Thesis

On the Detection of
Infanticide

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The unnatural crime of Infanticide, by which we mean the destruction of the new born infant, as distinguished from foetuses, the destruction of the fetus in utero, is unfortunately of such frequent occurrence, that its detection forms one of the most important departments of the duty of the scientific medical jurist, medical evidence being indispensable for the establishment of the offence.

Formerly the mother who concealed her pregnancy until she was delivered of a dead child, or who during labour failed to call for assistance, was by the laws both of England and Scotland, held guilty of Infanticide: by an act of James I. the onus of proving her innocence devolved on the mother, if it was not until the 43.° year of George III. that this iniquitous law was repealed, if another passed, providing that trials for Infanticide should be regulated by the same rules of evidence, and presumption as other trials for murder.
Before the end of the 19th century medical men were not consulted as witnesses in cases of suspected child murder; happily those times are long since passed, and now the evidence of the scientific witness is that which is chiefly relied upon by the jury, in determining the innocence or guilt of the accused. We shall therefore in the present paper endeavour to point out the signs and circumstances, on which it is safest to rely in the investigation of cases of the crime under consideration.

1° That which relates to the child.

2o° That which relates to the mother.

Evidence which relates to the child.

Some authors of great reputation as Dr. Gordon Smith, Good, Paris, and Copeland consider that a fetus born before the completion of the 7th month of gestation has a very slender chance of surviving, and consequently that no woman ought to be convicted of murder of an infant born within that period: according to them.
then, the first duty to perform when called upon to examine the body of an infant supposed to have been destroyed, is, thoroughly to satisfy our minds, that it has been born capable of maintaining a separate existence, or in other words, that it has at least reached the development acquired by 7 months of intra-uterine gestation. Other medical jurists (among whom may be reckoned Dr. Taylor and Ryan) deny that it is necessary to prove that the infant had arrived at such maturity, that there was a probability of its living: partly on the ground that the English law does not act on the principle, that a child in order to become the subject of a charge of murder, should be born with a capacity to live, and partly because numerous instances are recorded of children born before the completion of the 7th month of gestation (according to the opposite doctrine the minimum point of development consistent with viability) surviving and being reared. In our opinion no ground is found in the numerous reported trials for infanticide, for supporting the doctrine of viability; the issue has always turned
upon the fact whether the child was born living or dead, not whether it had or had not reached the 7th month of utero gestation: if born alive though only in the 6th month of gestation, it surely has the same probability of surviving and being reared, as those other infants of the same time, which are known to have lived: by destroying its life therefore, notwithstanding its slender chances of surviving, murder is as much committed as if the full term of nine months had been reached, and deserves the same punishment: this opinion is born out by the case of Reg. v. West (Nottingham Lent Assizes 1848) in which a midwife was tried for causing the death of a child under the 7th month of utero life, by leading to its premature birth, which clearly proves that a charge of infanticide may be fairly maintained with respect to children under the 7th month, and also that it is not necessary to prove the child capable of maintaining a separate existence, for in this case the child being only between the 5th and 6th months of pregnancy, was not viable from
me immaturity—*

We may judge of the uterine age of a child by various signs: the following are those by which we distinguish it. Between the 5th and 6th months of gestation - the length of the fetus from the vertex to the sole of the foot is from 10 to 12 inches, and its weight from one to three pounds; the head is large in proportion to the rest of the body, the eyelids are adherent, and the pupils closed by the pupillary membranes - the skin is of a reddish colour, and the nails are slightly formed. Calcification is found preceding in the sternum and the bones of the feet, the testicles are still in the abdominal cavity and the brain, as yet, is entirely devoid of convolutions. Between the 7th and 8th months the length of the child is from 12 to 14 inches, its weight from two to four pounds, and the centre of the body is between the umbilicus and sternum - the skin is thick and of a fibrous structure, covered by a white amnionic matter - the nails are firmer but do not yet reach to the extremities of the fingers - the hair is
long thick and coloured. Congestion is
advancing throughout the skeleton. Meconium
is found occupying the cecum and colon, and
the testicles will commonly be found baver-
ning the inguinal canals.

Between the 8th and 9th months, the child
is from 15 to 16 inches in length, and weighs
from four to five pounds: the eyelids are no
longer adherent, and the pupillary membranes
have disappeared: hair and nails are well
developed: the surface of the brain is not yet
regularly convoluted, although it is grooved
or fissured, and the grey matter has not yet
appeared: the large intestines are almost
entirely occupied by meconium, and some
trace of a liquid resembling bile is found in
the gall bladder: the testicles will be
found either in the inguinal canals or scrotum.

At the end of nine months' gestation,
the full time, the length of the body is
from 18 to 20 inches, and its weight is
from 5 to 8 pounds, generally between
6 and 7 pounds — and all the organs
are now fully developed. As a
general rule, all the measurements of
weight are rather less in female than in male children. Great deviations in length and weight are frequently met with. Cases are on record of children born weighing between 17 and 18 lbs. and measuring 26 inches in length - at the full time of intra-uterine gestation, the head is large forming one fourth of the whole length of the body - the skin is pale, and owing to the cellular tissue being filled with fat, the limbs are plump and rounded - the nails are fully developed and reach to the end of the fingers: the testicles most frequently are found in the Scrotum, though sometimes they do not descend from the abdomen till sometime after birth: the brain also presents convolutions, and grey matter begins to appear. Notwithstanding the fact that sometimes a child of nine months is but little more developed than one of seven; or vice versa, that one of seven may sometimes be as far advanced in development as one of nine months, we may in general by the careful examination of the
above circumstances, and by relying on the
majority of the characteristics which the
child presents, determine its uterine age.
This done, if it be under the 7th month, the
presumption is that the child was born
dead: but if it be arrived at its full
time, then the presumption is that it was
born alive: in either case it is our duty
to enquire in the next place, "was the child
alive when maltreated?" Before commen-
ting to investigate this question, it is necessary
carefully to examine the external appearance
presented by the body; otherwise they may
be lost as evidence, by the destruction of
the corpse in digestion: thus, in addition
to the length, weight, and other external
marks required to prove its uterine age,
we must search for the presence or absence
of any facial peculiarity: all marks of
violence in the shape of wounds, bruises,
or lacerations, must be carefully noted.
The umbilical cord must be examined
as to whether it has been cut and tied;
or lacerated, and the length of the portion
still attached to the child, ascertained.
Edinburgh Med. Journal No. 50/59
It must be stated in the report whether the child appears to have been washed or not, which is determined by the presence or absence of arsenic caseosa about the groins, armpits or neck, and it will also be necessary to mention whether there be about the body any marks of putrefaction, indicated by the separation of the cuticle, change of colour in the skin, or offensive odour.

Was the child alive when maltreated?

As it is evident that a child may be destroyed in the act of birth before it has respirated, or after birth before it has had time to respirate, (the possibility of which latter occurrence is proved by a case reported by Dr. Smythe of Polmont to the Historical Society of Edin., in which the heart of the child continued to beat for 2 hours and 45 minutes, with not the slightest attempt at inspiration, or, after artificial inflation of the lungs, at expiration) the necessity of the above inquiry is obvious; in order to answer the question, the practitioner must first
determine that the child has recently lived: hence if the body be highly putrefied when found the case must be abandoned, because it body can then furnish no evidence whatever of life after birth. Putrefaction which has taken place in the uterine from death of the fetus generally be best discerned from that caused by exposure to atmospheric influence of the body of a child born alive in the former case, when putrefaction is far advanced, owing to long retention of the dead fetus, the parts are so placed that the body is flattened when placed on a plane surface by the mere gravitation of its organs; the skin is of a reddish brown colour; the umbilical covering the hands, feet, is white and sometimes raised in blisters, the cellular tissue is filled with a reddish coloured serum, the bones are proveable and readily detached from the soft parts. The signs of putrefaction depending on exposure to the air need not here be described, suffice it to say that if we can determine the putrefaction to have taken place in utero, the
Under the present head we should examine
the evidence of live birth afforded by
marks of violence on various parts of the
body; in doing this the difficulty is to
distinguish between the ecchymoses of
hurricanes caused by violence, those
often found on the bodies of children dead
from natural causes. Very frequently
the violence has been far greater than
that requisite to destroy life, which
will facilitate matters, at other times
the wounds are so situated as to be
inexplicable except as the result of
wilful perpetration — marks of
violence on the body of a child which
had its in utero would not present
the characters of injuries inflicted on
the living; these would lie no ecchymoses
for effused Coagula of blood; these when
they exist, show that the child
was either living or but recently dead
when they were inflicted.
child could not have been born alive: on the other hand, if the presumption is dependant on exposure to atmospheric influences, the child may have been born alive and criminally destroyed. Yet no proofs to that effect can possibly be adduced owing to the advanced stage of decomposition.

Was the child born alive?

By the laws of different countries the life of an infant has been variously defined: in Scotland the viability of a child is determined by its crying; in France by its respiration; but in England any tumultuous motion of its muscles has been determined decided to constitute life: the medical jurisprudents, however, in most cases, neither hear the crying or see the movements of the limbs, but has to found his opinion on the signs found in the dead body given him to examine: these are chiefly derived from the inspection of the organs of respiration and circulation. We shall now therefore investigate the points of difference between the respiratory organs of a child born alive, and one born dead.
The circumstances here to be considered, are according to Dr. Beech "the general configuration and size of the Thorax: the volume of the lungs: the situation of the lungs: the color of the lungs: the shape of the lungs: the consistency or density of the lungs: the specific gravity of the lungs: the shape and situation of the Diaphragm: the condition of the intestines and the state of the Bladder."

The Thorax of a child which has never breathed will be found flattened and as it were compressed; and on opening its cavity the size of it will be exceedingly small, owing to the smallness of the fetal lungs and the elevation of the diaphragm. If however respiration has taken place, the Thorax will be rounded and arched, and its cavity enlarged in every direction: the diaphragm will also be depressed. The deductions to be drawn from the above facts are obvious – Daniel not satisfied with ocular inspection, suggested that the chests of a number of infants should be measured, in
order to establish a standard of size, both before and after respiration. Such experiments prove that the chest of a fully grown child, which has not breathed, will usually vary from two to three inches back-wards, and from two to two and a half inches from the sternum to the spine; when the same child has breathed, its chest would be from three to four and a half inches wide, and about three inches in depth; showing an increase in the latter case, over the former, of from two to two and a half inches in the one direction, and from half an inch to an inch in the other. These measurements, however, in the hands of persons of little experience in such matters are very apt to lead to error, so that on the whole it is perhaps best to trust to ocular inspection, without having recourse to any kind of measurement, being that the chests of children vary in size to such an extent as in most instances completely to do away with the value of the test. The absolute size or volume of the
lungs is a test on which much reliance cannot be placed: before respiration they are exceedingly small, and in general scarcely visible, unless forcibly drawn forwards in the chest. When respiration has been perfectly accomplished, their volume is so much increased that the bag of the pericardium is almost entirely concealed: but it must be born in mind that the child may live for several days, and yet the lungs be little distended with air.

The relative situation of the lungs is of considerable value, when taken in conjunction with the other signs of respiration: if the infant has not breathed they will be found to occupy a small space at the upper and posterior part of the thorax, leaving the pericardium and diaphragm almost entirely uncovered; if on the other hand respiration has taken place, the lungs will be found to cover the lateral portions of the pericardium, together with the sides and arch of the diaphragm: if imperfect respiration only, has occurred, they
will occupy the upper and posterior, together with the lateral portions of the cavity of the thorax. The colour of the lungs should also be taken into consideration, when endeavouring to determine whether an infant has respired; great caution, however, must be used in doing so, as this test is liable to many fallacies, owing to the modifying influence of disease, and the action of the atmosphere upon the lungs.

In the fetus prior to respiration, the Emar of the lungs is brownish red, which after respiration is changed to scarlet or pale red, at least those parts of them, which have been permeated by air.

We next come to the test of crepitation, one of the most valuable in determining whether respiration has or has not taken place: the lungs of the fetus anterior to respiration are dense and solid, so air bubbles can be squeezed from them, and when cut into with a knife, they do not crepitate: on the other hand after respiration has occurred, the lungs are soft and spongy and when cut into, emit the peculiar sound and sensation denomi-
respiration, which resembles nothing so much as the sound and feeling to the hand, produced by cutting through a piece of cartilage. Some difficulties however attend this test which must be guarded against: the lungs of a child may have been artificially insufflated after its death, for it has been well established that the lungs of a child which has never inhaled may be completely filled with air, and will resuscitate as after natural respiration. Artificial insufflation after death may be distinguished from the consequence of breathing, by the absence of a greater or less flow of blood when the lungs are cut into, which always occurs after real respiration, and also by the possibility of squeezing out the air, from lungs artificially inflated by pressure between the thumb and fingers, while no force of the hand is capable of depriving a lung that has breathed of its air, so as to cause it to sink in water. Putrefaction in its incipient stage also causes respiration. So that it is always necessary to be careful in determining whether putrefaction be present, as alluded to in a former
page of this paper—Sometimes again the lungs of children which have lived for a considerable time, give no Crepitation, they also present the other fetal characters, viz. are small and livid. From what has been said on Crepitation, it will be seen that the greatest care must be taken to examine every point likely to lead to fallacy, in order to prevent the evidence derived from this test, being turned against the suspected criminal. This having been done, and no signs of suffocation or artificial insufflation made out, the inference will be that the child has respired, but if no signs of Crepitation are present, we must not come to the conclusion that the child was born dead, in the face of the fact previously stated, that the lungs of some infants which have lived a considerable time are sometimes small and livid and present no Crepitation.

We now come to the celebrated "Decimana pulmonum" or hydrostatic test, which at one time was held to afford indisputable proof of the death of the child before or after death. Before entering
into a discussion concerning the merits of this test, the principle on which it acts must be described: if the lungs of a child which has never breathed be put into water, it is found they are specifically heavier than water, and of course sink. On the contrary, respiration having taken place, the lungs when put into water, owing to their insufflation with air, are specifically lighter than the liquid and in consequence float. Though the above statement may hold good in the majority of cases, it has been determined beyond doubt, that the lungs of children born alive will sometimes sink, and in some instances that the lungs of still born infants will float. Hence the views held by the older physicians regarding the value of the hydrostatic test in determining whether a child was born living or dead, must be greatly modified; in fact we cannot but come to the conclusion, that the only thing we can prove by its means, is, whether the child has or has not respired.

Let us first consider the objections.
brought forward to show, that the lungs may float, and yet the child not have been born alive: these are five in number, the first of which is, that the lungs may float in consequence of having undergoneincipient putrefaction. The most exact experiments on this point were made by Meyer, who found that the lungs of still-born children when put into water, sunk, but after an interval of 7 or 8 days rose again to the surface, with their colour changed, and the odour of putrefaction quite perceptible: here they remained until at the latest the 35th day, when having become quite disorganized, they again sunk, and though kept for some weeks longer, showed no inclination to rise again to the surface: the importance of being able to discriminate between the floating of lungs caused by decomposition, and that caused by natural respiration, is evident from the above mentioned experiments. The lungs of a still-born child when allowed to remain in the thorax are slow in undergoing putrefaction: nevertheless, they sooner or later acquire sufficient
air, to make them buoyant in water; this form of gaseous putrefaction may even take place in the lungs of a child, which has died in utero. Then the lungs are putrefied, this will in general be determined by putrefaction having extended throughout all the soft parts of the body, and the lungs in particular. Dr. Hunter states "that if the air, which is in the lungs be that of respiration, the air bubbles will hardly be visible to the naked eye, but if the air bubbles be large, or if they run in lines along the junctions between the component lobuli of the lungs, the air is certainly emphysematous, not air which had been taken in by breathing." Another mark to distinguish between the floating of lungs caused by respiration, and that caused by decomposition, is one which is strongly insisted on by Clare, and has already been noticed in this paper, viz. the case with which the air can be extruded from lungs which float in consequence of putrefaction. If then the body be found in a state of great putrefaction
it is better not to place any reliance on the hydraulic test, but as before stated abandon the case, as beyond the reach of medical research: if however subejection be but little advanced in the general topics of the body, the lungs being slow in undergoing second position while allowed to remain in the thorax, the medical juris may be able to determine by negative evidence or by employing the lists of Hunter and Mare, whether the floating of the lungs is caused by the air of inspiration or subejection.

The only Dr. objection brought forward against the hydraulic test, under the present head is, that the lungs may float in consequence of having been artificially inflated.

Many excellent observers among whom may be mentioned Helmont, Radeser, Hals, Prendell and Albert, are of opinion that it is impossible to pneumate the lungs of a child which has never breathed. The contrary doctrine is however maintained by a very large majority of writers on legal medicine, including most of the English and French authors, who nevertheless...
admit the difficulty experienced in insufflating
the lungs of an infant, when endeavouring to
induce artificial respiration; it is thus
evident from the conflicting character of the
proofs on the subject that although practi-
cable, the insufflation of the lungs of a
still-born child, is by no means of such
easy accomplishment as is generally supposed.
This consideration greatly weakens the force
of the 20 objection to the hypodermatonic test.
Nevertheless it is our duty to point out, by
what means, lungs artificially inflated
may be distinguished from those which
have naturally respired— if then, the
lungs have been artificially inflated.
they will resemble by their partial disten-
tion with air and other physical signs,
those of children which had imper-
fectly respired; like them, they may
float on water, but when cut into pieces
some of these will sink, owing to the
uniform distension of the air cells;
the if the entire organs or pieces of them
be firmly compressed, they will lose
their air and sink, when thrown into
The liquid—Mr. Mac's suggested that the inferior extremities of lungs artificially filled with air, will always sink, owing to the impossibility of completely inflating them; and maintains that this observation especially holds good with respect to the left lung. We have come to the conclusion, after examining into the force of the objection at present under notice, that it is easy enough to distinguish between artificial inflation and perfect respiration, but this distinction admitted by the effect of compression on the lungs in whole or part and by the other means just named, but it must be admitted, that there are no means of distinguishing imperfect respiration from artificial inflation, in either case the buoyancy of the lungs will be destroyed by compression, and their physical characters remain unaltered. In either case. In such a case, Dr. Taylor is of opinion, that the only course left open to the Medical Witness is to state to the jury that the evidence derived from
experiments on the lungs, left it uncertain, whether the Child in question had expired, or had  had its lungs artificially inflated. The 3d objection is, that there may be an emphysematous condition of the lungs, which will make them float, though respiration has never taken place. It is difficult to conceive in what manner, violence during delivery to which cause Emphysema is attributed, can produce it, containing as the lungs then do, no air. This objection may cause an emphysematous appearance in the air cells: the manner in which that is to be distinguished, has been already explained. So that the 3d objection in our opinion, possesses no force. It has been said in the 4th place that a Child will very commonly breathe as soon as its mouth is born or protruded from its mother, in that case it may lose its life before it is born, especially when there happens to be a considerable interval of time between what we may call the birth of the child's head, and the protrusion of its body.
That a child can respire directly its head is born, has been distinctly proved by numerous authors, among whom may be mentioned Dr. Macfainter, Laparone, and Schiolli, but no case is on record (so far as I can find out) of a child dying before the complete expulsion of its body, if it cried when its head was expelled. This objection, then, loses nearly all its force, however it is within the reach of probability that such instances might occur, especially from choking of the pharyngeal cord combined with a loop of the cord round the neck.

The possibility of uterine respiration. That the child may respire while yet in the womb, of before any part of it is delivered, has been urged as a 5th objection to the hydropoietic test. The possibility of uterine respiration was denied by all writers down to the time of Bohn, he in 1700 first maintained that in difficult labor the child may draw in air enough to suffice for the dilatation and floating of its lungs, and yet die before delivery. Several cases confirmatory of the possibility,
of uterine and vaginal respiration have been published, one of which related by Dr. A. F. Holmes of Dublin, states that the child cried distinctly in Utero, and was subsequently born alive — the evidence as to the possibility of uterine respiration is therefore undoubted. If we cannot but look upon the objection to the "doli / masia palmum," founded hereon, as perfectly valid, an additional proof that that test can only determine whether respiration has or has not occurred, not whether the child was born alive or dead — for it may breathe in the Uterus or vagina, or with its head at the outlet and yet die before delivery is accomplished. We have now considered all the objections to the hydrostatic test, which are urged for the purpose of showing that the lungs may float and yet the child have been born dead, and shall now briefly examine those objections which have been brought forward to prove that the lungs may sink in water, and yet the child have been born alive. The lungs of children born alive will sometimes
sink in water in consequence of disease: the disease may be one of several kinds, but need cause no difficulty, as the reason of the sinking of the lungs will at once be apparent - the cases which cause difficulty are those in which the child has lived for several days with only partial distension of the lungs, with air, even sometimes with entire absence of air from the pulmonary organs; the former state will be ascertained by cutting the lungs into small pieces and immersing them in water, when the distended portions will float, the undistended sink. to the latter state of matters (the entire absence of air from the lungs), the hydromatric test is inapplicable, as well as all other methods of inquiry applied to the respiratory organs; and these cases are not so rare as might easily be imagined, for all writers on this subject give numerous instances of acelebras so it is called, in which the subject of it lived for several hours after birth, the lungs after death showing no signs of respiration.

Having examined all the objections to the hydrosatric test, we find no difficulty in coming to the conclusion, that it has no
value in determining whether a child newly
born and found dead, was brought into the
world alive or dead: it can only show whether
respiration has or has not taken place, and
Consequently enables the medical jurist to state
that the new born child has lived, when
taking its life respiration has been full of
perfect - if respiration has been imperfect
owing to the death of the child immediately
after birth, or before birth, respiration having
occurred in utero or maternal passages,
the only inference deducible from the test
is, that the lungs have received air by
respiration, or by artificial inflation. If
the jury must ascertain from the other evi-
dence laid before them, which of the
two explanations is the most probable.
The other methods of enquiry applied to the
pulmonary organs, all lead to the same
conclusion as that derived from the hydro-
tate test, so without further ado, we
shall proceed to determine, how far an
examination of the circulatory organs
of the fetus will answer the question,
"Was the child born alive?"
The circulatory system of the fetus possesses certain peculiarities not found in the adult. E.g., the foramen ovale, an opening in the septum which divides the right from the left auricle of the heart, through which part of the fetal blood is conveyed directly from one cavity to the other; the ductus venosus, a vessel lodged in the posterior part of the longitudinal fissure of the liver; the ductus arteriosus, a vessel given off directly from the pulmonary artery, which enters the aorta just below its origin; the umbilical vessels and Cord.

**Foramen ovale.** This aperture is always open before respiration, but the blood taking a different course after the commencement of that process, nature abhorring everything which is of no further use in the economy, closes it up: its obliteration, however, is not completed till some days, or sometime even weeks after birth, so that although being found closed is very seldom decisive evidence of the child having required life for some time after birth; yet its open condition is no proof that the
child has not expired. Ductus venosus. This vessel comes off directly from the umbilical vein &
opens into the ascending vena cava, along with the hepatic veins; in the fetus anterior to respiration,
it is always open, being large enough to admit of the passage of a full sized probe; after
the child has expired, however, the blood ceases to pass through it. In course of time
the vessel becomes obliterated, and tumbles
down in the adult to a mere cord; this proves
(big becoming closed) though completed before
the closure of the foramen ovale, yet takes two
or three days, so that as with the latter
structure, although its impervious condition
affords evidence of the child having expired,
it open state is not conclusive proof of the
Contrary. Ductus arteriosus - this vessel
like the last mentioned is always found open
in the fetus previous to respiration, and like
it becomes obliterated and permanently
closed after birth; this test is however
liable to the same fallacy as the last two,
depending upon the fact that the closure
does not take place till some considerable
time after birth - Prof. Bernst
ject that correct inferences might be drawn as to the occurrence or non-occurrence of respiration, by observing certain changes which take place in this vessel at various intervals after the commencement of respiration - his deductions were, that "if the ductus arteriosus be found cylindrical in its shape, not contracted towards the auricle, and if its equal in size the pulmonary artery, the inference would be that the child was not born alive". On the other hand, "if the ductus arteriosus be contracted towards the auricular end, and if its size be much less than the pulmonary artery, the inference would be that the child was born alive". These conclusions however were found by Osíla, not to hold good in numerous cases which he examined, so that on the whole we are of opinion that it is best to put them out of view altogether. The umbilical vessels should not be examined: if found obliterated, it is conclusive proof that the child was born alive; on the other hand, their being open is no evidence
to the contrary, as they are not obliterated until at least the third day after birth. The state of the umbilical cord must be ascertained; if it be found that it has separated from the child in the usual manner, it is proof that the life must have existed for some time; as its separation, however, takes a considerable period of presence is no proof that life has not existed. Something may nevertheless (according to Billard) be learned from its condition; if it be flattened and shriveled, its reflexes obliterated, tortuous and dry, that writer draws the inference that life must have existed, as he maintains that desiccation can only take place during life, its post-facation coming on, after death or if life has never been present.

It still remains to examine the intestines and bladder. The meconium or fetal bile is generally expelled from the intestines soon after birth; if therefore meconium be found in the intestines of a dead infant, that circumstance goes far to show that it was still born: too much weight, however, must not be laid on this test, for it is well
known that the meconium is sometimes dis-  
charged some hours previous to birth; and it  
is also possible that the child may have been  
murdered before the meconium had time to be  
evacuated. The bladder of the fetus has been  
ascertained to contain a considerable quantity  
of urine; if therefore no urine be found in  
the bladder, the inference is, that the child  
was born alive; this test is however so  
manifestly liable to fallacies, that much  
reliance cannot be placed upon it.  
Having now examined the state of the respi-  
atory and circulatory organs, and also the intestines  
and bladder, it behoves us to mention how  
far we can determine from such examination  
whether the child was born living or dead.  
and I- From the pulmonary tests, we  
can only ascertain the fact that the child  
has or has not respi-; if the lungs are fully  
distended with air, the inference would be  
that life continued for some time after birth,  
as respiration cannot but be imperfect, when  
it occurs in the utero or maternal passages.  
D- From the examination of the circulatory  
system we draw the following reductions-
Last Times July 24th 1847 p. 433
Last Times &" Gazete. March 1857 p. 237
that the open state of the foramen ovale, ductus arteriosus and venosus, is no proof that the child was born dead, seeing that these structures do not become obliterated for a considerable period after respiration has been re-established, and infanticide is generally performed immediately after or during birth.  

b. That the separation of the umbilical cord, in the natural manner, affords evidence of live birth, but that its presence does not prove the child to have been born dead, as the vital process takes a considerable time.

3 ½ From the examination of the intestines and bladder we derive the following conclusions:

a. That the presence of food in the stomach is conclusive evidence of live birth.

b. That no reliance can be placed on the absence of meconium from the intestines, or urine from the bladder, as proofs that the child was born alive, since these liquids may be discharged during labour. Their presence also must not be looked upon as evidence of still birth, since infanticide may
Introduction to the Study and Practice of Midwifery

Dissertation on Infanticide by Dr. Hutchinson
have been committed, before they had time to be
evacuated — having determined as well as we
possibly can, whether the child was born alive.
We must in the next place, proceed to in-
vestigate by what means it came to its
death. A new born child may lose its
life, either by criminal or accidental causes,
these will now be considered serially, be-
ingning with the intentional neglect
of tying the umbilical Cord.
Most practitioners concur as to the
necessity of tying the Cord before it is divided,
to prevent fatal hemorrage which otherwise
might ensue from the neglect of doing so. Dr.
Campbell reports two cases which proved fatal
owing to removal of the umbilical ligature. Of
other instances of death from neglect of tying
the Cord, or from its removal are narrated by
Foderé, and one of recovery from impending
death in consequence of hemorrage from the fund
is related by Dr. Hutchinson. Dr. Klein
on the other hand has reported 183 Cases of
sudden labour in many of which the Cord
was ruptured, and in 21 Cases close to the
abdomen, and yet no fatal hemorrage.
This may be accounted for by the fact, that laceration or tearing of any artery will prevent it from bleeding. Again it has been argued that there is no use in tying the umbilicus, as the lower animals do not tie their cords; but animals separate their young by drawing the cord through, or the vessels are otherwise torn and as before said, born septa do not bleed.

It appears therefore from careful study of both sides of the question, that death may and has occurred in consequence of not tying the navel string, or from removal of the ligature, but that such is not the necessary result.

Death of the child from hemorrhage has taken place from rupture of the cord during delivery, owing to its shortness, and also several days after birth, when the umbilicus has separated by the natural process. It must also be remembered that labour may come on suddenly, and the woman being alone may not possess the requisite knowledge, ability or strength to apply a ligature to the ruptured and bleeding funis. So the child will perish - in fact we do not think that a chance of infanticide could be
sustained against any woman who has been delivered
suddenly by herself, when death of the infant
has taken place from hemorrhage from the ruptured
umbilical vessels - The signs of death from
hemorrhage are: a. Paleness of the surface
with a peculiar waxy appearance - b. Paleness
and lift of colour in the muscles and internal
vessels. c. The absence of the usual quantity
of blood in the heart and blood vessels -
Exposure to Cold is the 2nd criminal
means of destroying the life of a new born child;
the signs of death from this cause are given by
Fodere in the following terms: "If the body of an
infant be found stiff, discoloured, shrunken &
naked, or with only a slight covering on it in a
cold place, buried under stones, or under the
earth - from bile upon the lungs it is evident
that it has expired. If the great internal vesels
are seen gorged with blood, accompanied with
an effusion of blood into the cavities, while
the cutaneous vesels are contracted and almost
empty. When no other cause of death can be
detected, one cannot do less than attribute it
to the cold. Consider this abandonment and
defect of care the receptivity of which is evident
* Found it in page 505...
to the utmost comprehension, as a manifest intention to make away with the child."

Keeping from the child the nourishment necessary to support life, is another of the means sometimes resorted to, to destroy the life of a new born infant: death from pure starvation is very rare; it is generally combined with exposure, so that the signs of the two kinds of death will be present. The appearances likely to be found on examination of the body are general emaciation: an empty state of the stomach and intestines: enlargement of the gall bladder and effusion of bile into the intestinal canal.

The infliction of wounds and injuries of various kinds, is perhaps the most frequent method resorted to by the unnatural to destroy the life of her innocent offspring. In these cases to detect the cause of death a careful inspection of the surface of the body must be made, followed by inspection of the head, thorax, and abdomen: all marks must be cut into to ascertain if they be formed by true ecchymosis, and all wounds followed by probe and knife, to see whether or not vital parts are injured.
Great care must be taken to distinguish between wounds and injuries inflicted with criminal intent, and those sometimes received during a difficult and tedious labour, and in examining contused two cautions ought to be observed, viz. to distinguish them from the coloured spots which appear on the surface of the body at the commencement of putrefaction, if not to mistake accidents which may occur during dissection for those injuries resulting from acts of violence. Infanticide is also frequently committed by asphyxiating the new born child; this is accomplished in several ways, viz. by drowning, by hanging, by strangulation and smothering, by introducing articles into the mouth, nostrils, or throat, and by causing the child to inhale mephitic air. When a child is found immersed in water, the main point to be elucidated is, whether it was put into the water living or dead, as the signs of drowning will not be present in a child which has never aspirated. After respiration has occurred, the appearance produced in the child by drowning are the same as those induced in the adult by
the same cause. Infanticide by drowning is very uncommon, although the dead bodies of new born children are very frequently found immersed in water; these have generally been made away with by other means, then thrown into water to hide the real cause of death—a careful inspection of the body should be made, and all marks of violence upon it, must be explainable as having occurred from accidental causes, or from the struggling produced by the instinct of self-preservation. Excavation at the end of the fingers, and dirt or sand found under the nails, also water in the stomach containing fragments of straw or chaff, similar to those floating on the surface where the body was found, are decisive proofs that the infant was alive when immersed.

New born children may be drowned or suffocated by being thrown into mud, or into the soil of a privy; sometimes in these Cases, as in those of immersion in water, the child has been defecated in some other manner, and thrown into the privy after its death to avoid detection; the same precautions must therefore be taken as in the former Case, in order to come to a right conclusion— if the child has been
Known in living, the stomach will contain a quantity of the liquid in which immersion has taken place; this, in the case of soil, can be detected by the presence of hydroxysulphuretted of ammonia in large quantity. When the body of an infant is found in a privy, numerous lines of defence are set up by the mother or suspected murderess. It is most frequently asserted that delivery took place prematurely during the performance of a necessary act, and that the child dropped and was either suffocated or prevented from breathing. There is no doubt but that all these circumstances may readily occur, but the statement of the woman may be inconsistent with medical facts, for if the members of the infant be found separated or divided with by cutting instruments, or a cord round the neck, or plug in the mouth, nostrils, or fauces, or the umbilical cord cut with a clean edge and not ruptured, it is evident that the delivery did not take place as explained.

As far as I am aware it has never been suggested, that a woman knowing herself to be near the termination of labour, may deliberately seat herself over the privy or soil.
in one order that the child when born may fall into the soil or other liquid matter, and be suf-
focated. A case in point was recently related to me by a midwife, in whose practice it oc-
curred. A young woman, whom she was attending in labour with her illegitimate child, insist-
et when the process was nearly completed, on getting out of bed to use the close stool. This was foolishly permitted, and she had not been seated a minute, before my informant heard the half stifled cry of the infant in the pan, and at once secured it from impending suffocation, to the great disgust of the mother who, when taxed with the crime, admitted that she intended to destroy her offspring, hoping that it would not be able to cry out. Whether in any instance, the drowning of a child was criminal or acci-
dental, must be a question for a jury to determine from all the facts laid before them: Accidental suffocation may occur in Con-
sequence of the face and mouth of the child getting into a pool of the natural discharges of the mother, and not being removed in time; and again, several instances are on record.
of women mistaking the pains of labour, for the
feeling of the necessity to evacuate the bowels, and
the children in consequence have been
dropped into the utensils employed.

Death by strangulation and smothering, or by
introducing articles into the mouth, nostrils or
throat, is produced by the same general cause as
drowning: the general signs of asphyxia will
therefore be present in all these instances, the
specific mode by which death has been brought
about being detected by particular examination
and dissection. Strangulation may be accom-
plished by drawing a ligature tightly round the
neck, or by forcibly compressing the front of the
windpipe: in the first case, the mark round
the neck will be nearly circular, and not
inclined to the ear or occiput: in the latter
ecchymoses and discolorations about the
neck and chest, produced by the application
of fingers and nails to those parts will be
present. Great care must be taken not to
mistake the mark made by the umbilical
cord, when it has caused death by being
twisted naturally round the neck of the
child, for that made by a rope applied.
Taylor's Medical jurisprudence p. 172
wilfully to produce strangulation. Mr. Price has reported a case in which the cord was so tightly twisted round the neck of a child, that he was compelled to divide it, before delivery could be accomplished. There was in this case a deep groove formed on the neck, yet conveyed the impression to himself and a medical friend, that in the absence of any knowledge of the facts, they would have been prepared to say, that the child had been wilfully strangled by a rope. Dr. Williamson of Leith, states that during the course of his practice he has met with several instances of labour in which "immediately upon the birth of the head, the infant has respired freely, but upon running the finger round the neck, one or more loops of the cord, have been found firmly encircling the throat" in the instances referred to it was found impossible to disengage the coil of cord from the neck, so that each succeeding contraction of the uterus "tightened the umbilical ligature causing stoppage of the respiration, with blackness and congestion of the face necessitating division of the cord before the birth was accomplished." Dr. Williamson
draws particular attention to the suspicion which would have attended these cases, had not art interfered. for the children would have been born dead with an indented groove encircling their necks, and with all the signs of having respirated freely, leading to the supposition that they had been born alive and afterwards destroyed. Diagnosis. When the dead bodies of a new born child is found, with marks as if caused by a rope round the neck, the practitioner is very apt to be led into error by imagining that it was caused by the umbilical cord: now the fact is, that death from strangulation produced by the twisting of a loop of the cord round the neck, is very rare, there generally being sufficient length of the funic, to allow of the loop, without injury to the child;—no doubt however, Can exist, that fatal cases have occurred from the above cause, and are liable to occur again especially when the labour is unassisted by art: the instances quoted above, prove the truth of our statement. It comes therefore to be a matter of great importance, the able to distinguish
between the mark produced by the umbilical cord, and that produced by a string or tape applied intentionally. When the mark is deep, much ecchymosed, and there is extravasation of blood, with suffusion or laceration of the skin, and the lungs show all the characteristics of asphyxia having taken place, we should say that death was not caused by a loop of the umbilical cord, as it is questionable whether a child can be born with the umbilical cord, so tightly round the neck as to produce great deprefion of the skin, ecchymosis, and at the same time perform the act of respiration fully and completely. When death occurs from constriction of the cord, the lungs should be in their fetal condition, and the mark not so deep or deep as in the former case: again when death has been caused by the employment of a string or other ligature, we can generally discover such have been the case by the presence of indentations or irregularly ecchymosed spots upon the skin, the depressed portions of skin being generally white, if the raised edges livid.” (Taylor)
The infanticide may be effected by actually employing the political end as the means of strangulation: by allowing the head to be born first, then tightly twisting the navel string round the neck: in such a case, if the child has respired fully at the outset, the lungs will give the usual signs of respiration if breathing has been prevented by the loops of cord. The crime cannot be detected by medical evidence alone—accidental marks resembling those of strangulation, must not be mistaken for the marks really caused by strangulation: it is unnecessary to enumerate the many different kinds of natural and artificial appearances, which are liable to lead us into the error. Heed, common care and attention are all that is necessary to guard against it—Smothering: when the child has been death by smothering it under bed clothes, the cause of death can scarcely be determined except by the general appearances of suffocation, combined with the place where the body was found. The absence of any other probable cause to which death can be attributed—Defection can alone reveal the cause of death, when it has been produced by infanticide.
inhalation of noxious or odorous air. Infanticide may also be effected by compelling the new
born infant to inhale air deprived of its oxygen, or gases positively deleterious. The
signs in these cases, are those generally of asphyxia, i.e., suspicious and unnatural
circumstances attending the place where the body was found.
This chiefly by moral and circumstantial evi
dence that we are able to distinguish between
the accidental and criminal Causes of violent
deaths in general. This remark especially holds
good in infanticide, as must be abundantly
evident from the foregoing observations. In addition
The circumstances already mentioned, we should
make inquiries, as to whether the mother con-
ceded her pregnancy, whether she is a single
or married woman, whether she has had more
than one child (also whether she had pro-
vided clothes for her expected offspring), and
according to the result of these inquiries, our
verdict will be, in cases otherwise envel-
oped in doubt.
Evidence which relates to the Mother.

If the conclusion be arrived at, that the death of the child was owing to violence, it is next to be ascertained who the perpetrator of it was; should suspicion light upon a female as being the mother of the child, which is generally the case, the questions determined regarding her are,

I. Whether she has been delivered of a child.

II. Whether the signs of delivery correspond as to time, with the appearances observed on the child.

In order to ascertain whether a woman has been delivered of a child, it is necessary to make an examination of the parts of generation; this should not be delayed for any considerable time, in consequence of the rapidity with which the signs of parturition disappear in the majority of cases. Treasheus remarks that the proofs of delivery become uncertain after the tenth day, and the majority of obstetrical have fixed upon the term of from 8 to 10 days, so that within which, the examination should take place. If the female be examined within three or four days after the occurrence of delivery, the following
circumstances will generally be observed, viz.: a greater or less weakness; this sign cannot however, always be depended upon or expected, as many females have been known to proceed to their usual occupations immediately after the child was born, as if nothing had happened—A slight paleness of the face with the eye sunken, and surrounded with a dark coloured ring, and the skin of the body white like that of a person convalescing from disease; the genital organs much bruised, and the four-chests (especially in first labours) more or less torn: the vagina and uterus relaxed and the orifice of the latter soft and tumid, and dilated so as to admit one or more fingers. The belly is soft, and through its papules the uterus may be felt, firm and globular, extending nearly up to the umbilicus. The skin of the abdomen is relaxed, with numerous shining reddish and whitish lines, traversing it in various directions, especially between the breasts and pubis to the navel, which latter are the only persistent marks of delivery; other signs are generally present, which
might be mistaken, e.g., the lochial discharge, distinguished from all other vaginal discharges by its peculiar smell, which it is impossible to destroy; and the presence of milk in the breasts, a circumstance rarely absent two or three days after delivery, yet which cannot be depended upon by itself as a sign of parturition, owing to the fact that milk has been yielded by the virgin breast to the stimulus of suckling, even by the male breast; on a similar imitation being applied. If all the signs we have now enumerated be present, or even the greater number of them, there no doubt can be entertained of the woman having been recently delivered; but as before said, certainty can only be attained by an early examination, for after a period of 10 or 12 days the symptoms can afford no positive indication, the signs of recent becoming (if the woman has borne children before) associated with those of former deliveries. I even if she has not, after that time, they only prove the occurrence of sexual intercourse. Whether the signs of delivery correspond to
to time to, with the appearances of the child, is the next point to be investigated: this is determined by fixing the length of time which had intervened between the birth of the child and its death, with the view of comparing this with the signs of delivery in the mother.

All the points necessary to thoroughly satisfy our minds as to whether a child found dead was or was not feloniously made away with, to fasten the crime of infanticide upon, or to acquit its reputed, have now been mentioned, and it only remains for the medical jurisprudence, conscientiously to give his opinion before the constituted authorities. In cases surrounded with doubt giving the suspected criminal the benefit of that doubt, seeing that in all probability, the scientific evidence is that which will either send a fellow being to the scaffold, or restore her to her position in society.