Animals infected with B. typhosus have developed only in rare instances a disease at all comparable to that in man. So far as practical serum therapy is concerned, it has ever, in this disease, shown negative results.

Media Used as an Aid to the Isolation of the Bacillus Typhosus.—Many different media have been devised for use in isolating this organism, but there are only four which have stood the test of time, and which, in the hands of the trained bacteriologist, are admitted to be more or less effective in isolating the typhoid bacilli. The simplest one is that devised by Hiss. For completing the differentiation, however, Hiss uses two different media. His first step is to plate out some of the suspected material in a medium the composition of which is as follows:

Hiss' Plating Medium.

	Gm.
Agar	15.
Gelatin	15.
Liebig's extract	5.
Sodium chloride	5.
Dextrose	10.
Distilled water	1,000.

The agar is first melted and then the rest of the ingredients are added. After the mixture has boiled for a few minutes, it is allowed to cool and is cleared with the white of two eggs. Then it should be boiled again and filtered through a thin layer of absorbent cotton. Before filtering see that the total amount of fluid is 1,000 c.c.; and, if it be found to be less than this amount, add enough hot distilled water to bring it up to that point.

I have found that this is one of the most important points in making up this plating medium. No acid or alkali need be added to the mixture.

In this plating medium the typhoid colonies form thready growths, while the colon colonies are round with smooth edges. The colonies showing threads are fished out and plated in Hiss' tube medium, which is composed as follows:

Hiss' Tube Medium.

	Gm.
Agar	5.
Gelatin	80.
Liebig's extract	5.
Sodium chloride	5.
Dextrose	10.
Distilled water	1,000.

This medium differs from the first, as will be observed, in having 10 gm. less of agar and 65 gm. more of gelatin. The mixture is also cleared with the white of two eggs and is corrected to 1.5 acid, phenolphthalein being the indicator.

In this tube medium the Bacillus typhosus clouds it throughout in twenty-four hours. B. coli generally shows growth and gas formation only along the line of puncture. This medium has given us many excellent results, and I prefer it to all the others.

Elsner's Method (*after Park*).—1st. Grate 0.5 kgm. of small potates to a fine pulp and add one litre of cold water; let it stand over night in a cool place.

2d. Wash thoroughly and strain through a fine cloth. This must be done while the mixture is cold.

3d. Boil the filtrates and filter again.

4th. Add ten per cent. of gelatin and boil until it is dissolved.

5th. Test the acidity and have it so that 3 c.c. of a decinormal sodium-hydrate solution will neutralize 10 c.c. of the medium, phenolphthalein being the indicator.

6th. Boil and clear with egg.

7th. Filter through cotton and then through paper.

8th. To the filtrate add one per cent. of potassium iodide. (Use a solution so made that 1 c.c. shall contain 1 gm. of the salt.)

9th. Decant into tubes and sterilize.

The incubator for this medium must be kept at from 22° to 24° C.

The plates must be thoroughly cooled before placing in the incubator, as otherwise the difference between B. typhosus and B. coli would not be observed.

The colon colonies are the first to develop. They are rough and granular, and have a greenish-brown color; later, the typhoid colonies develop and are small, white, and gleaming, and can best be described as being dew-drop-like in appearance, although occasionally somewhat granular. This is apt to cause some confusion in the mind of the beginner, but one who is familiar with the use of this medium is very little likely to make a mistake. The potassium iodide prevents nearly all other organisms from developing in this medium.

This plating medium, used in conjunction with Hiss' tube medium, gives us a very satisfactory differential method.

The Capaldi plating medium and that formulated by von Drigalski and Conradi have in my hands furnished such variable results that I scarcely think it necessary to describe them here. The latter is a very complicated medium, by no means easy to prepare.

Distribution of the Bacilli Outside the Body.—The Bacillus typhosus may remain in contaminated soil for from two to three months, and in water for nearly the same length of time. On the other hand, if either the soil or the water contains enough organic matter for the support of the organism, it may remain there indefinitely.

The past few years have witnessed no change in our ideas regarding the transmission of typhoid fever. In fact, the theories of that time have merely been strengthened, and all are now agreed that in the vast majority of cases it is through the alimentary tract that the infection gains entrance to our system. In a few rare instances it is believed that the infection has been brought about by the inhalation of the Bacillus typhosus into the lungs.

There still remain to be considered the different methods by which this organism can gain entrance to the intestines. First, we may have a direct infection, that is, from a person suffering from the disease to one who has come in contact with the patient. When infection occurs in this manner some infected material must pass, through carelessness, to the alimentary canal of the individual contracting the disease; for, if perfect cleanliness and caution are observed, this form of infection need never occur.

Unless the excreta of the patient be thoroughly disinfected they will pollute the soil, and the infective organisms which they contain will remain quiescent until they are washed into some water supply, from which they gain entrance into some other human being. This may happen in any of the following ways: directly, as in drinking water or in ice, or in milk to which contaminated water has been added, either for purposes of dilution or in cleansing the receptacle. In milk the bacilli will multiply rapidly, unless the milk be kept constantly iced. If there be a large source of pollution, from which the poliuted material drains into a river or creek, the submerged banks of which are used for the fattening of oysters, these will take in the bacilli and will furnish them, if decomposition should begin to develop in the host, with a soil most favorable for their rapid multiplication. It is under these circumstances that oysters may serve as the source of typhoid infection among those who eat them in an uncooked state. (At some later date the author proposes to publish the experiments which he has made in this special field.)

If the excreta be thrown into sinks and privies where flies congregate in large numbers, these insects will transfer the infected material to the house—*i.e.*, they will deposit it upon any food, cooked or uncooked, to which they may gain access. This is probably a frequent mode of spreading typhoid infection among the different members of a family after one of their number has been taken ill with the disease. Nothing short of the most thorough disinfection will prevent such a spreading of typhoid fever.

Raw vegetables may serve as carriers of the disease

provided they have been watered with infected material or have been washed in infected water, in preparation for their appearance on the table.

Ice cream, when manufactured of milk or cream which contains typhoid bacilli, and which has not been cooked, may serve to communicate the disease.

Major Firth, of the English Army Medical Corps, has recently shown that clothing which has been soiled by the excreta of a patient suffering with this disease may retain the virulent typhoid bacilli at the end of eighty-four days. Consequently soiled clothing, unless disinfected, may be a means of spreading the disease. The same authority has also shown that the bacilli may remain fully virulent in the soil for eighty-five days, and we know from other observations that it can remain so for much longer periods. Major Firth also claims that they may retain their virulence for twenty-five days after having been dried and blown about as dust. If this be so, it is certainly a matter of great importance, for it shows that the typhoid bacillus is a much more resistant organism than we have given it credit for being. This observation, however, must first be confirmed by other authorities before we can accept it as a fact.

To sum up, then, we find that there are three great roads by which infection reaches human beings. These are, first, personal contamination from person to person; second, contamination of water supply and therefore of milk and food; and third, the spread of the bacilli by household insects such as flies, cockroaches, etc.

From this it will be seen that the great weapons for combating the spread of this disease are, first, thorough disinfection of all excreta from the patient; and at this point I wish to emphasize the fact that it is of the greatest importance to disinfect and to handle carefully the urine of these patients. Our second weapon is the thorough sanitary supervision of our water supplies so that our water-sheds may escape contamination.

Cyrus West Field.

Literature.

Eberth: Virchow's Archiv, 1881.
Gaffky: Mitt. a. d. Kais. Ges.-Amt., Bd. 2, 1884.
Gruber und Durham: Münch. med. Woch., No. 13, 1896.
Widal et Grünbaum: Semaine Médicale, 295, 1896.
Besson: Revue de Médecine, xvii., 1897.
Horton-Smith: Lancet (London), May 20th, 1899.
Richardson: Boston Med. and Surg. Journal, 1897; Philadelphia Medical Journal, March 9th, 1900.
Widal: Ann. de l'Inst. Pasteur, No. 5, 1897.
Schottmüller: Ztsch. f. Hyg. u. Inf. Krankh., Bd. 36, 1900.
Buxton: Journ. Med. Research, vol. viii.
Hiss: Journ. Med. Research, No. 1, 1902.
Elsner: Ztsch. f. Hyg. u. Inf. Krankh., Bd. 21, 1895.
Capaldi: Ztsch. f. Hyg. u. Inf. Krankh., Bd. 23, 1896.
von Drigalski und Conradi: Ztsch. f. Hyg. u. Inf. Krankh., Bd. 39, 1902.

VISION, DISORDERS OF: CHROMATOPSIA (*Colored Vision*).—Chromatopsia is a modification of the visual sensation, as a result of which all objects appear of a certain color (red, purple, blue, yellow, green, white), without any effect upon the acuteness of vision or any visible changes in the fundus.

Erythropsia (*Red Vision*), the most common variety, is not infrequent after cataract extraction, occurring in three to five per cent. of cases (Becker), and after exposure to intense light, for example, sunlit snow fields especially in high regions, brilliant electric light, flashes of lightning, and observation of the sun. This visual disturbance becomes more marked when the illumination is suddenly diminished, as after going from the open into a house. After cataract extraction there is less frequently purple or *blue vision* (*kyanopsia*), or the patient complains of objects appearing of a glaring white. The phenomenon generally appears shortly after the operation, or after some days or weeks; it lasts a variable number of hours, days, weeks, or months; it may be constant or intermittent; it generally disappears in the course of a few days or weeks. No treatment is called for beyond the wearing of smoke-tinted glasses; potassic bromide has been recommended in these cases.

Independently of cataract extraction, the occurrence of colored vision is favored by dilatation of the pupil, congenital coloboma of the iris, iridectomy, by excitement of any sort, and by elevation of body-temperature. Red vision is an occasional symptom of optic-nerve atrophy, glaucoma, nyctalopia, migraine, hysteria, hystero-traumatic amblyopia, and amaurosis, exhausting diseases, and severe fevers; it sometimes occurs with intra-ocular hemorrhage; it may be part of the epileptic aura; it is said to be caused by coffee in rare instances. Blue vision is occasionally complained of by patients suffering from retinitis albuminurica and detachment of the retina, and may also follow the use of cannabis indica. *Green vision* (*chloropsia*) is a rare symptom of detachment of the retina, optic-nerve atrophy, and aphakia as the result of cataract extraction. Blind eyes occasionally are conscious of colored lights, probably due to irritation of the visual centres.

It seems probable that chromotopsia may be due either to central irritation or to local causes. No entirely satisfactory explanation of the phenomenon has yet been offered. Fuchs attributes red vision to the action of strong light on the visual purple and its slow regeneration under less intense light; but the absence of visual purple at the macula upsets this theory. Snellen believes it to be due to the coloring of white light by its passage through the translucent and vascular lids and choroid, and the subsequent diffusion of this reddish light over the retina. After the extraction of cataract, upon exposure to bright light, the lids are partly closed; there is thus a small central pupillary opening for white light, while the periphery of the retina is flooded with red light which has come through the lids. When the intensity of the illumination is reduced, the red perception of the periphery changes to a complementary green as a result of fatigue, while central vision appears red by contrast. The blue vision after cataract extraction is attributed by Burnett to fatigue of the retina as a result of long-continued exposure to light rendered yellow by passage through amber-colored cataracts, giving blue as a residual sensation in white light.

Toxic Chromatopsia.—Colored vision, usually yellow (*xanthopsia*), is one of the symptoms of the poisonous effects of certain drugs, of which santonin is the most common example; this agent may, however, produce green vision, or rarely red or blue vision. Other drugs which may produce chromatopsia are amyl nitrite, picric acid, chromic acid (as a result of local applications), osmic acid, digitalis, carbonic oxide, and tobacco. Xanthopsia also occurs as an early symptom of catarrhal jaundice, being due probably to the discoloration of the dioptric media and the structures of the eyeball by bile pigment. Yellow vision is also seen after dazzling from electric light, and occasionally accompanies nyctalopia.

Charles H. May.

WOLFFIAN BODY, PATHOLOGY OF.—In mammalian embryos the mesonephros or Wolffian body is a rather pyriform body symmetrically placed in the abdominal cavity. In very young embryos it is, next to the liver, the largest abdominal organ. It was first observed by Wolff in 1759. The exact origin of the Wolffian body is not yet determined; some authors hold that it is ectodermal, others that it is mesodermal, while others still ascribe to it both an ectodermal and a mesodermal origin. It is developed from the pronephric or Wolffian duct and from the mesonephric cords. The origin of the latter has not yet been wholly worked out in the case of the human body. In the lower mammals they arise through aggregations of the cells of the Wolffian ridge into solid cords which at first are not connected with the Wolffian duct or the cœlomic epithelium. These cords acquire a lumen and connect at one end with the duct, while at the other end there is a condensation of the mesoderm, forming the glomeruli, into which vessels from the aorta penetrate. The tubules increase in length rapidly and in the human embryo assume an **S**-shape. Secondary and tertiary tubules develop in connection with each of the primary ones, but the mode and origin of these have not yet been determined, some writers hold-

ing that they arise as buds of the primary tubules, others that they have an independent origin. Through the development of these additional tubules and the progressive elongation of all the tubules, the Wolffian ridge becomes a voluminous body attached to the dorsal wall by a distinct mesentery and projecting into the cœlomic cavity. Embedded in its substance on its lateral portion is the Wolffian duct; and on its mesial surface anteriorly is the developing genital ridge. In the human embryo the Wolffian body reaches its greatest development at about the sixth or seventh week, after which time it begins to degenerate. The tubules undergo retrogression and the glomeruli become occluded, so that by the sixteenth week the organ has nearly entirely disappeared. Portions of the tubules, however, persist in both sexes. In general the tubules of the Wolffian body consist of

FIG. 5246.—Adenoma-like Remains of the Wolffian Body, within the Uterine Musculature (formalin, alcohol, hæmatoxylin, eosin). × 100. (After Ziegler.)

secreting and collecting portions, the epithelium varying in the two, being low and cubical in the collecting portion and columnar in the secreting. In 1824 Jacobson discovered that the organ excreted uric acid which was carried into the allantois. He therefore called it the primordial kidney. According to Lorsel the Wolffian body liberates and accumulates fatty substances in its cells. It therefore plays the part of an embryonic organ and at the same time that of an excretory organ.

In the male the upper or genital portion of the Wolffian body persists as a whole in the efferent ducts of the testis, forming the globus major of the epididymis. By some writers the seminal tubules are also regarded as arising from the Wolffian body. The excretory portion almost wholly disappears, only a small part remaining as the paradidymis or organ of Giraldès. A single elongated tubule arising from that portion of the Wolffian duct which forms the globus minor of the epididymis persists as the vas aberrans. The hydatid of Morgagni is believed by Roth to stand in close relation to the Wolffian body. The Wolffian duct is retained entire, a portion forming the body and globus minor of the epididymis, the remainder becoming converted into the vas deferens and the ejaculatory duct. In the female the genital portion of the Wolffian body persists as a group of from ten to fifteen tubules lying between the two layers of the broad ligament near the ovary, and known as the epoöphoron, or parovarium, or organ of Rosenmüller. Toward the ovary the tubules possess blind ends, but at the other end they are somewhat coiled and open into a collecting duct representing the upper end of the Wolffian duct. Kölliker holds that the environing cells of the Graafian follicle probably arise from the Wolffian body. The excretory portion persists as the paroöphoron, a rudimentary body composed of tubules lying in the broad ligament near the tube. In about one-third of adult females remains of the Wolffian duct are found in the form of a straight tube lined by cylindrical epithelium surrounded by muscle, or of a muscle bundle without epithelium, lying anteriorly and to the side of the uterus and vagina (duct of Gärtner). According to Aichel the cortex of the suprarenals is also derived from the Wolffian body, the medullary portion coming from the sympathetic system. The origin of suprarenal tissue from the Wolffian body is made very probable from the fact that accessory suprarenal tissue (adrenals of Marchand) is found in the broad ligament in the female, and along the spermatic cord and near the epididymis in the male.

Of the pathological conditions directly affecting the Wolffian body we know nothing at present. Hyperplasia of the primitive Wolffian body has been assumed, but not yet demonstrated. It is, however, very probable that disturbances in the development and retrogression of this organ are responsible for a number of important pathological conditions which are either apparent at birth or develop later in life. From the rudimentary structures which represent persisting portions of the Wolffian body and duct there may develop tumors of great clinical importance. Of the factors concerned immediately in the genesis and development of these tumors nothing is yet known. In general the pathological conditions which may be referred back to disturbances in the normal development and retrogression of the Wolffian body, or which have their origin in rudimentary or persisting structures derived from this organ or duct, may be classed as follows:

Malformations.—The fact that both male and female sexual organs, internal and external, develop from anlage which are at first identical makes it *a priori* very probable that disturbances in the differentiation of the sexual apparatus might be brought about through an asymmetrical development of the anlage of the right and left sides, or through the formation of organs peculiar to both sexes, or to a lack of harmony in the development of the internal and external sexual organs. The close relations between the Wolffian body and the developing sexual glands, and the part which the genital portion of the former plays in the development of the genital tract give strong support to the view that anomalies and disturbances in the development of the mesonephros are responsible, at least in part, for some of the malformations of the internal sexual apparatus. Landau and Pick have described a congenital atresia of the cervix and uterus, which they explain as due to a hyperplastic adenomyoma of mesonephric origin. Persistence of portions of the Wolffian body and duct are not infrequently found in cases of pseudohermaphrodism. In pseudohermaphrodismus femininus internus such structures are found in the broad ligament and utero-vaginal wall, sometimes extending to the clitoris. At an early period of development the urogenital tract is represented by the Wolffian body, the Wolffian duct, the Müllerian duct, and the developing ovary or testis. There exists therefore at this time an indifferent stage from which the development proceeds either in one direction to become an ovary or in the other to form a testis. During this differentiation the Wolffian body in part undergoes degeneration and in part persists in the form of certain rudimentary organs, as already mentioned. In the male the Müllerian duct degenerates, in the female only rudiments of the Wolffian duct are preserved. Theoretically it is easily seen how disturbances of this normal differentiation of the sexual glands and ducts might arise, but the actual occurrence of such disturbances remains to be demonstrated, although pathological findings are not wanting to prove the possibility of such.

Teratomata and Dermoid Cysts.—The teratomata and dermoid cysts of the ovary and testis are believed by a number of writers to arise from the Wolffian body and duct. Bandler in particular has defended this view. He holds that in the development of the retroperitoneal dermoid cysts and the retrorectal tumors the Wolffian body, the Wolffian duct, and the caudal intestine play the important rôle. The ovarian dermoids, he believes, contain only ectodermal and mesodermal products, and these arise as the result of the displacement of ectodermal and mesodermal tissues in the formation of the Wolffian duct and Wolffian body. Regarding the duct as of ectodermal origin, and holding the view that the Wolffian body arises from the duct, he therefore regards the derivatives of the Wolffian body as ectodermal. While Bandler's views are not generally accepted (see *Teratoma*), Wilms regards the simple dermoid cysts of the retroperitoneal region and of the broad ligament, and also the mixed tumors of the cervix and vagina, as due to a displacement of ectodermal and mesodermal cells by the Wolffian duct. Von Recklinghausen found in one cyst of the ovary a formation which he regarded as resembling in structure the Wolffian body. The cysts which arise from the remains of the Wolffian body and duct found in the broad ligament, uterine wall and tubes, and also those arising in the cervix, portio vaginalis, vagina, and hymen from the duct of Gärtner may also be classed with the teratomata. Remains of the Wolffian body may also take part in the formation of the mixed tumors of the kidney. If the view that adrenal tissue is also derived from the Wolffian body be accepted the tumors (hypernephromata) arising in the kidney and elsewhere should also be classed as teratomata derived from the Wolffian body.

Tumors Derived from Wolffian Body Rests.—During the last decade much has been written upon the origin of the adenocystomata and adenomyomata of the ovary, broad ligament, tube, uterine wall, cervix, and vagina. These tumors play a rôle of great clinical importance in gynæcological pathology, and in recent years much attention has been paid to their histogenesis and etiology. As a result of the discussion concerning the histogenesis of these tumors the writers upon this subject may be divided into two schools: the one affirming the origin of these growths from remains of the Wolffian body, the other holding that they arise from misplaced epithelium of Müller's duct. Some writers have compromised, in so far as the adenocystomata and adenomyomata of the uterine wall are concerned, by the hypothesis that they arise from a combination of remains of the Wolffian body and the Müllerian duct. The majority of writers, however, agree with von Recklinghausen, who holds that the adenomyomata of the uterine wall may be divided into two groups: those arising in the peripheral layers of the myometrium and those arising centrally or presenting themselves as submucosal tumors, the latter being characterized by the fact that the adenomatous portions unite to form ducts which empty into the uterine cavity. The possibility of the second group arising from the Müllerian duct is admitted. According to Neumann the intramural and subserous adenocystomata of the uterus and tubes arise most probably from embryonal remains of the Wolffian body in connection with remains of Müller's duct or from a combination of the two. The pathological glands and cyst formations found in the ovary arise from the epoöphoral portion of the Wolffian body and correspond to the medullary cords. The tumors of the tubes are of pure paroöphoral origin. The structural resemblances existing between the adenomyomata of the ovary, tubes, broad ligament, inguinal region, round ligament, and cervix, make it very probable that all of these are derived from the Wolffian body, and they may therefore be classed as mesonephric adenomyomata. The various arguments advanced in support of this view may be found in the literature cited below.

The adenosarcomata of the kidney have also been explained as arising from inclusions of portions of the Wolffian body. A similar origin has been ascribed to the adenosarcomata, adenomata, and adenocystomata of the testis and epididymis. Some writers have described glandular structures included within pelvic lymph glands, and have explained such inclusions as remains of the Wolffian body or duct. From such inclusions adenomata, cystadenomata, and carcinomata might arise.

To Aichel belongs the credit of demonstrating that adrenal tissue (cortex) is found in the closest relations with derivatives of the Wolffian body (epoöphoron, paroöphoron, epididymis, paradidymis, broad ligament, etc.). From such accessory adrenal tissue (classed by Aichel as adrenals of Marchand) tumors similar to those arising from the adrenals themselves may come. Pick has reported the occurrence of a hypernephroma of the ovary, and a number of other writers have found adrenal tissue associated with adenomyomata. If the adrenals of Marchand are derived from the Wolffian body, as according to Aichel, such hypernephromata must be regarded as mesonephric. *Aldred Scott Warthin.*

LITERATURE.

Bandler: Arch. f. Gyn., Bd. 61, 1900.
Landau and Pick: Arch. f. Gyn., Bd. 64, 1901.
Neumann: Arch. f. Gyn., Bd. 58, 1899.
Pick: Arch. f. Gyn., Bd. 57, 1898; *Ibid.*, Bd. 64, 1901.
Vassmer: Arch. f. Gyn., Bd. 64, 1901.
Von Babo: Arch. f. Gyn., Bd. 61, 1900.
Von Recklinghausen: Die Adenomyome und Cystadenome der Uterus- und Tubenwandung etc., Berlin, 1896.

WORMIAN BONES, AND FONTANELS.—Wormian bones are small bones varying in diameter from 1 or 2 mm. to more than 20 mm. They are to be found ordinarily at the angles of the sutures of the cranium, and particularly in the lambdoid sutures (Fig. 5248). They take the name of Wormian bones from Claus Wormius, a physician of Copenhagen, who first gave a detailed description of them, though an account of them had been given before by Gœthes.

The Wormian bones are regarded by some writers as evidence of retarded ossification, while by others they are considered to indicate excessive ossification. Doubtless both theories are true. In some instances the usual centres of ossification do not go on to the full development, and the coalescence which occurs in the formation of a perfect bone fails to take place; this is probably what happens in the case of the largest Wormian bones, which are found in the fontanels.

According to Meckel, isolated osseous germs develop

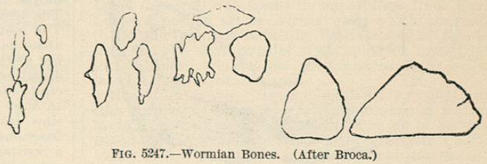

FIG. 5247.—Wormian Bones. (After Broca.)

at the circumference of the occipital bone and unite themselves with it. Sometimes, though rarely, thicker ones develop about the articular regions. When there is an arrest of evolution of one or more of these inferior centres, Wormian bones are formed. Gosse, who considers Wor-

mian bones to be due to an arrest of ossification, attributes their formation to a rachitic or scrofulous condition, to the effects of violent pressure, or to hereditary transmission.

The Wormian bones which present the greatest interest are those which are occasionally found in both the

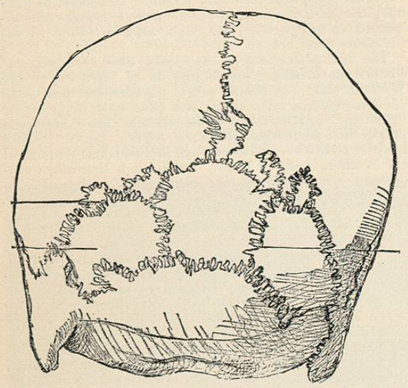

FIG. 5248.—Skull dug up in the Vicinity of the Church of St. Etienne du Mont. (After Jacquart.)

anterior and posterior fontanels. Those in the posterior fontanels are more frequent (Figs. 5248 and 5249). A Wormian bone of large size may be confounded with the interparietal bone, which has given rise to so much ethnological discussion; a number of interesting and learned papers having been written by anthropologists upon this subject. M. Rivero and M. Tschudi, in the "Antiquités Péruviennes," published in 1851, gave drawings showing the bone which Anoutchune, after making studies of the skulls in various museums, announced was to be found in twenty per cent. of the Peruvian skulls. The name, "the bone of the Incas," was given to it, though,

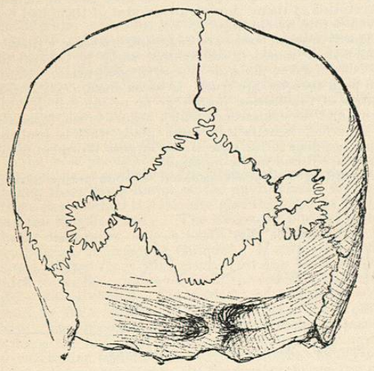

FIG. 5249.—Skull of a Negress, of Sahara. (After Jacquart.)

as Jacquart thinks, unjustly. In an elaborate paper he shows that it is found frequently in other races. The question among savants has arisen as to whether this is a mere anomaly, or a reversal to a lower type, since the interparietal bone occurs in rodents, ruminants, dogs, and cats. The upper portion of the occipital bone develops from four osseous centres, which are separate in early fœtal life, but gradually coalesce. The lateral union is accomplished first, and afterward the two segments above and below unite; when union of these two latter fails to take place, the interparietal bone is formed. The recent line of union shows very well in the skull of the new-born. Cuvier, Milne-Edwards, Geoffroy St. Hilaire, and the other writers already mentioned, insist that a distinction should be made between the interparietal bone and the large fragments occurring in the posterior fontanel, which are the true Wormian bones. Anoutchune, in his researches, made the following divisions in summing up his percentages:

1. Complete: Os Incas, or interparietal bone.
2. Incomplete: The os bi-, tri-, or quadripartitum, or, in other words, the epactal bone, os triquetrum, os quadratum.
3. Os lambdoideum.

It will therefore be seen that these bones may be single or multiple; even as many as eight having been observed by one writer quoted by Geoffroy St. Hilaire.

The effect of Wormian bones occurring in fontanels at childbirth, and the relation which these bear to the

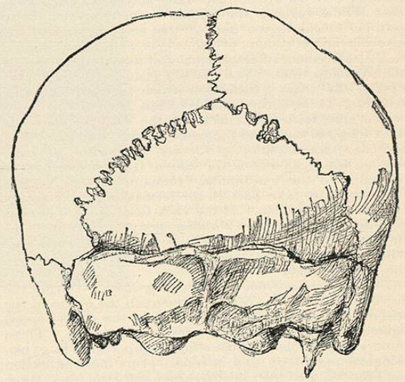

FIG. 5250.—Skull from a Breton, showing Interparietal Bone. (After Jacquart.)

moulding of the skull at that time, are questions which have received some consideration by the author of this paper.

The possibility that such bones, if of considerable size and if they occurred in the posterior fontanel, might exert a detrimental, if not fatal, influence, was suggested by three cases which came under observation at the hospital of the New York Infirmary for Women and Children. The histories of the three cases were almost identical. The mothers were all primiparæ. There was nothing abnormal in the measurements, either of the pelves of the mothers, or of the heads of the infants. The presentations were all of them the usual left anterior occipito-iliac. The labors progressed slowly but normally through the first stage, but the second stage was very slow, lasting between two and three hours in each case. Instruments were not used in any instance, as there was a constant expectation that the labors would terminate naturally. The irregularity of the fontanel could be very easily detected. In the first two cases it gave rise to confusion in determining the position; but in the third and last case, the attendant, having had the experience with the two others, easily discovered that the posterior fontanel contained Wormian bones (Fig. 5251). Each child was still-born. The skulls of two were preserved, but

the family would not permit an autopsy to be made upon the third child, which was taken away for burial. It could, however, be easily felt that Wormian bones were

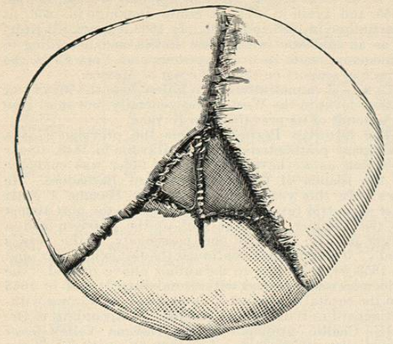

FIG. 5251.—Wormian Bones, as seen in the Author's Case.

present and that their shape and number were the same as in the other two cases, there being two triangular pieces, one larger than the other.

The writer believes it to be possible that during labor these bones may prevent the usual overlapping of the sutures of the skull, and that during the second stage—*i.e.*, when the pressure is greatest—they may even inflict serious, possibly fatal, injury upon the contents of the cranium. The question then arises, Could this be avoided by the prompt and early use of instruments? It is hoped that obstetricians will record cases of a like nature, and report upon them with a view of determining the effects produced by Wormian bones during the progress of childbirth. *Grace Peckham Murray.*

BIBLIOGRAPHY.

Bianchi, Stanislao: Sul modo di svilupparsi dell' osso Wormiano epipterico nell homo. Lo Sperimentale, Gennajo, 1889, pp. 34.
Broca: Instruction craniologique. Bulletin de la Société d'Anthropologie, 1875, p. 138.
Chambellan: Études anat. et anthropol. sur les os Wormiens, 1883.
Cuvier: Ossements fossiles, t. ii. Anat. Comp., t. ii., p. 701.
Deutsches Arch. für Physiol., vol. i., p. 591.
Dorsay, G. A.: Wormian Bones in Artificially Deformed Kwakiutl Crania. Am. Anthrop., 1897.
Fischer: De osse epactal seu Goethiano, Moscow, 1811.
Gosse (Père): Dissertation sur la race du Pérou. Mém. de la Soc. d'Anthropologie, t. i., p. 173.
Gruber, Wenzel: Zu den in der Sutura Squamosa auftretenden Knochen. Anatomische Notizen. Arch. für path. Anat. und Physiologie, etc., 1878, pp. 480.
Jacquart: De la valeur de l'os epactal ou partie supérieure de l'écaille occipitale restée distincte comme caractère de race en anthropologie, etc. Monograph, 1875; Journal d'Anatomie, 1865.
Hektoen, L.: Anatomical Study of a Short-limbed Dwarf. Amer. Journ. Med. Sciences, May, 1903. (Case of a micromelic dwarf, forty-five years of age, in whose skull there were one hundred and seventy-two Wormian bones.)
Meckel: Considérations anatomiques et physiologiques sur les pièces osseuses qui enveloppent les parties centrales du système nerveux et sur leurs annexes. Journ. Complémentaire du Dictionnaire des Sciences Médicales, t. ii., p. 226.
Milne-Edwards: Leçons sur la Physiologie, t. x., p. 312.
Parkinson, J. T.: Abnormal Cranial Sutures. Indian M. Rec., Calc., 1901, xx., p. 8. (Reports a case of autopsy on a woman aged fifty years, in which he found a large Wormian bone in the posterior fontanel.)
Peckham, Grace: Wormian Bones in Fontanels, and their Effect in Childbirth. Medical Record, April 14th, 1888.
Rivero and von Tschudi: Antiquités Péruviennes.
St. Hilaire, Geoffroy: Philosophie Anatomique, t. ii., p. 51.
Topenjard, T.: Eléments d'anthropologie générale, p. 789.

YELLOW FEVER: HISTORY AND GEOGRAPHIC DISTRIBUTION.—The geographical range of yellow fever is more restricted than that of any other acute infectious disease, and within the area of its prevalence it is essentially a disease of the littoral, and especially of seaport cities. While occasional epidemics have occurred upon the southwest coast of the Iberian peninsula, the disease, as an epidemic, is unknown elsewhere in Europe, and there is no evidence that it has ever invaded the great and populous continent of Asia. In Africa it is limited to the west coast. In North America, although it has occasionally prevailed as an epidemic in every one of our seaport cities as far north as Boston, and in the Mississippi Valley as far north as St. Louis, it has never established itself as an endemic disease within the limits of the United States. Vera Cruz, and probably other points on the gulf coast of Mexico, are, however, at the present time, endemic foci of the disease. In South America it has prevailed as an epidemic at all of the seaports on the gulf and Atlantic coasts, as far south as Montevideo and Buenos Ayres, and on the Pacific along the coast of Peru.

The region in which the disease has had the greatest and most frequent prevalence is bounded by the shores of the Gulf of Mexico, and includes the West India islands. Within the past few years yellow fever has been carried to the west coast of North America, and has prevailed as an epidemic as far north as the Mexican port of Guaymas, on the Gulf of California.

The idea that yellow fever may originate *de novo*, within the area of its occasional prevalence, was entertained by many medical authors during the first half of the past century. Thus Cornillac (1886) says: "In the zone which is habitual to it, yellow fever may develop at a given moment without apparent cause. It is born spontaneously at a point of this zone, or at several at a time, and neither the temperature, moisture, barometric pressure, electricity, nor finally effluvia given off from the soil, can explain this sudden invasion." It is true that, in localities where the disease is endemic, cases occur which are not directly traceable to importation, but it is also true that in the principal endemic foci of the disease, such as Vera Cruz, Havana, and Rio Janeiro, yellow fever was at one time unknown, and we have reliable historical data fixing the date of its importation. In short, a careful consideration of the historical evidence relating to the disease gives no support to the idea of independent local origin, any more than in the case of smallpox, cholera, or other specific infectious diseases.

But the early history of the disease is involved in obscurity, and we are at present unable to determine whether, as maintained by some, it was endemic at certain points on the shores of the Gulf of Mexico at the time of the discovery of the "new world," or whether it was imported to the West Indies from the African coast, as maintained by others. The early historians, Herréra, Oviédo, Rochefort, and others, make reference to epidemics among the natives which occurred prior to the discovery of the Antilles, and to fatal pestilential diseases among the first settlers of these islands; but their accounts are not sufficiently exact to enable us to affirm that the disease referred to by them was yellow fever. The west coast of Africa was discovered and colonized to some extent before the discovery of America, but the first authentic accounts of the prevalence of yellow fever on this coast date back only to the year 1778, over two centuries after the first settlements had been established. On the other hand, this very epidemic of 1778 at St. Louis (Senegal) was traced to importation from Sierra Leone, a portion of the African coast which, according to Hirsch, "appears to be the headquarters of the disease, and the starting-point of its epidemic inroad into the territories lying to the north and south, as well as into the West African islands."

Rochefort, whose "Histoire naturelle et morale des isles Antilles de l'Amérique" was published in Holland in 1558, says of the West Indies: "The air of all those islands is very temperate, and healthy when one is accustomed to it. The *peste* was formerly unknown there as well as in China and other places in the Orient; but some years since the islands were afflicted with malignant fevers, which the physicians considered contagious. The bad air was brought there by some ships which came from the coast of Africa, but at present we hear nothing more of these maladies."