and nucleolus. A specimen (Fig. 4) showing ganglion cells on a nerve trunk, which twists as a diagonal spiral round the artery, entwines the latter like a garland of roses. The well-defined and completely developed character of these cells, with their well-defined axone, preclude the possibility, in my opinion, of their being embryonic and transient structures.

Although, therefore, I have not detected an innervation of the small arteries of the vascular plexus, I believe it is legitimate to conclude that further research will still more extend the anatomical distribution of the cerebral vascular nerves, and think we already have sufficient evidence of such innervation to modify current conceptions of the physiology of the intracranial viscus. The further discussion of this important point I must leave till a later date.

ON THE MICROSCOPIC CHARACTERS OF RETAINED PRODUCTS OF CONCEPTION.

By T. W. Eden, M.D., M.R.C.P, Senior Assistant Physician, Chelsea Hospital for Women.

It is sometimes necessary to recognise or exclude pregnancy by microscopic examination of—(1) Matters expelled from the uterus, or removed with the finger or curette; (2) blood clot found in the peritoneal cavity, or in a dilated Fallopian tube or broad ligament. Inasmuch as products of conception found under such circumstances differ notably from the same tissues obtained under normal conditions, mistakes frequently arise, which sometimes lead to needless mutilating operations, and are, in any case, to be deplored, as they are quite avoidable. I thought it would be desirable, therefore, to put together the various points upon which reliance is to be placed in the microscopic diagnosis of pregnancy, and to point out the chief directions in which mistakes are liable to occur. Having had a fair amount of experience in these cases, I am able to furnish illustrations of the chief conditions which deserve notice, from material which has come under my own observation.

Products of conception may be either foetal or maternal; the only foetal structure which need be considered is the chorion, the only maternal structure the decidua vera.

Chorionic tissue is unmistakable in its characters when fresh and fairly well preserved. The villi of which it consists, in the main, are composed of—(1) A covering epithelium, (2) a delicate connective tissue stroma, (3) numerous wide capillaries. Of these the epithelial covering is unique in its characters, and therefore of prime importance from our present point of view. Elsewhere I have described it as follows:1—“In a well-preserved specimen of a young ovum it is easy to demonstrate the presence of a double

1 Journ. Path. and Bacteriol., Edin. and London, 1896, vol. iii. p. 453.
epithelial layer covering all parts of the chorion. . . . The superficial layer consists of a stratum of granular, multinucleated protoplasm, in which no cell outlines can be distinguished. The whole layer stains deeply; its nuclei are small, round, and placed irregularly; its protoplasm is in places prolonged between the underlying cells of the deep layer. This is the plasmodial layer, now often called the syncytium. In the deep layer the cells are large and well defined, with oval nuclei standing with their long axes at right angles to the surface; the intra-nuclear network stains very distinctly; the peri-nuclear protoplasm is often retracted from the nucleus, and there is no basement membrane. This is the cellular layer or layer of Langhans. . . . During the early months the plasmodial layer shows great activity. Marked proliferation occurs in definite localised areas, resulting in the formation of nodes or buds of various sizes, or of club-shaped or broad-based processes upon the epithelium. These buds consist, like the layer itself, of masses of nucleated protoplasm. . . . Sections of processes are frequently seen as free islets of nucleated protoplasm in the intervillous spaces. . . . These proliferating areas represent the various stages and modifications of the process of budding, by which new villi are formed from the parent stems" (Fig. 1).

The characters of this structure are so distinctive that its
recognition is quite sufficient to determine the nature of the tissues in which it may be discovered. It is important to remember, however, that only young villi show these points; in mature placental tissue the plasmodial layer is atrophied and incomplete, and displays little or no budding. The presence of budding plasmodium, therefore, not only determines the existence of pregnancy, but also refers it to the earlier months of gestation. It is unnecessary to enter into a full description of the changes which occur in chorionic villi during the course of the gestation period; but the subject will be found fully described in the paper to which reference is given.

The maternal structure or decidua is the endometrium, modified by certain changes excited in it by the presence of a fertilised ovum in some part of the genital tract. It is important to bear in mind that decidual formation in the uterus occurs both in uterine and in ectopic pregnancy. In tubal pregnancy no decidual changes can, as a rule, be recognised by ordinary methods in the tubal mucosa, although there is no doubt of their occasional occurrence in interrupted patches, both in a gravid tube and in its non-gravid fellow of the other side. For purposes of clinical diagnosis, however, these changes are not of service, and in the case of tubal blood clot, foetal tissue is the only product of gestation ever definitely recognised.

The characters of decidual cells are so well known that description is unnecessary; a reference to Fig. 7 will suffice. The decidual membrane is a structure easily recognised by naked-eye examination alone; it is from 5 to 7 mm. thick, with a glistening, furrowed inner surface, on which the patent mouths of glands may at times be distinguished, and a rough outer surface, frequently studded with tiny cysts. If complete, the membrane forms a cast of the uterine cavity, triangular in shape, with two small apertures at the basal angles, corresponding to the entrance of the Fallopian tubes, and a larger apical aperture corresponding to the os internum. It is rare to obtain an entire cast, more often it is discharged piecemeal; but, when fitted together, the fragments will often show the typical triangle. Microscopically, it is characterised mainly by the conversion of the connective tissue of the stroma into "decidual" cells.

A fully-formed uterine decidua may be regarded as pathognomonic of the occurrence of gestation in some part of the genital tract. As I have shown, however, rare instances occur in which, although a decidual membrane is formed and shed, no ovum can be anywhere discovered; and the inference is that it perished very early, leaving no trace behind, while the development of the

1 Journ. Path. and Bacteriol., Edin. and London, 1896, vol. iv. p. 265.
2 Clarence Webster, "Ectopic Pregnancy."
3 "On Spurious Abortion, with an Account of Three Cases," Brit. Med. Journ. London, November 1897.
decidua proceeded. It is doubtful, however, whether the occurrence of isolated clusters of large cells, in scrapings from the uterus, can always be held to be evidence of pregnancy. After all, the "decidual" cell is only a large connective tissue corpuscle, and possesses no characters by which it can be distinguished from similar cells of different origin. The supposed development of cells of malignant uterine growths from "decidual" cells is the origin of the name "deciduoma malignum," applied to the latest *enfant prodigieux* of continental pathologists. On the other hand, the converse error of regarding clusters of decidual cells in uterine scrapings as malignant sometimes occurs.

The microscopic features of normal villi are represented in Fig. 1, taken from a placenta of the third month of gestation. The characters of their epithelial covering, already described, are fairly well seen; the stroma forms a loose reticulum, with numerous round and spindle-shaped nuclei, and supports the widely patent vessels. Many free sections of epithelial buds are present in the empty spaces which separate the villi, being the intervillous spaces through which the maternal blood circulates. Here and there are small clumps of fibrin adherent to the surface of the villi, and at (c) is a mass of considerable size, composed of cells derived from Langhans' layer and fibrin. Placental fragments, which have been retained for any length of time in the uterus, or which are found in tubal blood clot, always show marked modifications, which may render them unrecognisable as such to an unpractised observer. These modifications affect both the arrangement and structural characters of the villi.

As a rule, they occur singly or in clusters of two or three, surrounded by large areas of blood clot, which is often stratified, and usually shows some signs of organisation. When two or three villi lie together, they adhere. Their characteristic contour is always preserved, and they show up in transverse, oblique, or longitudinal sections through single villi, or through planes of division, in the manner familiar to those acquainted with normal placental tissue. The change in arrangement is, therefore, that there is the absence of the intervillous spaces.

In structural characters the villi have usually lost almost everything that is distinctive. The earliest structure to disappear is their epithelial covering. In Fig. 2 it will be seen that no trace of this layer remains. Frequently clusters of six to ten or more nuclei may be found at some point on the surface of a villus, representing a vestige of the plasmodial layer; and in the case of young placental tissue, isolated plasmodial buds may be here and there discovered in the blood clot, but not infrequently no trace of this structure can be anywhere discovered. Its place is, however, taken by irregular concentric rings of fibrin, deposited upon the villus from the maternal blood. Among the fibrin strands are a few small round nuclei of leucocytic origin. In Fig. 2 the small
The stroma is markedly altered; its vessels have disappeared, leaving no trace whatever; the loose reticulum is replaced by a granular, structureless material, in which are numerous irregularly-placed nuclei. These nuclei vary in size and shape, but the majority are more or less elongated or spindle-shaped. The presence of these spindled-shaped nuclei is of the greatest importance, since they prove that we have here the remains of what was once connective tissue. The surrounding blood clot is traversed by strands of fibrin, which sometimes form a close reticulum, and sometimes are arranged in such a manner as to enclose areas of blood of various shapes and sizes. Around the villi there is always a richer deposit of fibrin than in other parts of the clot. Sometimes these fibrin rings and ovoids bear a certain resemblance to villi, and, as will be pointed out later on, may be mistaken for them. There is usually evidence of the clot having been formed by successive haemorrhages, for in places it is retracted with degeneration of the blood cells, while in other places it is loose, with well-preserved red and white cells. Villi may be found in either the older or the more recent parts.

The above mentioned changes are due to necrosis; they follow upon the death of the ovum, but do not cause it. It must be borne in mind, however, that an unhealthy ovum may perish...
from haemorrhage, either in the uterus or the Fallopian tube, and therefore primary pathological changes may occasionally be

definitely recognised in retained villi. Fig. 3 is taken from a tubal mole, and the villus shown in the illustration displays the changes in the stroma characteristic of vesicular or myxo-
matous degeneration of the chorion. The epithelial covering is well preserved, and there is little or no blood clot in its neighbourhood, and no deposit of fibrin upon it. The preservation of the chorionic epithelium is to be explained partly by the fact that the mole was of recent formation, and partly by the fact that the villus in the illustration was lying clear of the effused blood. In other parts of the same specimen villi may be seen, which correspond to those shown in Fig. 2, and have not been affected by the degeneration of the stroma. This, of course, is quite in accord with what we know of the anatomy of this affection of the chorion, all the villi being never found diseased in the early stages.

Fig. 4 is an illustration of the forms sometimes assumed by fibrin rings and ovals in blood clot. They bear a certain resemblance in contour to villi, and I have known them sometimes erroneously represented to be villi. As a rule, blood cells may be recognised within the fibrin enclosure, which of course decides their nature; but at times, as in the illustration, the blood cells have almost entirely disappeared, leaving the spaces practically empty. The absence of rod-shaped or spindle-shaped nuclei will suffice, as a rule, to show that they are not villi, even if all traces of blood have been removed from them. Further, it is rare to find that a considerable number of retained villi fail to show some trace of their epithelial covering in some part; and this structure, being easily recognised, should be carefully looked for in any difficult case.

Another error may arise in the case of tubal blood clot, and that is, that sections of the plicae of the tubal mucosa may be mistaken for chorionic villi. I have known a specimen exhibited to a scientific society as a case of tubal pregnancy, the diagnosis depending upon a bit of tubal mucous membrane caught in a mass of blood clot; and in a recent work on abdominal surgery published in this country, the same error is perpetrated in an illustration. Fig. 5 is taken from a tubal mole; it represents an oblique section through a fold of mucous membrane, which appeared lying free in the blood clot, closely adjacent to some undoubted chorionic villi. In general shape and contour it is not unlike a villus; it has a definite epithelial covering, a vessel containing blood at one end, and a stroma rich in small round nuclei. The points of distinction are—(1) The epithelial nuclei are elongated and arranged with their long axis vertical to the surface; further, with a higher power, the outlines of the columnar

![Fig. 5.—Section through a fold of tubal mucous membrane, simulating a villus.](image-url)
cells become apparent. (2) The connective tissue stroma forms a closer reticulum, and shows a greater preponderance of round over spindled-shaped nuclei than the chorionic stroma. (3) It is sometimes possible to trace, in serial sections, the origin of the structure in the tubal wall, and its continuity with the elements of the latter. The significance of this error is greater than may at first sight appear. It is now agreed that a certain number of cases of haemato-salpinx occur in which no chorionic tissue can be recognised by practised observers. This negative result is hardly open to the objection usually urged against such conclusions, namely, that the chorionic tissue may have been there all the same, because we know that villi may be preserved for many months in blood clot which remains free from infection, and, if present, can hardly be missed. But if tubal mucous membrane be mistaken for villi, we may be classing as tubal gestations conditions which have quite a different origin, and thus impeding an important step in the analysis of the morbid conditions of the Fallopian tubes.

Maternal products of conception only occur as relics of a uterine pregnancy. In tubal moles I have never found decidual cells, and their recognition is not a point of any practical importance in these cases. It is different with fragments obtained by curettting, or expelled naturally from the uterus. The detection in these tissues of decidual elements is a point of importance as evidence of a preceding gestation, and also in doubtful cases they need to be carefully distinguished from sarcoma cells. Occasion-
ally an entire cast of the uterus, composed of decidual elements, is formed, and expelled, in cases of extra-uterine pregnancy; and casts similar in all respects to these occur in rare instances as relics of a uterine pregnancy, from which the fetal elements have entirely disappeared. For this latter condition I have suggested the name of "spurious abortion," to distinguish it from the anatomically distinct condition known as "missed abortion."

Fig. 6 is from a photomicrograph of a fragment removed by curetting in the case of a woman who had persistent haemorrhage following an incomplete abortion. Other fragments showed altered chorionic villi. In the figure is shown a piece of the endometrium, at the centre of which is a cluster of decidual cells, characterised by their size, their large nuclei, and the considerable amount of their perinuclear protoplasm. Around them is a considerable hyaline deposit, and some of the decidual cells themselves are undergoing the same hyaline degeneration. The surrounding endometrium is rich in small round nuclei and spindle cells, and other parts showed the changes characteristic of the glandular form of endometritis.

It is necessary to emphasise the fact that appearances such as those shown in Fig. 6 are not of themselves sufficient to prove the pre-occurrence of pregnancy. Large connective tissue corpuscles, closely resembling decidual cells, may be occasionally found in a diseased endometrium apart from pregnancy, and, as already stated, may be also closely imitated by sarcoma cells. One or two observers have succeeded in exciting decidual formation in the uterus by mechanical irritation; and after acute phosphorus poisoning in the human subject, a pseudo-decidual formation has been described. I have myself, in two cases, found similar large cells in scrapings from the uterus of women who had never to their knowledge been pregnant; but it must be admitted that the exclusion of antecedent pregnancy is, in every case, an extremely difficult matter, except at the extremes of life. On the whole, however, there is good reason to hold that the occurrence of scattered large cells in the endometrium does not necessarily imply antecedent pregnancy. In the case illustrated by Fig. 6, the diagnosis was confirmed by the discovery of villi in other fragments.

Fig. 7 is an illustration from a case reported fully by the late Dr. Remfry. The patient had suffered from haemorrhage for six weeks, and, after dilating the cervix, a mass was found attached to the wall of the uterus, and removed, which consisted in part of villi and blood clot, and in part of the cells represented in the figure. These cells, being submitted to a pathologist, were held to be sarcoma cells, and the uterus was in consequence removed without delay. Examination of the organ, when removed, failed to reveal any trace of new growth, and more careful examination by a committee of the Obstetrical Society, of which I was a

1 *Trans. Obst. Soc. London*, vol. xxxviii. p. 223; xxxix. p. 2.
member, of the intra-uterine mass removed at the prior operation, showed it to be a placental polypus, and the cells shown in Fig. 7 to be in reality decidual cells. I have said that sarcoma cells may closely imitate decidual cells, and errors so deplorable as this can only be avoided by attention to general principles rather than to the shapes and sizes of particular cells.

A word should be said finally about decidual casts. It has long been known that closely following the death of a tubal ovum, from hemorrhage or other accident, a cast of the uterus is frequently discharged, either entire or in fragments, the structure of which corresponds closely to that of the decidua vera of uterine preg-

![Fig. 7.—Cluster of decidual cells in scrapings from a case of placental polypus.—After Remfry.](image-url)

nancy. So closely was this phenomenon connected with extra-uterine pregnancy, that it was held by many to be a pathognomonic sign. In consequence, we find two cases on record, in which abdominal section was undertaken, largely, or chiefly, upon the supposed significance of the discharge of a decidual cast from the uterus.\(^1\) In neither of these cases was extra-uterine pregnancy discovered, and in one case there was no morbid condition whatever present. In the other there was a small ovarian cyst, which had been mistaken on physical examination for the gestation sac. A third case has been recorded by myself,\(^2\) in which operation was avoided. Examination of the cast in my case showed that the membrane was composed in the main of "decidual" cells, and

---

1 *Trans. Obst. Soc. London*, vol. xxxvi. p. 335; vol. xxxvii. p. 385.
2 *Ibid.*, vol. xxxviii. p. 132.
in general characters corresponded pretty closely to the decidua vera. There is in fact no means of distinguishing it by microscopic examination from casts obtained in cases of extra-uterine gestation, or from fragments of decidua vera; and the only essential distinction from the decidua of uterine pregnancy is the entire absence of admixture of fetal (chorionic) elements, that is to say, no placental site can be discovered. From the casts of membranous dysmenorrhoea it is readily distinguished, for while in the latter there may be found scattered large cells, the connective tissue stroma of the endometrium shows inflammatory changes, but no extensive large-cell formation.

From these considerations it is apparent that serious error is much more likely to arise in connection with the maternal than with the fetal products of gestation. Decidual cells are in themselves less conclusive evidence of gestation than villi, and from their likeness to cells of malignant origin an error may be attended with disastrous consequences, whether that error be in the direction of mistaking decidual for sarcoma cells, or vice versa.

---

REMARKS ON DYSEPSIA AND A DIET.¹

By A. LOCKHART GILLESPIE, M.D., F.R.C.P.Ed., F.R.S.E., Medical Registrar, Edinburgh Royal Infirmary.

I will only venture to hazard a few remarks towards the subject of discussion, conscious that the importance and value of the contributions already made to it by so many well-known experts must render anything I can say of little weight. I have on the billet the title of a paper dealing with the actions of diets and drugs upon the chemical and bacteriological processes in the intestinal tract, which I had intended to read as my offering; but as the time left at the disposal of the section is so circumscribed, it would be unwise in me were I to attempt to do so. As the paper took years to compile, months to write, and would require an hour or so to read, it were better left alone.

In connection, however, with one of the questions touched upon in it, namely, the influence of intestinal fermentation upon healthy (if it can ever be so, under the circumstances) gastric digestion, I may say that lately I have been surprised at the frequency with which patients come complaining of some fancied disorder of the stomach, for which they have been treated in the usual manner, who prove on investigation to be suffering primarily from the metabolic misdeeds of bacteria in the bowel.

They undoubtedly presented symptoms of gastric disturbance, quite independent of hepatic troubles, while the state of the

¹ From the discussion on "Treatment of the Diseases of the Stomach," in the Section of Pharmacology and Therapeutics, British Medical Association, July 1898.