

The bulk of Harvey's *De Generatione Animalium* is made up of his careful observations and descriptions of the development of the ovum and foetus in all stages in birds, animals, and man. He made many dissections of human embryos, "from the big-ness of a tadpole and so upwards to the birth." He calls attention to the great changes which take place in the second, third, and fourth months. He had often dissected the human ovum in the second month. It was of the size of a pheasant's egg; sometimes he found a foetus, at others none. The foetus was of the length of the nail of the little finger, but the shape was like a little frog save only that the head was great and the legs extremely short; just like the tadpoles in June. "The face was like that of other animals, as of a dog or cat without lips, and a wide mouth from one ear to the other."

His description of the foetus and its viscera at various ages commands our warmest admiration, both for its accuracy and happy illustration; thus of the foetus at the third month he writes, "the substance of the heart was most white, having two ventricles of equal magnitude and thickness and a double cone like two twin-kernels of a nut; the liver was wondrous little and also white. All this time, namely, for three months, scarce anything of the after-burden is to be seen." He points out how the head at first outstrips the body in bulk, but afterwards is very much short of it, and that "the like disparity is between the body and the limbs, so that at the second month his arms are so short that if you stretch out his fingers to their furthest extent they will not be able to touch one another and his thighs are so short that being inflected upon his abdomen they will hardly reach to his navel." In newborn children the bulk of the body is a pretty deal larger, he says, than that of the limbs until they are able to stand and go, "but go upright they cannot till the prolixity of their legs and thighs exceeds the longitude of the rest of the body. And hence is it that their first venture to foot it represents them a prone kind of cattell which can scarce exalt themselves to the erection of a cock."

Harvey made a discovery of the highest medico-legal importance when he observed that the lungs of foetuses which had breathed "stretched and dilated by the air put on a whiter colour, and by this observation of the different complexion you may discover whether a mother brought her child alive or dead into the world; for instantly after inspiration the lungs change colour, which colour remains, though the foetus die immediately after."

The great and original merit of Harvey's work on generation lies in the careful and methodical observation and record of the embryo and foetus at all stages. Harvey did for development what the illustrious Paduan professor, Malpighi, subsequently did for disease in his *De sedibus et causis morborum* (1761).

When Harvey came to consider the *causa causans* of generation he confessed he was "at a stand." It was a "dark, obscure business" about which "authors do nowhere more cavil and contend." Having failed, owing to the non-existence of the compound microscope, to discover the ovum or the spermatozoon, and having convinced himself by many observations and experiments that no part of the male seed entered the uterus, "and yet there is a necessity that something should be there which may render the female fruitful," he had no refuge left but to apprehend that the woman was impregnated by the con-

ception of a general immaterial idea, "that the same thing is effected in the womb as in the brain, unless," he adds. "some cunning Philosopher whom the gods have better provided for can finde out some efficient cause which is not included in our recapitulation." Atoms, contagion, effluvia, odours, incorporeal spirits, had all been cited as the efficient cause: Harvey pleads for a place for his conjecture, which he offers "in a problematical way," until there be some certainty established in the business. "Let the learned and ingenious stock of men consider it; let the supercilious reject it; and for the scoffing ticklish generation, let them laugh their swinge."

The whole of the work on the development of the foetus is a testimony to his great powers of observation and reasoning, and justifies Sir Thomas Browne's description of Harvey as an "ocular philosopher and singular discloser of truth," and his work as "that excellent discourse of generation so strongly erected upon the two great pillars of truth, experience and solid reason."

To gynaecology, which in his time was in an embryonic state of development, Harvey made several notable contributions. He gives a good description of the broad ligament of the uterus—"the pendulous band or tie," he calls it; mentions the Hottentot apron of which he received information from a surgical friend, "an honest man": this he likens to the "vail" in animals. He describes the green sickness in virgins "whose womb is slender and their terms are at a stay"; he had seen ectopic gestation; alludes to the displacements of the womb; and is doubtful as to the agitation of the womb in hysteria. He gives a good account of spurious pregnancy and mentions an instance in a noble matron, whom in spite of all the arguments he could suggest, he was unable to persuade that she was mistaken; this shows considerable experience and confidence in diagnosis.

Harvey applied his knowledge of the circulation of the blood to surgery, pointed out how by tying the artery going to a tumour the tumour could be removed with safety, and thus laid the scientific foundation for the extensive operations, such as hysterectomy, now performed by the same method (isolated ligation of vessels instead of ligation *en masse*), a lesson not yet learned by all gynaecologists at the present day.

For the treatment of intrauterine diseases Harvey invented a dilator, after which he used injections, and by this means cured patients suffering from offensive discharges and from sterility.

Harvey discovered a peculiar bleeding tumour of the uterus which he called the "honey-comb"; for the mention of it we are indebted to the *Observations in Midwifery* of his friend, Dr. Percivall Willughby. When we recall that we owe to Ent the publication of the *De Generatione Animalium*, we can only surmise how many other observations of Harvey's were contained in his lost *Medicinal Observations* to which Harvey often refers. Willughby writes:

"There came into my house, at Darby, my honoured good friend, Dr. Harvey, 1642.

"We were talking of severall infirmities incident to the womb.

"After that I had related the foregoing story de caudâ mulieris, and how shee flouded and was cured, hee added to my knowledge an infirmity, which hee had seen in women; and hee gave it the name of a honey-comb, which also, hee said, would cause flouding in women."

No further details are given; but the appellation "honey-comb" suggests that the growth had holes in it discharging thick fluid; so far as I know, the only condition of the cervix corresponding with this description is a very rare form of cancer, an instance of which has been published, with illustration, in the Lettsomian Lectures for 1920. Percivall Willughby was at the time of Harvey's visit 66 years of age, and was well acquainted with the ordinary forms of cancer, of which he records many observations. It is interesting, therefore, to find that Harvey should be able to add to the knowledge of this experienced gynaecologist an undescribed disease, the "honey-comb."

Harvey's chapter on labour (*De Partu*) is the first original English work on midwifery, and justifies Aveling's designation of Harvey as the Father of British Midwifery. The scientific part consists of criticism of previous opinions on the anatomy and physiology of the foetus and of parturition based on his own observations; the practical part

gives evidence of extensive personal experience in midwifery and is in the main devoted to the recommendation of patient watchfulness and gentleness, imitating nature, in ordinary cases, with resort to podalic version in difficult ones.

Harvey was the first to describe accurately the foetal circulation and the great development of vessels in the pregnant uterus. He also had observed, as had Ambroise Paré before him, the softening and loosening of the sacroiliac and pubic articulations before labour.

He gives a careful description of the lie and posture of the foetus in utero, states that it executes the somersault ("dives down") a little before labour, and that it sometimes changes its presentation from time to time.

"For he swimmeth in a water and moveth himself to and fro, he stretcheth himself now this way, and now that, and so is variously inflected and tumbled up and down, in so much that sometimes, being entangled in his own navel-string, he is strangely ensnared"; "and the Great-bellied women know full well that he doth sometimes acquire a different situation when they find the Child kick sometimes above, sometimes below and now on this side and at other times on that."

Harvey alludes to cases in which the foetus is born completely enclosed in the unruptured membranes, and cases of adherent placenta "oftentimes hardly divided from the uterus which doth induce evil symptoms, noisome smells, and sometimes gangreen whereby the mother is brought into imminent danger."

With regard to the duration of pregnancy Harvey gives the usual ten lunar months. He quotes Franciscus Valesius's case of the survival of a five-months' girl and another case of a woman who bore a living child after a gestation lasting sixteen months. "But I confess," says Harvey, "these are rare accidents." "It must not be denied that there are many crafty and fraudulent women which for lucre sake, or for fear of punishment or infamy, will feign and swear they are with child. And likewise it is well known that others are easily deceived and do conceive themselves to be with child when it is no such thing." And a superfoetation may cause the duration of pregnancy to be apparently longer than it is in fact.

Harvey shared the opinion of Hippocrates that the birth of the child was due in the main to its own efforts, and here is at variance with Fabricius, who ascribed the work to the uterus, the muscles of the abdomen, and the diaphragm. Harvey admits, however, that the uterus has its share in the business, and gives details of a case of labour in a procident uterus as a proof, and states that an unnatural birth sometimes results from failure of the mother in her expulsive office (uterine inertia).

Harvey shows his extensive experience by mentioning rare cases in his own practice, such as ectopic gestation, the passage of by-waters (hydrorrhoea) without premature labour ensuing, which "he had often seen," the survival of the infant which had been delivered by Caesarean section several hours after the death of the mother, the child sucking the finger while still in the passage (? face presentation), the successful delivery of an unconscious woman (? eclampsia) by irritation of the nares; the removal of a putrid "false conception" (? sloughing fibroid) after delivery; the vagitus uterinus, etc.

Harvey has a special chapter on the membranes and humours of the uterus. With regard to the chorion, he points out the error of Fabricius in stating that the urine of the foetus was passed through the allantois into the chorion and that the amnion contained the sweat of the foetus, and asks if his master had ever seen such a creature as a sweating chicken. His own opinion was that the liquor amni served as food for the foetus. He based upon the opening of the mouth of the foetus seen through the membranes, the fact that the child will suck the finger while still stuck fast in the birth and the way in which a newborn child sucks "as if he would devour the nipple; he still draws it into his mouth and by the aid of his tongue and palate he sucks the milk as if he chewed it; with farre more earnestness and delight than a grown body. Wherefore he seems to be good at it of old and to have practised it in the womb."

Harvey showed, as Aranzius had done, that there was communication between the vessels of the foetus and the mother; the placenta "served to concoct or digest the edible nutriment which proceeded from the parent to

support the foetus"; perhaps Harvey here anticipated the discovery of the function of the syncytium.

In considering the practical side of Harvey's work in obstetrics we are handicapped by the unfortunate loss of his *Medicinal Observations*. In the management of ordinary labour he advocates patience and gentleness in imitation of Nature, which "is a perfect operatrix"; "if you carefully ponder Nature's works you shall find none of them made in vain, but all directed to some end and some good." He especially rebukes

"the younger more giddy and officious midwives who, lest they should seem unskilful at their trade, do mightily bestirre themselves and provoke the expulsive faculty by medicinal potions whereby they rather retard and pervert it and make it an unnatural and difficult delivery and vainly persuading the women to their three-legged stooles weary them out and bring them in danger of their lives. It is much happier with poor women, and those that dare not own their great bellies where the midwives help is never required, for the longer they retain and retard the Birth the easier and more successful proves the delivery."

The birth in breech presentation is slow and painful,

"and yet notwithstanding in abortment, and where the foetus is dead or that there would be a hard delivery any other way, so that there is necessity of handiwork in the business the more convenient way of comming forth is with the feet forward; for by that means the straights of the uterus are opened as it were by a wedge."

An excellent description is given of the contraction of the uterus after labour, of the after-pains, of the condition of the os as indicative of the state of the contents, of the powerful contraction of the uterus resulting from stimulant injections, and the state of the lochia as a guide to treatment. He points out that if any clotted blood or any other preternatural matter remains in the cavity of the womb after delivery, the womb will neither retire upwards nor close its orifice, but its neck will continue soft and open, and mentions a case where, guided by this experience, he successfully removed an "almost gristly substance" (apparently a sloughing fibroid) as big as a goose's egg from a puerperal patient suffering from fever, a disordered pulse, and a cold sweat, "as if she were a-dying."

He gives a careful description of the involution of the uterus after delivery and of the lochial discharge. "It is indeed a wonderful thing that the so vast bulk of the uterus should so much lessen in so short a space—namely, in the space of fifteen or twenty days." This is a more accurate statement of the period during which the uterus is palpable in the abdomen after delivery than that given by many modern textbooks.

Fortunately we are able to judge of the high esteem in which Harvey was held as an obstetric physician by the writing of his contemporary Percivall Willughby (1596–1685), who was the son of Sir Percival Willughby of Wollaton Hall, Nottinghamshire, and uncle of Francis Willughby the naturalist. He was educated at Tunbridge, Rugby, Eton, and Oxford, graduated B.A. on July 6th, 1621, and was admitted an extra Licentiate of the College of Physicians on February 20th, 1640. He practised in Derby from 1631 to 1655, when he removed to London for the better education of his children, returning in 1660 to Derby where (except for a short interval at Stafford) he practised till his death at the age of 89. He acquired a great reputation in midwifery throughout Derby and the neighbourhood, and wrote *Observations in Midwifery and The Country Midwife's Opusculum*,* which were first published in one volume in 1863, by H. Blenkinsop at Warwick, from a manuscript then in his possession, and now in the Library of the Royal Society of Medicine. In this work, which gives the best contemporary account of midwifery in England, Willughby quotes his honoured friend Dr. Harvey on no less than sixteen occasions, attributes all his knowledge to him, and recommends his work in the following words, with which I will conclude: "I know none but Dr. Harvey's directions and method, the which I wish all midwives to observe and follow, and oft to read over and over again; and, in so doing, they will better observe, understand, and remember the sayings and doings of that most worthy, good and learned Dr., whose memory ought to be had for ever in great esteem with midwives and child-bearing women."

* A Dutch translation of the *Opusculum* was published in 1642 at Leyden.