and fashionable plants bought for the season is not gardening, but a mere evidence of wealth. The real gardener in these cases is the nurseryman.

The gradual increase in the yield of a plot of land, at least for a very long series of years, is limited only by the amount of skill and tillage which it receives and the amount of dung which is available for it. We are gradually becoming alive to the fact that fertility is a biological question rather than a chemical question. To imagine that chemicals can ever replace dung is a pure delusion from which we shall some day be aroused. The success or failure of agriculture is very largely a question of dung, and it must be admitted that the dung prospects in this country are very bad indeed. Imported animal food yields very little dung for the land, because it is mostly washed (ultimately) into the sea, while the use of steam engines, motor cars, and bicycles must mean a diminution of horse dung. The sanitary pioneers of half a century ago thought that the huge expenses of modern sanitation would be compensated by the yield from sewage farms. That has proved to be erroneous. Sewage has proved to be merely the happy hunting ground of sanitary tradesmen who have fattened on the ratepayer. The century closes with the spectacle of a Royal Commission still discussing the best way of destroying the potentialities of life and prosperity.

In these lectures I have brought forward many facts to show that there is no proof of any danger arising from the use of dung for agricultural purposes, while it is undeniable that the practice of agriculture is pre-eminent healthy and invigorating. I have been unable to find any evidence that contagia spread in the soil. To live in filth and to inhale the products of putrefaction given off from privies or pails of *læces* or sodden ground result in disease, but there is no evidence whatever that disease thus generated is able to spread through the soil and infect a neighbouring house or street. Looked at in another way we must admit that filth disease, like many other forms of disease, is proportionate to overcrowding.

While we exult (not always reasonably) in our diminished death-rate, let us not forget the diminished birth-rate, the multiplication of asylums of various kinds, and the steady increase in the amount of help from public funds which is necessary to maintain the health and decency of the masses. The year just ended has been unsurpassed in the volume of trade and the bounty of the harvest, but the infant mortality in our towns for the Michaelmas quarter was the highest on record.

At present he who advocates any attempt to entice a fair proportion of the people "back to the land" is regarded as a Utopian dreamer. I feel convinced that the only chance of getting a living from agriculture lies in the due enrichment of the soil. There is no chance of this so long as the only form of sanitation which receives any official encouragement is one which involves a systematic starvation of the soil. One sometimes comes across statements which would lead one to suppose that cultivated land is a public danger, statements which are mere assertions. Our sanitarians, careless of food supply, are liable to be dominated by ideas and to fix their attention unduly upon one side of the question and upon one disease. The more enthusiastic of them, if they can secure a trifling diminution in the mortality from one disease, seem quite ready to "make a solitude and call it peace."

REFERENCES.

¹ Lectures I and II were published in the BRITISH MEDICAL JOURNAL of February 25th and March 4th respectively. ² BRITISH MEDICAL JOURNAL, October 8th, 1898. ³ *Journal of Royal Agricultural Society*, vol. viii, 1897, p. 674. ⁴ *Ibid.*, vol. viii, 1897, p. 469.

THE PASTEUR INSTITUTE IN HYDERABAD. — A Hyderabad correspondent states that the statement already made regarding the scheme being settled is premature and somewhat inaccurate. He, however, allows that a scheme for such an institute has been formulated, and is now before His Highness the Nizam for consideration and orders, and that it contemplates not only the foundation of a Pasteur Institute, but also of a bacteriological laboratory. For the last six or seven months work has been going on in a temporary laboratory in connection especially with the plague, and many important results have been obtained.

THE ARRIS AND GALE LECTURES ON THE ANATOMY AND SURGERY OF THE PERITONEAL FOSSÆ.

Delivered at the Royal College of Surgeons of England,

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LECTURE II.—THE PERICÆCAL FOLDS AND FOSSÆ. —PERICÆCAL HERNIA.

[ABSTRACT.]

THE pericæcal folds and fossæ are primary and secondary. The primary folds are vascular in origin; the secondary folds are dependent upon the adhesion, sometimes wanting, between the cæcum and ascending colon and the posterior abdominal wall. The primary folds are found whatever the position of the cæcum may be, the secondary are only present when the cæcum and ascending colon are normally placed.

The primary folds are:

1. An anterior, raised up by a branch of the ileo-colic artery as it runs over the anterior aspect of the ileo-colic junction.
2. A posterior, raised up by the artery to the appendix.
3. An intermediate, which is partly muscular and partly vascular in origin.
4. An accessory anterior fold due to a lateral branch of the ileo-colic artery.

THE ILEO-COLIC ARTERY AND ITS BRANCHES.

The ileo-colic artery (Fig. 12) as it approaches the angle of

Fig. 12.—The ileo-colic artery and its branches.

junction of the ileum with the ascending colon gives off, as a rule, five branches. The precise mode of origin of these branches may vary within considerable limits. The most frequent arrangement is for the vessel to divide into two main trunks which subsequently split up, the anterior into two, and the posterior into three branches.

The anterior branches are: (a) A branch running to the left along the upper border of the ileum, and (b) a branch which continues, in the line of the ileo-colic, over the ileo-colic junction. In a few cases the largest offshoot of this latter branch is a vessel which runs to the right on to the colon, forming in its course a well-defined curve with the concavity upwards and to the right. The posterior branches are: (a) A branch running upwards to anastomose with the right colic; (b) a branch which runs to the posterior aspect of the junction of the ileum with the colon distributing twigs to the right and left; and (c) the appendicular artery which runs in the meso-appendix to the tip of the vermiform process. The chief branch of this last vessel arises close to the lower margin of the ileum, and runs

with a curve downwards and to the right, and again arches upwards and to the left in the ileo-appendicular fold.

The Anterior Vascular Fold (ileo-colic fold or fold of Luschka).—This fold is constant.—The younger the subject

Fig. 13.—The ileo-colic fold and fossa.

the better marked the fold, as a rule. In the aged and in the obese it may become blurred and flattened, but it is always present. It is semilunar in shape, having a curved attachment to the anterior layer of the mesentery, the anterior aspect of the ascending colon, and the caecum down to the root of the appendix. The free edge of the fold containing the vessel looks to the left, and is shorter than the attached margin, representing, as it were, the string of a bow. The fold is thin, sharp, and transparent in the young; thick, dull, and fatty in the aged. In its upper part are generally one or two lymphatic glands. The ileo-colic fold is sometimes continued on into the appendix, and the vessel it contains replaces the appendicular artery.

The Accessory Anterior Vascular Fold (Fig. 14).—In 17 cases out of 200 I have met with a distinct fold raised up by the

Fig. 14.—The accessory ileo-colic fold and fossa. The ileo-colic fold is continued into the meso-appendix.

lateral branch of the anterior division of the ileo-colic before referred to. The fold is well seen in the figure. A small fossa lies behind it. Both the fold and the fossa determined by it have hitherto escaped recognition.

The Anterior Vascular Fossa (ileo-colic fossa: fossa of Luschka).—This is a narrow fossa or chink situated between the ileo-colic fold in front, and the enteric mesentery, ileum, and a small portion of the upper and inner part of the caecum behind.

The Posterior Vascular Fold—Meso-Appendix (Figs. 15 and 16).

Fig. 15.—The ileo-appendicular fold and fossa.

—To see this fold clearly the caecum and appendix must be turned upwards. It is quadrilateral in shape. Its superior border springs from the mesentery, the right is attached to the colon on its postero-internal aspect for a short distance, and then to the caecum; the inferior to the whole length of the vermiform appendix; the internal or left border is free, and contains the appendicular artery. The anterior surface is joined by:

The Intermediate Fold: Ileo-appendicular Fold (bloodless fold of Treves) (Figs. 15 and 16).—This is quadrilateral in outline.

Fig. 16.—Diagram of attachments of the meso-appendix and ileo-appendicular fold.

The upper border is attached to the ileum, opposite the mesenteric attachment, for about $1\frac{1}{2}$ inch to $2\frac{1}{2}$ inches; the lower border extends from the angle formed by the appendix with the caecum inwards on the anterior surface of the meso-appendix, or occasionally on the appendix itself. The outer or right margin is attached to the inner aspect of the caecum as far down as the root of the appendix. The left or inner border is concave and free. This latter edge contains the recurrent, or ileo-appendicular artery, given off from the appendicular vessel close to the lower margin of the ileum. Between the two layers of peritoneum in this fold, especially in children, are seen some muscular bundles continuous on the one hand with the caecum, and on the other with the ileum. In later years so much fat may be deposited between the layers that it forms a solid slab, resembling a miniature thickened omentum.

The Ileo-appendicular Fossa (ileo-caecal fossa) (Figs. 15 and 17).

Fig. 17.—The ileo-appendicular fossa, in section.

—This fossa lies between the ileo-appendicular fold and the mesentery of the vermiform appendix. On section it is triangular, being bounded above by the posterior surface of the ileum and the mesentery, in front and below by the ileo-appendicular fold, and behind by the upper part of the meso-appendix. Two cases are recorded in which it is believed that this fossa has become closed at its mouth and subsequently dilated to form a cyst (Schott, Widerhofer).

The Fossa of Hartmann (fossa ileo-caecalis infima).—In some cases the lower attachment of the mesentery to the iliac fossa

is prolonged into a sharp fold, the "inferior ligament" of Tuffier. Between this fold and the mesentery of the vermiform appendix there may be found a small fossa, funnel-shaped in general, but occasionally subdivided by a small peritoneal fold (Leichtenstern).

SECONDARY FOLDS AND FOSSA.

On lifting up the cæcum there may be seen:

The Retrocolic Fossa (Fig. 18) of variable size and capacity.

Fig. 18.—Retrocolic fossa.

In some cases the whole length of the index finger can be comfortably laid in a sort of peritoneal tube which extends upwards to the kidney. In others there may be merely a narrow and shallow dimple that would contain the tip of a lead pencil. This fossa is bounded and determined by two folds—(1) an outer and upper, and (2) a lower and inner.

1. *The Parieto-colic Fold* (fold of Hensing, superior ligament of the cæcum).—Roughly triangular in shape, this fold contains some tough, strong, shining, fan-shaped fibres. Its posterior border is attached to the abdominal wall from the lower border of the kidney over the iliac crest to the iliac fossa; the anterior or internal border is attached to the postero-external aspect of the colon, extending not seldom on to the cæcum also; the lower free border or base is concave, and extends from the iliac fossa to the intestine. The summit or apex is firmly fixed in the lumbar fossa.

2. *The Mesenterico-parietal Fold* (inferior ligament of Tuffier).—Is in reality the insertion of the enteric mesentery into the iliac fossa. In some cases it is prolonged downwards as far as the inguinal canal in the plica genito-enterica of Treitz. These two folds may be each continued downwards and coalesce in the formation in the iliac fossa of a falciform fold. In such a case the fossa formed by them would be retrocæcal, not retrocolic.

Fossa Iliaco-subfascialis (fossa of Biesiadecki).—This is situated about the middle of the iliac fossa; its orifice is directed upwards, and is bounded in front by a more or less well-defined fold, the inner extremity of which is directed upwards over the psoas towards the root of the mesentery, and the outer extends towards the iliac crest. The fossa is about $1\frac{1}{2}$ inch to 2 inches in diameter, and is placed at the junction of the upper loose iliac fascia, and the lower tense and more firmly fixed portion.

Genesis of the Folds.—The ileo-colic fold and the meso-appendix are vascular in origin.

The ileo-appendicular fold is more difficult to account for. Luschka believed that it was muscular in origin. Treves asserted that it was the true mesentery of the appendix, the meso-appendix being a substituted mesentery. Jonnesco and Berry consider that the fold is a subsidiary mesentery of the cæcum. Without entering into the reasons, I may say that my view is that the fold is of dual origin; that it is primarily muscular, dependent upon the ileo-appendicular muscle; and that later its development is modified by, and attributable to, the ileo-appendicular vessel. This fold is the last to appear in the embryo, less constant than the meso-appendix, and receives its vessel (upon which it to some extent depends for its existence) from the posterior vascular fold.

With regard to the genesis of the retrocolic fossa and the parietocolic fold, I have already stated that they are

secondary, and are due to the coalescence, sometimes wanting, of the posterior surface of the ascending colon, and sometimes, though rarely, of the cæcum to the posterior wall of the abdomen.

PERICÆCAL HERNIA.

So far as I am aware, there are no cases on record which can be considered as hernial protrusions into either the anterior vascular fossa or the accessory anterior vascular fossa. The fossæ are only of anatomical interest; they have no pathology.

With regard to the ileo-appendicular fossa, I have already referred to its cystic dilatation. In 4 cases it has been the seat of a hernia.

CASE I.—Recorded by Tuffier in a meagre and unsatisfactory manner. The patient was a man aged 50, very stout. An intestinal loop, which measured 8 cm., was contained in this pouch, which was very dilated.

CASE II.—Specimen in the Musée Dupuytren (pièce de Michon). This is referred to by Tuffier as a true specimen of ileo-appendicular hernia. Jonnesco says of it that "it is not very convincing."

CASE III.—Recorded by Dr. Little (Fig. 19). A drawing is given. Man, aged 60,

Fig. 19.—Little's case of ileo-appendicular hernia.

powerfully built. Nine days symptoms of intestinal obstruction, terminating fatally. "From a point near the tip of the vermiform appendix a narrow, but strong, whitish band is seen passing to an attachment into the front of the ileum, at a distance of about 5 in. from the termination of the latter gut." A large loop (16 or 18 inches in length) was strangled by this band, which is evidently the ileo-appendicular fold. The case is very fully and graphically described, and remarks are made on the anatomy of this region.

CASE IV.—Recorded by Mr. Partridge. A maid servant, aged 26, died after five days' acute obstruction. A knuckle of the ileum immediately above its termination was found strangulated and much congested, in consequence of having passed through, and become impacted in, a hole or interspace in the mesentery of the vermiform appendix. The specimen is said to be in the King's College Hospital Anatomical Museum, but it cannot be traced.

There are also many cases of hernia of the vermiform appendix into the pouch.

Hernia into the Retrocolic Fossa.—Jonnesco accepts the following as genuine cases of hernia into this fossa: 1 by Fages, 1 by Wagner, 1 by Parise, 3 by Rieux, 1 by Engel, 1 by Klebs, 1 by Moxon, 1 by Josse, 1 by Furst. On careful perusal of these cases, the only ones that can be accepted as even possibly of this class are the last two recorded by Rieux. All the others are negatived either by paucity and inexactness of description, or belong quite obviously to a different variety altogether. Moxon's case, recorded by Pye-Smith, is in the Guy's Museum. It is a beautiful example of right duodenal hernia, and has no connection whatever with the cæcum.

Hernia into the Fossa of Biesiadecki.—One example of this was exhibited at the London Pathological Society by Dr. Mott. It was seen and recognised by Mr. Treves as a hernia into the fossa iliaco-subfascialis. A case recorded by Engel is very probably also of this variety.

Hernia into the Fossa of Hartmann.—One case has been recorded by Dr. Snow. A lady, aged 24, when in the eighth month of pregnancy, was seized with acute abdominal pain, which was followed by symptoms of intestinal obstruction, ending fatally on the fourth day. The record of the *post-mortem* appearances is rather bewildering. I think, however, that only one conclusion is possible, and it is that hernia occurred into the fossa of Hartmann. The case is so accepted by Leichtenstern.