

recently observers such as Williams, Dobbert, and Tussenbroek have pointed out that there exist certain differences in the structure of the two membranes. For example, in uterine pregnancy the spongy layer of the decidua is not so well developed as in extra-uterine pregnancy, and in the former there is a portion of decidua lying under the spongy layer that maintains the appearance of the normal, non-pregnant mucosa. In extra-uterine pregnancy the vessels are markedly enlarged and lie near the surface of the decidua, their rupture accounting for the uterine hemorrhage so frequent in this condition.

Soon after the death of the fetus the uterine decidua is cast off, either as a whole or in small pieces, a phenomenon said to possess considerable diagnostic importance.

Decidua Vera in the Tube.—The opinion of all of the earlier writers on extra-uterine pregnancy was that a definite decidua vera was developed in the pregnant tubes. In 1891 Bland Sutton denied its existence, and since then there have been many conflicting statements regarding it. If one expects to find a distinct decidua membrane in the pregnant tube analogous to that found in the uterus one will be disappointed, as it does not occur as such; but beyond any possible doubt changes take place in the connective-tissue stroma cells of the tubal folds by which they are converted into cells morphologically similar to the decidua cells in the uterus. This change does not take place throughout the entire length of the tube, but only in discrete patches, and undoubtedly a great part of the tissue which has been described as decidua is in reality foetal ectoderm. In the specimens of Williams the decidua changes are beautifully shown and the distinct transition from a connective-tissue to a decidua cell can be traced.

The view that a decidua forms in the tube has been materially strengthened by the discovery of analogous changes in the opposite non-pregnant tube, so that at present we cannot deny that a decidua vera is formed, although not to the same extent as in the uterus. The specimens of Williams also show that the columnar epithelium of the tube becomes flattened out just as it does in the uterus.

Decidua Serotina and Reflexa.—From what has just been said, it is evident that the decidua serotina does not reach the same state of development in the tube that it does in the uterus, and undoubtedly that which has so frequently been described as serotina is nothing more than a mass of foetal ectoderm or "Zellschicht." Careful examination, however, at the point of attachment of the ovum will enable one to differentiate between three varieties of cells, viz., syncytium, "Zellschicht," and true decidua cells.

The same may be said of the reflexa—*i.e.*, while undoubtedly present it never reaches the same stage of development that it does in the uterus. Its existence has been denied by many, but if one examines a carefully prepared intact specimen, one finds a thin layer of tissue separating the ovum from the lumen of the tube. This band of tissue is usually covered on its outer side by flattened tubal epithelium; it contains few if any true typical decidua cells. The cells in this situation can be identified with "Zellschicht" cells, and as pregnancy advances marked degenerative changes in them are seen to occur.

This appearance, particularly in early pregnancy, has led to a number of different explanations: for example, that two tubal folds had grown over the ovum, or that the pregnancy had taken place in an accessory tube lumen. The question has lately been entirely cleared up by the monograph of Peters, in which he describes a young ovum in the uterus (certainly the earliest one as yet described) in which the reflexa has not yet closed over the ovum. Peters is of the opinion that the ovum burrows beneath the epithelium of the endometrium which then closes over it, and there is every reason to believe that the same process occurs on the tube.

Placenta.—Except for the difference in the structure of the tube wall and uterus, and the difference in the

formation of the decidua, the structure of the placenta in tubal pregnancy does not differ materially from that in uterine pregnancy. The chorionic villi, not being separated from the muscularis and vessels by a thick layer of serotina, invade more deeply and quickly the tube wall and open up the vessels, thus accounting for the hemorrhage and early tubal abortion. The villi themselves present practically the same appearance in extra- as in intra-uterine pregnancy, their stroma is made up of a loose mucoid connective tissue, and in early cases one can distinguish two layers of epithelium—"Zellschicht" and syncytium. When a villus comes in contact with the serotina its behavior is the same in the tube as in the uterus; viz., there is marked proliferation of the "Zellschicht" at the point of contact, resulting in the formation of a "cell node." If abortion does not occur at an early period, a definite intervillous circulation is established, the intervillous spaces being lined with syncytium just as in uterine pregnancy. The old view that in certain instances the placenta continues to grow after the death of the fetus is now scarcely tenable.

SYMPTOMS.—The symptoms of an early unruptured extra-uterine pregnancy are by no means characteristic, and frequently one has no idea of the existence of the condition until rupture takes place and the patient is in a state of collapse.

The patient usually considers that she is beginning an ordinary uterine pregnancy, and has the usual subjective symptoms of that condition. There is not uncommonly some pain in one or the other ovarian regions, but usually of so slight significance as not to alarm either the patient or her friends. Menstrual suppression, while not the rule, sometimes occurs. Statistics show that the menses persist in about forty-three per cent. of the cases.

If the fetus dies at an early period—*i.e.*, before rupture or tubal abortion—there is usually a discharge of blood from the uterus. This may be mistaken for the return of a delayed menstrual period or an early abortion.

In the majority of cases the first indication of anything being wrong is the occurrence of a sharp, lancinating pain in the ovarian region, followed soon by signs of collapse. When collapse occurs it is usually the result of intraperitoneal hemorrhage, either from a rent in the tube wall or from the fimbriated extremity after tubal abortion, and it is readily seen how, unless immediate relief be obtained, the collapse may become deeper and deeper and the individual finally bleed to death into her peritoneal cavity. On the other hand, the hemorrhage may not be of sufficient extent to be fatal, and here the result will be a retro-uterine hæmatocele.

If the hemorrhage is severe the symptoms are those of collapse—weak, rapid pulse, subnormal temperature, pallor, etc.—while in those cases in which the hemorrhage is slight and is followed by the formation of an hæmatocele, we have a general improvement of the symptoms. The present opinion is that by far the majority of pelvic hæmatoceles are the result of an extra-uterine pregnancy.

Hæmatocele usually is the result of tubal abortion and not of tubal rupture, and according as the hæmatocele occupies the greater part of the pelvis or forms a smaller mass on the region of the fimbriated end of the tube we can differentiate between diffuse and solitary pelvic hæmatoceles. In the former case adhesions of the pelvic viscera are necessary to prevent the escape of the blood into the general peritoneal cavity, but not in the case of the latter, for according to Sanger the solitary hæmatocele is the result of a gradual dripping of blood from the fimbriated end of the tube. The formation of an hæmatocele is almost always a favorable termination for extra-uterine pregnancy, for in this way the acute hemorrhage is checked. However, cases have been reported in which the hemorrhage at the centre of the mass continues, finally causing its rupture into the peritoneal cavity and death. Another unfavorable termination of hæmatocele is supuration.

Occasionally the patient does not succumb to the first loss of blood, and here, if the placenta is not entirely

separated from its attachment to the tube wall, a secondary abdominal pregnancy will result. In such a case the ordinary symptoms of pregnancy will continue, possibly with an abnormal amount of pain.

In a small number of cases rupture may occur between the folds of the broad ligament, and further development go on only to rupture again into the peritoneal cavity; then the fetus becomes abdominal while the placenta remains between the folds of the broad ligament. Term may be reached in such an instance.

When a patient with a secondary abdominal pregnancy reaches term, what is known as false or spurious labor sets in, during which there are distinct contractions similar to those occurring in the early stages of normal labor. The contractions, however, are not of the gestation sac, for this structure contains so few muscle fibres that its contraction is a matter of impossibility; but the contracting organ is the uterus. False labor continues for several days and during that time the child dies. After foetal death the placental circulation becomes obliterated; the foetal sac shrinks and becomes closely applied over the body of the child, which then undergoes one of the changes above mentioned. The abdomen here of course becomes smaller, a symptom which is usually noticed by the patient.

In certain instances the extra-uterine pregnancy may exist at the same time as an intra-uterine one. Parry pointed out the frequency of this occurrence and found that it occurred 22 times in 500 cases. To his 22 cases Williams has recently added others, making the present number of reported cases 49. Parry called the conditions "combined pregnancy." More rarely twin extra-uterine pregnancy has been noted, and in very rare cases both fetuses were in the same tube.

Repeated tubal pregnancy has been observed and reported in a number of instances. Williams has collected a total of sixty-six such cases in which the diagnosis has been confirmed at operation or autopsy. This phenomenon has been utilized by certain observers to explain points in the etiology of the affection. The anatomical findings, however, have not been uniform, and little information has been gained from this source.

DIAGNOSIS.—The symptoms of an early unruptured extra-uterine pregnancy are so uncertain that they render a diagnosis at this stage almost an impossibility. Tait made the statement that it was impossible to make a diagnosis, and most operators agree with him. In rare cases a diagnosis of the condition is made, but it is almost the rule that after such a diagnosis the operator finds the mass in question to be either an inflamed tube or a small ovarian cyst.

The diagnosis would be based upon the following symptoms: A patient who had been sterile for some time thinks herself pregnant, having the usual subjective symptoms, with possibly an abnormal amount of pain in the ovarian region. If such a patient were the subject of a tubal pregnancy, on examination the uterus would be found to be enlarged and somewhat soft and boggy, and off to one side there would be a small pulsating (?) tumor roughly the size of the supposed pregnancy. But as has already been said, it is common to find after such a diagnosis (?) that the mass is of other than the suspected nature. Taylor has called attention to the fact that the pregnant tube may prolapse into the cul-de-sac of Douglas and give one the impression of a retroflexed pregnant uterus—a statement proven by the fact that several cases have been reported in which rupture of the tube followed an attempt to replace that which was thought to be the fundus.

According to Williams, Veit in Germany in 1883 and Janvrin in this country in 1888 were the first to confirm by abdominal section the diagnosis of unruptured tubal pregnancy. This state of affairs is very rare, the writer never having seen a case in a considerable experience as resident obstetrician in the Johns Hopkins Hospital, and he knows of only one case in the hands of a colleague (Upham, of Columbus, Ohio).

If the fetus die before rupture of the tube a diagnosis

is still very difficult, such cases usually being taken for uterine abortion associated with an inflammatory tubal mass. The source of error is that when the fetus dies the uterine decidua is cast off in shreds giving the appearance of the discharge of a normally implanted ovum.

Most observers believe that the discharge of a more or less complete decidua cast of the uterine cavity is an infallible sign of extra-uterine pregnancy. The fallacy of this sign is shown, however, by the fact that, relying on this sign alone, some operators (Griffith and Dolan) have opened the abdomen only to find it free from abnormality, or that the supposed extra-uterine pregnancy had been simulated by a small ovarian cyst.

It has been advised that the uterus be curetted for diagnostic purposes, the presence of decidua on the scrapings affording conclusive evidence as to the existence of extra-uterine pregnancy; but as the decidua may have been cast off early in the pregnancy, the discharge being considered by the patient to be a menstrual period, the uncertainty of this procedure is obvious.

A probable diagnosis after death of the fetus and before rupture can be made in some cases by a careful sifting of the history of the case and by an examination of the patient. For example, she thinks herself pregnant; she has discharged shreds of tissue which may have been decidua. If now an enlarged uterus is found with a small mass on one side corresponding in size to the supposed duration of the pregnancy, a fairly probable diagnosis can be made.

At the occurrence of rupture or of tubal abortion with intraperitoneal hemorrhage, the symptoms are so characteristic that an almost certain diagnosis can be made even without an examination. The patient may or may not have given the above history when suddenly, with a sharp attack of pain in the ovarian region, she goes into a condition of collapse, with weak rapid pulse, pallor, subnormal temperature, etc. Vaginal examination here usually reveals but little, as the patient is too sensitive to allow a thorough exploration. A crepitating sensation may be imparted to the examining finger in the cul-de-sac, due to pressure upon recently clotted blood. With the above symptoms the diagnosis of ruptured tubal pregnancy is practically a certainty, and if not speedily relieved by operation the patient will die. If she recovers from the collapse the probabilities are that a tubal abortion has taken place and that the hemorrhage has been checked by the formation of a pelvic hæmatocele.

As tubal rupture may occur very early in pregnancy, even before the patient has thought herself pregnant, one should always regard collapse with signs of intraperitoneal hemorrhage as strong probabilities in favor of ruptured extra-uterine pregnancy; and in such a case only by acting promptly can the life of the patient be saved.

If, as is often the case, she is not seen until after primary rupture, examination will reveal a large tumor filling the posterior portion of the pelvis, and an exploratory puncture through the posterior vaginal fornix will render the diagnosis certain.

In cases in which the fetus has survived the damage done at the time of primary rupture and has continued to develop in the abdominal cavity or in a gestation sac, the diagnosis is not usually made, because our attention is not directed to the fact of early rupture, and it is not until false labor sets in that our suspicions arise as to the child's not being in the uterine cavity. If careful examination be made, however, the condition should offer little difficulty; the child is found to be more easily palpable than normal, its movements give the mother a certain amount of pain, and by bimanual examination the uterus is found to be practically normal in size. If an hæmatocele has formed between the folds of the broad ligament, the mass will lie largely in the small pelvis and the uterus will be pushed over to one side.

When an extra- and an intra-uterine pregnancy occur together and have reached term, the diagnosis of twins has usually been made, and it is not until the cause of delay

in the birth of the second child is investigated that its extra-uterine existence is noted.

Treatment.—Before Rupture.—When an extra-uterine pregnancy is diagnosed before rupture, it must be regarded as a malignant growth and removed by laparotomy as soon as possible. This procedure cannot be too urgently advised, for until it is removed the patient is in imminent danger of a fatal rupture. All methods which have as their end the destruction of the fetus, such as electricity or the injection of medicinal substances, are to be strongly condemned; for, as we know, even the death of the child does not preclude the possibility of rupture of the tube. However, from what has already been said, it is apparent that such a line of treatment will rarely be thought of owing to the uncertainty of diagnosis at this time.

After Rupture.—Although laparotomy was advised some years ago for the removal of a ruptured tube, operators were not willing to accept this plan of treatment until Tait demonstrated the ease with which the diseased tube could be removed and hemorrhage checked. This method is now almost universally employed, and all of us can recall numerous instances in which life has been saved by it.

The diagnosis of ruptured tube and intraperitoneal hemorrhage once having been made by the very characteristic symptoms already discussed, the abdomen must immediately be opened (unless the degree of collapse is so great that the patient is moribund when first seen). Then immediately afterward long clamps are to be passed down into the pelvis and applied on both sides of the tubal mass. This will at once check all hemorrhage, and the injured tube can be excised without unnecessary haste. If the peritoneal cavity is filled with clotted blood which obscures the field of operation, the clamps must be applied by the sense of touch alone.

An excellent method of counteracting the effect of the loss of blood is by the infusion of normal salt solution. This can be done during the operation and the infusion allowed to run into the submammary subcutaneous tissue or injected directly into the circulation.

In tubal abortion some operators have made the attempt to save the affected tube. The advisability of such an attempt appears to be of doubtful nature, as it has not been proven that the tube once affected ever regains its functional activity.

Operation through the vagina has lately been advised and even now has many adherents. As it has many obvious disadvantages, it is mentioned here only to be condemned. Among the disadvantages may be mentioned the small field of operation in the vaginal method as compared to the large one in the abdominal, and the frequent necessity of having to open the abdomen to arrest hemorrhage which has been started in the vaginal operation.

Hæmatocele.—It has been shown that the majority of cases of pelvic hæmatocele undergo spontaneous cure and rarely require operation. Thorn reports 157 cases, in only 6 of which was operation thought necessary, the rest having been treated by careful watching and rest in bed. The total mortality here was only six-tenths of one per cent. Fehling has reported 91 cases, treated in a similar manner, without a single death. A disadvantage of the method, however, is that it is extremely slow and the patients have to remain many weeks in bed.

On the other hand, there are certain conditions which render operation imperative in cases of hæmatocele: such indications as rapid increase in the size of the tumor, signs of suppuration, or pressure on important organs. When such conditions are present the hæmatocele is best attacked by way of the vagina. An incision is made through the posterior vaginal wall, the clot is evacuated, and the cavity is at once packed with sterile gauze. This usually gives most excellent results, but all operators agree that it is frequently necessary to open the abdomen in order to check hemorrhage that cannot be controlled by the pack; therefore one should always have the abdomen prepared for a laparotomy before making the vaginal incision.

Treatment during the Latter Months of Pregnancy.—Occasionally in the latter half of pregnancy we shall find the fetus enclosed in a large tubal or ovarian sac; more commonly, however, the fetus has escaped through the rent in the tube wall and we have to deal with a secondary abdominal pregnancy in which the placenta is attached to the pelvic floor while the fetus lies free. In such cases, as there is always danger of a secondary rupture, prompt laparotomy is indicated. If the child is within a few weeks of viability some have advised a waiting policy, thus giving the child a chance that it would not have were immediate operation done. If such a course be decided upon the dangers to the mother should always be explained to the family.

As to the best method of operating in such cases, unquestionably the ideal procedure is to open the abdomen and remove the entire gestation sac; but frequently, on account of adhesions to neighboring organs, such a course is inadvisable, and here the sac should be incised, care being taken to avoid wounding the placenta if possible. Then the child should be removed and the edges of the sac should be stitched to the margins of the abdominal wound, the cavity being packed with gauze and the placenta allowed to come away piecemeal. This entails a longer convalescence, but on the whole is better than endangering the life of the patient by attempting to remove an adherent placenta. In certain cases this plan cannot be carried out, and then the entire sac must be removed no matter how serious the procedure may seem.

When the fetus dies the danger to the mother materially diminishes, for, when the fetal circulation ceases, the hemorrhage from the placental site is not so much to be feared. If a diagnosis of the death of the child be made, operation should be deferred for a short time in order to favor closure of the maternal blood spaces and separation of the placenta; it being understood, however, that immediate operation may be necessary at any time.

George W. Dobbin.

EXUDATION, PATHOLOGICAL.—One of the chief phenomena of inflammation is the passage of a portion of the fluid and cellular constituents of the blood from the blood-vessels into the tissue spaces or out upon one of the free surfaces of the body. This process is known as exudation, and the fluid and cells which have left the vessels as an exudate. *Exudation* is distinguished from *transudation* in that it is always a part of an inflammatory process, while the latter term is commonly restricted in its application to an increase in the formation of lymph not due to inflammation, but dependent upon changes in blood pressure, alterations in the blood, or in the vessel wall which favor an increased lymph production (oedema). *Exudates* differ from *transudates* in their higher albumen content, higher specific gravity (1.016–1.025), and their greater richness in cellular elements. *Transudates* have a low specific gravity (1.006–1.008, rarely reaching 1.012), contain but few cells, and differ but little in their composition from that of normal lymph, their albumen content being very slight, sometimes lower and sometimes slightly higher than that of lymph. *Exudates* are usually turbid from the large number of leucocytes contained in them, while *transudates* are usually clear or but slightly cloudy.

The source of both the fluid and the cellular constituents of exudates is the blood, and the escape of these from the vessels is due to some alteration in the vascular walls which forms an essential part of the inflammatory process. Evidences of this alteration are seen in the dilatation of the vessels, the increased resistance offered to the blood current with consequent slowing of the circulation, the increased adhesion of the cellular elements of the blood to the vessel wall, and, most important of all, the increased permeability of the walls. The composition of the exudate is therefore dependent upon the degree of pathological alteration as well as upon the peculiar property of the affected vessel. The greater the injury the greater the exudate and the amount of albumen and cellular elements contained in it. Moreover, since the

properties of the blood-vessel walls differ in different regions of the body, the character of inflammatory exudates in different parts will also vary; thus the albumen content of pericardial and pleural exudates is higher as a rule than that of peritoneal. Exudates differ further in the proportionate amounts of the various blood elements contained in them. In one case the exudate may be almost entirely fluid with a very small number of cells (serous exudate); in another, the leucocytes may be so numerous as to give the exudate a more or less thick, creamy appearance (purulent exudate); or the escaped fluid may contain large amounts of fibrinogen and fibrin ferment (fibrinous exudate). Further, many red blood cells may escape by rhexis or diapedesis (hemorrhagic exudate), or large numbers of blood plates may be present in the exudate. Combined characteristics exist, so some exudates may be properly styled sero-fibrinous, sero-purulent, fibrino-purulent, etc. Besides the blood constituents inflammatory exudates also contain tissue debris, fluids arising from cellular liquefaction and degeneration, etc. The high proportion of albumen in many exudates is due partly to proteids derived from cellular destruction. In exudates there may be contained also poisons arising from tissue destruction or, in infective inflammations, from the growth of micro-organisms; the bacteria themselves, and cells arising from the proliferation of fixed cells of the tissue, may likewise be present.

The various problems regarding the manner of escape of the exudate from the blood-vessels have offered abundant scope for investigation and speculation, and a survey of the various theories evolved to solve these problems forms one of the most interesting historical chapters in the development of pathology. The existence of pathological exudates was very early recognized. Rokitansky believed that they arose from an increased permeability of the wall of the vessels due to thinning from overdistention. Vogel, Paget, and others explained their formation as being due to an increased attraction between the tissues and the elements of the blood. Virchow distinguished two kinds of exudates: one the result of mechanical pressure in the vessels, pressed-out blood serum; the second as nutritive, the result of an increased attraction between the tissues and blood constituents. The cellular portion of the exudate he believed to originate from a proliferation of the tissue cells in the inflamed area.

Dutrochet in 1842 and Waller in 1846 first observed the migration of leucocytes from the vessels, but these observations were forgotten until Cohnheim in 1867 rediscovered the phenomenon. This observer affirmed that the passage of leucocytes from the vessels formed the essential feature of inflammatory exudation; that the cells in inflamed areas did not arise from the tissue cells; and he explained the origin of the fluid portion of the exudate as due to a molecular change in the vessel wall. This view was opposed by many, notably Stricker, who held that the greater part of the cells in inflammatory exudates were not leucocytes but new cells arising out of the inflamed tissue, pus cells therefore taking their origin from connective-tissue cells.

Heitzmann believed also that the cells of the exudate were not leucocytes, but were embryonic cells arising from the softened or dissolved intercellular substance. More recently Grawitz has taken a similar position, in that he declares the cells of the exudate to arise from so-called "slumbering cells" in the intercellular substance of connective tissue which under normal conditions are not visible. The views of Stricker, Heitzmann, and Grawitz find little acceptance at the present time, the almost universally accepted opinion being that the chief part of the cells of inflammatory exudates at least arises from the blood.

Heidenhain explains the formation of lymph as a process of secretion on the part of the cells of the vessel walls and not as a pure filtration process. Pathological stimulation of this process or alterations in the vascular walls will change the amount and character of this secretion. A portion of the fluid of exudates at least must

be regarded as being of the nature of a pathological cell secretion. According to Arnold, Thoma, and Engelmann the formation of the exudate is due chiefly to changes in the lines of cement substance lying between the endothelial cells of the vessel wall. Through distention of the vessel the cement substance may be so thinned as to form small openings through which both fluid and cellular elements escape. Other writers hold that the escape of the leucocytes is not due to alterations in the vascular walls but to chemotactic influences acting from outside of the vessels and causing the cells to pass through the wall.

At the present time the exact nature of the process by which exudates are formed cannot be said to be definitely fixed. The most commonly accepted view is that the chief part of the fluid and cellular elements comes from the blood, and that both pathological secretion and alterations in the wall, as well as chemotaxis, play parts in the formation of the exudate. The escape of the leucocytes is considered an active process brought about by means of their amoeboid power in response to chemotactic stimuli. In the very earliest stages of the inflammatory process the cells of the exudate are wholly leucocytes; later, tissue proliferation begins and a part of the cells of the exudate may thus be derived from tissue cells.

Recently much attention has been given to the closer study of the leucocytes found in exudates. Lubarsch divides the cells of inflammatory exudates into hæmotogenous wandering cells and histogenic wandering cells, in the former case descendants of immigrated cells, in the latter arising from fixed connective-tissue cells. The relative proportion of these cells varies in different forms of inflammation, and in different stages of the same form; but the immigration of leucocytes forms the most prominent feature of the majority of inflammations. Until recently it was affirmed that the migrating leucocytes were chiefly polynuclear forms and that these only possessed the power of active movement. Welch, Councilman, and others have shown that lymphoid cells may also migrate, a fact which was formerly denied. The so-called plasma cell also appears to play an important rôle in many exudates, particularly those of chronic inflammation. This cell is now believed by the majority of writers to be of hæmatogenous origin, most probably a form of lymphocyte. It is characterized by a protoplasm staining blue with methylene blue, an eccentrically placed nucleus, a perinuclear clear space, and a nucleus possessing a number of coarse particles of chromatin arranged on the inner surface of the nuclear membrane. Plasma cells occur in large numbers in the cellular exudate of chronic inflammations, particularly, as Councilman has shown, in the interstitial nephritis of scarlatina. This observer believes that they are lymphocytes which migrate as such or as plasma cells from the blood, and multiply outside of the vessels in response to chemotactic stimuli. It would appear, then, that there are selective chemotactic stimuli; part influencing the migration of lymphoid and plasma cells, part the polynuclears or other varieties of leucocytes. Some exudates contain large numbers of eosinophiles and mast cells, but the significance of such occurrence is not yet known.

Wieniarski confirms the assertion of Korczynski and Wernicki that lymphocytes predominate in exudates not due to malignant disease or showing a tendency to become purulent. When neutrophile polynuclears predominate the exudate is caused either by malignant disease or by pus-forming agents. According to these observers the presence of eosinophile cells and red blood cells in exudates is without significance. In pleural and peritoneal transudates the cells are almost exclusively lymphocytes; in pleural exudates of serous nature they are also lymphocytes; the predominance of polynuclears always indicating a purulent process in case no malignant disease is present. In one case in which but few leucocytes were present in the exudate, but these all polynuclears, a purulent exudate developed later; in another case in which 6,280 lymphocytes were present in a cubic millimetre of the exudate the inflammation did not