poisonous ptomaines. The symptoms in one case of pernicious anæmia of Dr. Hunter's appear to support such a conclusion. Exacerbations occurred from time to time presenting the nervous phenomena of toxic poisoning. Dr. Hunter, therefore, feels justified in drawing the conclusion that the special factor required to initiate the symptoms peculiar to the form of anæmia is the presence, under certain favourable conditions, of micro-organisms of specific nature within the gastro-intestinal tract; and these favourable conditions he conceives to be such as have been met with—malignant disease and such other organic changes as have been found in association with this disease, or functional disturbances of the mucous membrane of the stomach and intestine induced by the presence of intestinal parasites, or by prolonged bad nourishment. Dr. Mott, in a valuable communication to which I have already several times alluded, does not believe that there is always a relation between the pyrexia, the diminution of corpuscles, and the colour of the urine. He points out, as Dr. Hunter has done, that ulceration in the intestines may exist in which the whole contents of the bowel must swarm with micro-organisms of many kinds, with everything to favour absorption of their contents without pernicious anæmia occurring. Further, that though constipation and anæmia may concur, and the latter may be benefited by curing the former, in such cases of faecal poisoning, the corpuscles are not broken down, but insufficient colouring matter is found.

The morbid changes found after death in pernicious anæmia indicate three processes: 1. The effects of the anæmia, in the bloodless condition of all the organs, with the exception in some cases of the spleen; and in the fatty and degenerative changes, especially marked in the heart and blood vessels. 2. The activity of the cytogenic organs, especially the bone marrow, which is usually red and vascular (and containing enormous numbers of developing red blood corpuscles) where it is normally yellow and fatty. 3. The signs of excessive hæmolysis and of the process of removal of the broken down corpuscles; the former, as demonstrated in the liver and spleen, by the evidences of active destruction of the red corpuscles; the latter, in the presence of blood pigment containing iron in the kidneys. Thus the evidence goes to show there is excessive blood destruction and its consequences, which the blood regeneration, however active, is unequal to compensate for. Dr. Hunter's pathology is so coherent, and supported by so much direct evidence, that I am convinced of its adequacy and correctness in some at least of the cases regarded as pernicious anæmia. For cases in which the urine is pale throughout, containing no pathological urobilin and no excess of normal urobilin, and no increase of iron—if such should be proved to occur—another explanation must be found; some different evidence of blood dissolution must be found, or unequivocal evidence afforded of defective hæmogenesis. Ehrlich remarks: "Degeneration and regeneration course side by side in uncomplicated anæmia; it depends upon the preponderance of one or other process whether this simple anæmia ends in a cure or in the progressive pernicious form."³⁴

THE HISTOLOGY AND PATHOLOGY OF THE FALLOPIAN TUBES.

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[Continued from page 110.]

PATHOLOGY.

When it is stated that a comparatively small number of the tubes examined showed absolutely normal appearances, it will readily be understood that a brief notice of some of the most interesting pathological specimens is all that is possible in the limited space and time at disposal. The pathological

conditions selected for special consideration in this paper are:—First, tubal hypertrophy; secondly, the cystic conditions known as hydro-, hæmato-, and pyosalpinx; thirdly, certain malformations and displacements of the tubes; fourthly, tubercular disease; and fifthly, cancerous affection of the Fallopian tubes.

Fig. 4.—Hypertrophy of the Fallopian tube $\times 40$ diameters; A, areolar and peritoneal layers; B, circular and longitudinal fibres greatly hypertrophied and mingled; C, tubular and elongated structures lined by non-ciliated columnar epithelium and closely resembling gland acini; D, submucosa greatly thickened.

Hypertrophy of the Fallopian Tubes.—Whilst a few of the specimens showed the physiological tubal hypertrophy of pregnancy, one specimen exhibited a condition resembling great hypertrophy, which calls for a detailed notice. The uterine appendages were removed by Professor Simpson from a girl in whose history there was a strong suspicion of gonorrhœal infection. The tube was in all its extent manifestly enlarged, being about the size of the thumb, and was covered by old inflammatory adhesions which brought it into close relation to the ovary. The ovary, which was but slightly enlarged, showed on section one or two pea-sized cystic cavities. The peritoneal coat, as defined in the first part of this paper, was not at all enlarged. The loose areolar tissue connecting this coat with the middle muscular coat contained a number of isolated hypertrophied longitudinal and circular muscular fibres, and was very vascular. The muscular layer of the tube wall was greatly hypertrophied, and the longitudinal and circular fibres were so blended together that two separate layers could not be recognised, although the longitudinal fibres were somewhat more marked on the outer side and the circular on the inner. A few longitudinal fibres were seen entirely to the inner side of the circular lying in the submucous tissue. The inner coat of the tube was enormously thickened, and consisted of round and spindle-shaped cells, some of which had one, others two or more nuclei, and others, again, were simple granular cells, and between them ramified a few delicate fibrils of connective tissue. These cells at parts invaded the muscular layer separating the fibres from each other. The tubal plicæ, at some points nine, at others twelve in number, were simple and compound, and consisted of the same structural elements covered by a single layer of non-ciliated columnar epithelial cells. Tubular-looking structures lined by a similar layer of cells were everywhere visible in the mucous and submucous tissue and in the substance of the plicæ, and these structures were round, oval, or irregular in shape. We hesitate to regard this case as one of simple hypertrophy of the tube, for the appearances seen are

so strongly suggestive of benignant adenoma that that title recommends itself as the more appropriate one.

The Cystic Conditions of the Tube known as Hydro-, Hæmato-, and Pyosalpinx.—In order to give some idea of the relative frequency of the cystic conditions of the tubes, it may be stated that in our sixty-one consecutive specimens (which were the only ones available for this purpose) tubal cystic dilatations occurred in nine cases, or 14 per cent. Seven of these cases were examples of hydrosalpinx, one was a hæmato- and one a pyosalpinx. Two additional specimens of hydrosalpinx were obtained from Professor Simpson's practice.

Hydrosalpinx.—In all the specimens showing this condition it was noted that the tubes were tortuous, that the ostium abdominale was blocked, and that there was no communication with the uterine cavity. In the great majority of the cases the hydrosalpinx was bilateral. In the specimens removed by laparotomy the swelling was of the size of a walnut, whilst in those obtained from the *post-mortem* theatre it varied from a tumour of that size to one having the dimensions of the head of a six months' fetus (Fig. 5). In the smaller-

Fig. 5.—View of uterus and appendages from above, showing double hydrosalpinx. One-half natural size. A, fundus uteri; BB, right and left round ligaments; C, large hydrosalpinx of right Fallopian tube; D, smaller hydrosalpinx of left Fallopian tube; E, outer end of left ovary, seen below the margin of the displaced mesosalpinx; F, pouch of Douglas; K, rectum; H, adhesions.

sized specimens the mucous membrane of the tube showed the normal folds, whereas in the larger ones the lining of the tube was smooth. The thickness of the wall of the larger cysts was not uniform, varying from 2 to 5 millimètres.

On microscopical examination of the smaller specimens the peritoneal covering was found to be normal, the muscular coat, both in its longitudinal and circular fibres, was hypertrophied, the submucous coat was absent, and in the mucous coat the branched folds were flattened and reduced in size, and the simple folds at parts had completely disappeared. The epithelial covering of the mucous membrane was, in some places, perfectly normal, and in others the cilia were absent, but the methods of hardening employed might in part account for this. In the larger specimens the wall was almost entirely fibrous, and it was impossible to differentiate the three layers. Near the blocked ostium abdominale the muscular fibres were few, and in some sections entirely absent, and as the uterine end was approached they were relatively more numerous although even there they were scanty. The lining of the cyst in those larger specimens at parts consisted of a low cubical epithelium, and at other parts a layer of round cells was its only representative. The folds, both simple and branched, were absent.

The contents of the large hydrosalpinx consisted of a transparent yellowish limpid fluid which, after standing, deposited a greyish sediment; the specific gravity was 1010, the reaction was neutral or slightly alkaline, there was an abundant precipitate with heat and also with nitric acid. The sediment showed granular *débris*, red blood corpuscles, small homogeneous, non-nucleated, hyaline cells, and a few nucleated, non-ciliated epithelial cells. In all the cases extensive pelvic peritonitis was present, and all the specimens were removed from married women except one (the largest), which was found in a prostitute. The ages of the patients varied from 30 to 61 years, and in all the cases where complete clinical history was obtained there was sterility. With regard to the causation of this disease, whilst it is possible that the persistence of fetal tortuosities may have some effect, we believe that more potent factors are to be found in pelvic peritonitis causing kinking of the tubes, and in inflammation affecting their lining membrane.

Pyosalpinx.—In one example of this disease, the affection was unilateral, the right tube and ovary were found firmly fixed to the posterior uterine wall, and covered by a thick layer of membranous adhesions, which, when removed, exposed a swelling the size of a pigeon's egg, occupying the middle portion of the tube and containing pus; and the left tube, with the exception of a few peritonitic adhesions, was healthy. The pus-containing cavity was lined by a tissue composed of round cells devoid of an epithelial covering; there were some tubal folds upon which the epithelium was also absent, and the muscular wall was thickened and showed minute hæmorrhagic foci.

Hæmatosalpinx.—The patient from whom the only specimen of hæmatosalpinx was obtained was admitted into Professor Simpson's ward in the Edinburgh Infirmary, complaining of symptoms of pelvic peritonitis. She was aged 25, married, but sterile, and she died a few days after her admission to the infirmary. At the *post-mortem* examination there was found recent general peritonitis, and the pelvic viscera showed the following advanced pathological conditions. There was a pus-containing cyst of the left ovary, the size of a child's head, the left Fallopian tube was represented by one primary, and several secondary and tertiary cyst cavities containing a dark grumous fluid, and having darkly pigmented walls. The primary cavity, which was proved to be the dilated tube, showed on its inner aspect a roughened granular wall, but the secondary and tertiary cavities which were cysts in the wall of the tube had a glistening lining membrane. The right Fallopian tube was in a similar condition, showing as it did primary and secondary blood cysts. The atrophic remains of the right ovary were found adherent to the wall of the tube. The ovarian cyst, the two distended tubes, the uterus, and the rectum, were all bound together by dense recent and chronic inflammatory adhesions. The condition of the pelvic viscera was such as to place insurmountable difficulties in the way of any attempt at the removal of the ovaries and tubes during the life of the patient, and it was fortunate that no such attempt had been made.

The microscopic examination of the wall of the primary cavity revealed the fact that at some points atrophied remains of muscular fibres were visible, but that the greater part of the wall was composed of fibrous tissue. Towards the uterus, where the tube was less dilated, muscular fibres were larger and more numerous, and the wall was very vascular, showing numerous minute hæmorrhages. The mucous membrane was entirely destroyed, its place being taken by a pigmented fibro-cellular tissue. The secondary and tertiary cyst walls presented similar microscopic appearances, but the muscular fibres in them seemed to predominate. No folds were seen on the interior of any of the cysts. The contents of the cavities showed under the microscope red blood corpuscles, which presented a very singular appearance due to the precipitation of the hæmoglobin at four or five points in the cells, and in some specimens blood crystals were found.

Malformations and Displacements of the Tubes.—In 2 out of 61 cases there were accessory ostia at the abdominal end of the tube; they did not coexist with dermoid cyst of the ovary or with varicosity of the pampiniform plexus, conditions with which they have been stated to be associated. In a case of tubercular disease of the tubes, to be hereafter described, there was congenital absence of the outer two-thirds of one tube.

A displacement of the left tube was more frequently met with than of the right, and this displacement was, in all the cases, backward. In the 61 consecutive cases: in 5 the left tube was displaced, in 2 the right tube, and in 1 both tubes were dislocated backwards. The explanation of the fact that the left tube is more frequently displaced is probably due to the greater tendency for inflammation to occur on the left side, which, in its turn, is most likely to be associated with the absence of the valve in the left ovarian vein.

Tubercular Disease.—In a case of primary tubercular disease of the tubes, with congenital absence of the right Fallopian ampulla and associated tubercular disease of the uterus, it is deemed to be necessary to give a short note of the clinical history of the patient. She was an unmarried woman, aged 28, admitted to the Edinburgh Infirmary, suffering from symptoms of tubercular meningitis. She had a phthisical family history; her menstruation, which began at the age of 17, was irregular in type and habit, and had been entirely in abeyance during the six years preceding her present illness; and, on her death, the *post-mortem* examination revealed tubercular disease of the brain, uterus, and Fallopian tubes. The lungs and peritoneum were healthy.

Fig. 6.—Posterior view of uterus and appendages showing double tubercular salpingitis, congenital absence of the outer two-thirds of the right Fallopian tube, and displacement of the left ovary. A, fundus uteri; BB, tubercular nodules, situated in the isthmus of each Fallopian tube; C, parovarian cysts; DD, right and left ovaries; E, cone-like termination of right Fallopian tube (isthmus), the ampulla being absent; F, cut margin of the posterior layer of the mesosalpinx which has been dissected away; G, small pea-sized fibroma attached to the posterior border of the right ovary; H, adhesions passing backwards from the posterior uterine wall. One-half natural size. Removed *post mortem*.

Naked-eye examination of the pelvic organs showed that both oviducts were affected. The left presented, in its inner third, an oval-shaped nodule measuring 1 centimetre in diameter, which involved the superior and lateral tube walls, was of a firm consistence, and, on section, the cut surfaces presented a greyish glistening appearance. The lumen of the tube at this point was slightly dilated, and contained a few drops of thick, yellowish, and caseous looking pus, which, when washed away, left a smooth wall behind; on the uterine side of the nodule the tube was completely occluded. The ostium abdominale was blocked and firmly bound to the superior surface of the ovary, which, along with the tube, was displaced downwards and backwards. The right tube was also affected, and showed a somewhat similar nodule similarly situated. Its lumen, however, had undergone a greater dilatation, and contained a larger quantity of pus. The outer two-thirds (that is, ampulla) were absent. A vigorous search was made for the missing portion, and several likely structures were examined microscopically, but with no result. A small portion of the tube, about 4 centimetres long, with a cone-like tapering extremity, was the sole representative on this side, and this, as already stated, was the seat of tubercular disease. Both ovaries were enlarged, but apparently were free from tubercle. The uterus was smaller than normal (length, 6 centimetres; length of cavity, 5 centimetres; breadth, 4.4 centimetres; thickness, 2.9 centimetres), was covered with perimetrial adhesions, and showed, on section, the following appearances: The mucous membrane in the upper part of the body presented a granular irregular surface of a yellowish-grey colour, and was somewhat thickened; partly in the superior and partly in the left lateral wall was situated a cavity about the size of a walnut, containing a thick caseous material, which, when washed away, left a roughened wall behind.

The cavity ran in the direction of the interstitial portion of the left tube, but did not communicate with the interior of the uterus, and the tube, in its passage through the uterine wall, was completely destroyed. The uterine mucous membrane opposite the tubercular cavity was greatly thickened.

As the microscopical characters of the tubercular affection were practically the same in each tube, the description of one only is given. The peritoneal covering was slightly thickened, the mucous membrane was replaced by a thick layer of fibrous tissue; and although the muscular coat was atrophied, the entire thickness of the tube wall was increased. The peritoneal coat showed no tubercular follicles; these were, however, abundant in the muscular coat, the muscle fibres of which were separated from each other by a small round cell infiltration; and although the fibrous tissue representing the mucous membrane showed no follicles, it was evidently the result of a tubercular process, as the bacilli were found therein. The muscular fibres in the immediate vicinity of the follicles were undergoing fatty degeneration. Some of the follicles were typically tubercular, containing as they did a centrally placed, branching, many-nucleated giant cell surrounded by an inner layer of large and an outer layer of small lymphoid cells; other follicles contained lymphoid cells only. Tubercle bacilli were detected around the giant cells, between the connective tissue fibres in the layer which represented the mucous membrane, and in the caseous *débris* contained within the lumen. No tubercle follicles or bacilli were detected in the ovaries. Numerous giant-celled tubercle follicles were seen in the superior and left lateral walls of the uterus surrounding the cavity which had replaced the interstitial portion of the left tube, and a few were observed in a corresponding position on the right side. In the mucous membrane lining the upper half of the left lateral wall, and in this part of the mucosa alone, tubercle follicles were found. Tubercle bacilli were found in the uterine wall in and around the fibrous wall of the tubercular cavity.

In this case the tubercular lesions were much more advanced in the tubes than in either the uterus or brain, and whilst the symptoms of brain disease were recent, those of menstrual disturbance were of long standing, and for these reasons we regard it as more than probable that the process originated in the tubes. Heywood Smith and Rutherford,² Jeannet,³ Gardner,⁴ Orthmann,⁵ Chandeux,⁶ Hegar,⁷ and Klinovitch⁸ have recently reported cases of primary tuberculosis of the tubes, but such conditions are rare. Secondary tuberculosis of the oviducts, on the other hand, is well known to be comparatively common, so much so that German gynaecologists have recommended the examination of the vaginal discharges for tubercle bacilli, when this condition is suspected. If it be permissible to draw conclusions from a few cases, it would seem that the most frequent position in secondary tubercular disease of the tubes is the ampulla, whilst in the primary lesion it is the isthmus. The congenital absence of the outer two-thirds of the right tube makes this interesting case truly unique. It need scarcely be added that there had been in this case no surgical interference with the pelvic viscera.

Cancerous Affection of the Fallopian Tubes.—In one only of the specimens examined was the Fallopian tube the seat of cancerous disease. The left tube, which was the one affected, measured 4 to 5 centimetres in length, its isthmus was 8 millimetres in cross section, and its ampulla was enlarged into a hard nodular mass about the size of a walnut. The fimbriated end of the tube was completely blocked, and its fimbriae were lost in surrounding adhesions. Both the tube and ovary were displaced inwards and downwards into the pouch of Douglas. The serous covering was slightly thickened, the muscular and mucous coats were markedly hypertrophied. The lumen was filled with yellowish-grey material of the consistence of

² Heywood Smith and Rutherford. *Brit. Gyn. Journ.*, August, 1889.

³ Jeannet, Salpingite tuberculeuse à forme kystique, *Gaz. Hebd. de Med.*, 1888.

⁴ Gardner. Double Tubercular Pyosalpinx, *Med. News*, Philadelphia, 1889.

⁵ Orthmann. Demonstration eines Falles Pyosalpinx tuberculosa duplex, *Zeitschr. f. Geb. u. Gyn.*, 1889.

⁶ Chandeux. Deux Cas de Salpingite Tuberculeuse, *Province Méd. Lyon.*, vol. iii, 1889.

⁷ Hegar. Die Entstehung, Diagnose und chirurgische Behandlung der Genital Tuberculose des Weibes, 1886.

⁸ Klinovitch. Cases of Primary Tuberculosis of the Fallopian Tubes, *Ejend. Klin. Gaz. St. Petersburg.*, 1889, ix, p. 401.

cream, and the lining membrane was covered with thick granular-looking villous projections. The right tube was apparently free from malignant disease, but both ovaries showed foci of commencing cancerous disease, and in the cervix uteri also there was commencing cancer. Some parts of the affected tube showed, on microscopic examination, the characters of scirrhus cancer, other parts showed a growth more adenomatous in type. In the mucous membrane were seen spaces filled with a large number of polymorphous epithelial cells with large nuclei. The projections on the mucosa were covered by several layers of epithelial cells, with deeply-stained nuclei, and some of these cells were proliferating. In the centre of some of the villous growths were small spaces filled with closely-packed cancerous cells. Scattered at intervals in the muscular coat were large spaces, some of which were densely filled with polymorphous cells, and there were also smaller spaces similarly filled. Lying in the stroma between the spaces were epithelial cells arranged singly or in twos and threes, and immediately around the large spaces small round cells infiltrated the stroma. The growth was most marked in the lower part of the tubal wall at the spot where the folds of the broad ligament separated to embrace it, and outside the muscular layer at this part were several masses of

Fig. 7.—Cancer of the Fallopian tube. $\times 320$ diameters. A, wide spaces filled with epithelial cells; B, epithelial cells lying singly or in twos and threes in the stroma; C, transverse section of bundle of muscular fibres; D, small space filled with epithelial cells; E, small round cell infiltration; F, muscular fibres; H, fibrous stroma.

epithelial cells, with the central cells arranged in a tubular manner. Possibly these were tubules of the parovarium which had become affected. Their lumen was lined by cubical epithelial cells. In Doran's case of primary cancer of the tube similar and similarly situated structures were seen, which were not by him regarded as parovarian; they were lined by ciliated columnar epithelial.⁹ Cancer of an adenomatous type was seen in both ovaries, and there was commencing malignant disease of the cervix. The isthmus of the right Fallopian tube showed cells of a suspicious nature, probably cancerous. The patient, who was married but sterile, was 35 years of age, although she looked 50, and for two years before death had suffered from dysmenorrhœa.

We have hesitated whether to classify this condition as primary or secondary in the tube, and it is always difficult to decide such a question. The malignant disease in the abdomen (of the pylorus, etc.) was far advanced, but so was the cancerous disease of the tube, and further dysmenorrhœa was a symptom complained of before any other. On the whole we are inclined to place this case among the secondary can-

cerous affections of the tubes, and we are the more led to this conclusion by the fact that in the only three cases of undoubted primary cancer of the tubes recorded the ages of the patients differed markedly from that in our case. In these three cases, of which one was reported by Sânger, of Breslau,¹⁰ the second by Orthmann,¹¹ and the third by Doran,¹² the age of the patient varied from 46 to 51, and Doran suggests that there is a distinct relationship between the onset of the menopause and the appearance of malignant disease of the tubes. The patient in our case was only 35. In connection with this subject, Schroeder¹³ states that in cancerous disease of the ovaries the tubes remain long unaffected, and in two of our cases this was strikingly verified, for in both of these specimens the ovaries were undoubtedly the seat of primary cancerous disease, and yet the tubes were found, on microscopical examination, to be perfectly healthy.

Cysts in the Peritoneal Covering of the Tubes.—In about 15 per cent. of the cases examined small cysts were found in the peritoneal covering of the tubes; these varied in size from that of a pea to that of a bean, and the smaller ones were frequently arranged in clusters. Some of the cysts contained a clear, limpid, yellowish fluid, but others were found to be filled with a yellow, gelatinous, semi-solid material, which, before the cysts were pricked to allow of its escape, gave to them a very hard and firm consistence. Had this last-named variety of cyst been felt during life the laparotomist might easily have been led to mistake them for malignant nodules upon the tube, and the resemblance was the more marked from the fact that they were usually arranged in groups and always small in size. On microscopic examination the semi-solid contents were found to consist of colloid masses and epithelial cells undergoing colloid degeneration. The smooth lining wall of the cysts was probably covered by endothelial cells, for such cells were seen in the contents, although none were to be distinguished *in situ*.

In only one pair of infantile tubes was there a pathological condition, and this was in the 7 months syphilitic infant. Many of the tubal folds were adherent at their apices, forming transverse bands, and in the muscular wall were a few deposits of small round cells exactly resembling those found in the liver and other organs in this infant. These were the syphilomata of Parrot, and the so-called miliary gummata of other authors.

[Many of the observations and statements made in the above paper are taken from the M.D. theses of Drs. Ballantyne and Williams, the former of which gained a gold medal and the Gunning-Simpson Prize in Obstetrics, and the latter a gold medal, at the University of Edinburgh.]

MEMORANDA: MEDICAL, SURGICAL, OBSTETRICAL, THERAPEUTICAL, PATHOLOGICAL, Etc.

THE TREATMENT OF DIPHTHERIA.

For the purpose of this note, I need only profess myself of the number of those who regard diphtheria as a specific exanthem, the local manifestations of which appear, of course, after the general infection. For this reason I attach little importance to the tonsillar and pharyngeal troubles (though, of course, their occurrence in the larynx constitutes an accidental complication of the greatest danger); and I disregard, as not only useless but as positively mischievous, the measures generally adopted by those who, fearing systemic infection from what they view as the primary seat of the disease, are chiefly concerned with the repeated removal, by means of solvents, etc., of the diphtherial membrane. Nor need I give reasons—for they will occur to all—why, with my views, the indications for therapeutic treatment that suggested themselves comprised a germicide, an antipyretic, iron, iodine, soda.

The immediate results of the adoption of this treatment were more than gratifying. It is true I have only eight cases

¹⁰ *Centr. f. Gyn.*, 1886, p. 601.

¹¹ *Op. cit.*

¹² *Lancet*, 1888, i, p. 879.

¹³ *Ziemssen's Cyclop. of Pract. Med.*, vol. 10.

⁹ *Trans. Path. Soc. Lond.*, vol. xxxix, 1888.