functional relationship between the thyroid gland, the pituitary body, and the genital organs. The almost constant genital insufficiency found in conditions of athyroidea is so well recognized that I need not do more than mention it. That a similar peculiarity may be associated with lesions of the pituitary body is perhaps not so widely known. Some years ago I performed an autopsy on a female about thirty years of age, who died with symptoms of a basal tumor of the brain. The genitalia were markedly infantile in size and appearance. A tumor of the hypophysis was found, although there were no signs of acromegaly. A similar case is one reported by Babinski (Society of Neurology, June 7th, 1900), who found signs of infantilism, viz., lack of body hair, amenorrhœa, an excess of fat, in a girl of seventeen, but without acromegaly, who post mortem exhibited a tumor of the pituitary. Analogous peculiarities have been found in the male in such cases. While it is true that children the subjects of atrophy of the genitals are often small, instances of the reverse are not unknown. Eunuchs are often of more than normal height. The increase in length is most manifest in the lower limbs, a peculiarity that is to be observed also in the capon, or castrated chicken, and in the ox. The relationships suggested by the above observations might be depicted graphically in the diagram (Fig. 5124).

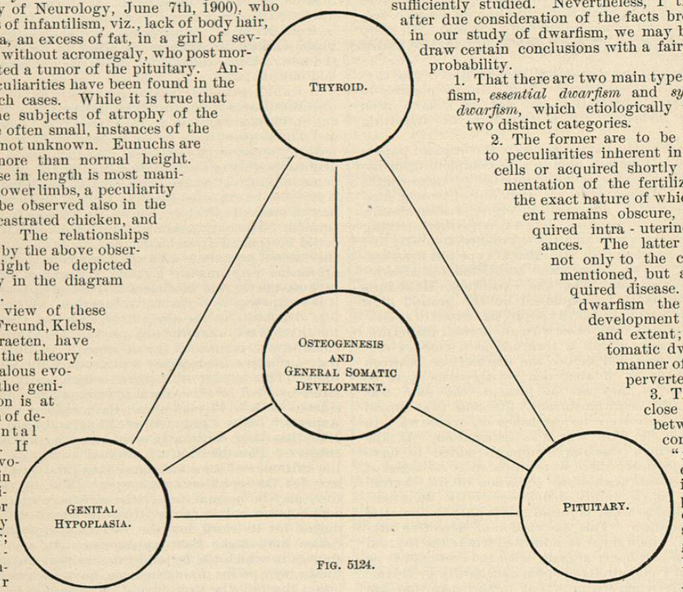

FIG. 5124.

It is in view of these facts that Freund, Klebs, and Verstraeten, have advanced the theory that anomalous evolution of the genital function is at the bottom of developmental dystrophy. If genital evolution be in excess, gigantism or acromegaly will occur; if defective, infantilism or dwarfism results. It seems to me, however, that this is much too strong an assertion, and one that is not supported by the facts, as we know them. Such a theory supposes the existence of an internal secretion in the case of the genital organs, to wit, the testes and ovaries, the evidence for which is not beyond question. Further, the association between genital anomalies and developmental peculiarities is not necessarily direct, as cause and effect, but may be indirect through some third factor. We have experimental evidence to show that defect of the thyroid will produce hypoplasia of the genitalia, but not the converse, and in this case as a matter of fact genital hypoplasia is simply part and parcel of a systemic developmental defect. In the case of the pituitary evidence is scanty, inasmuch as experimentation, except in the single particular of pituitary feeding, is extremely difficult. The evidence, so far as I can gather it from autopsies, seems to favor the view that certain lesions of the pituitary, provided they arise early enough, may prevent the proper development of the genital organs. There is absolutely no evidence to prove that hypoplasia or any other pathological condition of the genitalia has produced disease of the pituitary. Could it do so, one would suppose that, considering the very respectable number of cases of aplasia and hypoplasia of the genital organs that have been described, some abnormality of the pituitary body would occasionally have been noted. This is, however, not the case. It would seem more probable that genital hypoplasia, if not indeed always an effect, is an associated condition merely. In regard to the factors at work in this very interesting but obscure condition of anomalous development, the sum and substance of the whole matter is that our views cannot attain finality until we know much more of the chemistry of the internal secretions and of metabolic processes generally. Hitherto the anatomical peculiarities and the pathological chemistry of the thyroid and pituitary glands in cases of dwarfism and giantism have not been sufficiently studied. Nevertheless, I think that after due consideration of the facts brought out in our study of dwarfism, we may be able to draw certain conclusions with a fair degree of probability.

1. That there are two main types of dwarfism, *essential dwarfism* and *symptomatic dwarfism*, which etiologically belong to two distinct categories.

2. The former are to be attributed to peculiarities inherent in the germ cells or acquired shortly after segmentation of the fertilized ovum, the exact nature of which at present remains obscure, or to acquired intra-uterine disturbances. The latter are due, not only to the causes just mentioned, but also to acquired disease. In true dwarfism the defect of development is in time and extent; in symptomatic dwarfism the manner of growth is perverted as well.

3. There is a close association between such conditions as "fœtal rickets," cretinism, osteopsathyrosis, osteoporosis, osteogenesis imperfecta.

4. Fœtal rickets so called has nothing to do with rickets as it is ordinarily understood.

5. The term *chondrodystrophia fœtalis* is a misnomer, inasmuch as it implies a local lesion, and, moreover, attributes it to a nutritive cause, whereas not only the cartilage but the bone and soft tissues are involved. Virchow is probably correct in regarding it rather as a developmental anomaly.

6. The three types, chondrodystrophia hyperplastica, chondrodystrophia hypoplastica, and chondrodystrophia malacica, are probably not varieties of the same disease.

7. Chondrodystrophia of Kaufmann's first or cretinoid type is probably a modified cretinism.

Albert George Nicholls.

EMBALMING.—This article is intended to furnish useful information to the medical practitioner who may be called upon to preserve a dead body for a limited period of time. This duty can occur only when it is not possible to secure the services of the professional embalmer.

When the object in view is simply to keep the dead human body from undergoing decomposition for a few days, there are a number of methods from which the physician may make a choice. Thus, for example, when it is possible to obtain ice in plenty and the services of a person who can be trusted to renew the supply as frequently as may seem desirable, this method of preventing or at least postponing decomposition is probably as good as any other that can be suggested. But it is often impossible to obtain ice in the desired quantity, or the period of time during which the dead body must be preserved is longer than is compatible with the employment of this method. Under these circumstances it becomes necessary to fall back upon some other procedure, one, for example, which depends for its efficacy upon the employment of chemical reagents. Among the large number of such procedures the physician may be compelled, by reason of the circumstances in which he happens to be placed, to select one of the simpler and less efficacious methods. I will therefore mention a few of these first, reserving to the last an account of the steps which one must take if it be desired to preserve the dead body in good condition for a reasonably long period of time—for months or even years. It is only to such a procedure that the term embalming may with propriety be applied.

Methods Suited to the Preservation of a Dead Body for a Short Period of Time.—(*a*) Place the body, without opening it, and as soon as possible after death, in sawdust mixed with powdered zinc sulphate. The skin, it must be remembered, has a tendency, under continued exposure to this reagent, to assume a yellow color.

(*b*) Open and clean the body and viscera, and keep all the parts that can be reached saturated with a corrosive sublimate solution (1 in 1,000) or a formalin mixture (of a strength of from five to ten per cent.). Cloths saturated with the same fluid should be wrapped around the body, and enough of the preservative should be added from time to time to keep the cloths constantly moist.

(*c*) Open a femoral artery at the apex of Scarpa's triangle and inject a solution of arsenous acid (eight drachms in 9 kgm. of alcohol; cinnabar, q. s.). Then open the abdominal cavity, wash out the cavities of the stomach, bladder, and intestines, and inject the preservative solution into them freely.

(*d*) Camphor dissolved in alcohol, in the proportion of 1 part of the former to 6 of the latter, can be used effectively as a preservative fluid. Another mixture is the following: Oil of turpentine, 5 pints; Venice turpentine, 1 pint; oil of lavender, 2 ounces; oil of rosemary, 2 ounces; vermilion, q. s.

Another mixture, which has been used with some measure of success in England, is the following:—To one pint and a half of glycerin add three quarters of a pound of white arsenic (arsenous acid) and boil; afterward add one gallon of pure glycerin. Still another useful mixture is one composed of alcohol and glycerin in equal parts (each representing forty-seven and a half per cent. of the entire bulk), and carbolic acid to the extent of five per cent. A small quantity of arsenic (about one per cent.) may, if desired, be added to the mixture.

All of the ingredients mentioned in the preceding paragraphs are, as a rule, easily obtainable, and the manipulations required call for no special skill. At the same time it must be remembered that these procedures can at best retard decomposition for only a relatively short time. Thoroughly satisfactory results can be obtained only through the more elaborate and painstaking methods adopted by the professional embalmer.

An Effective Method of Embalming.—Mr. Frank E. Campbell, of 241 West Twenty-third Street, New York City, a recognized authority in embalming, has very kindly allowed the use of the following description of the method of embalming which he prefers:

"I. Bathe and dress (in underclothing) the body to be embalmed, and place it upon a board supported in an inclined position. Close the mouth and eyes, and securely plug all orifices.

"II. Place within easy reach all the instruments and various objects that will be needed, viz., scalpel, aneurism needle, blunt hook, scissors, arterial tube, five six-inch lengths of linen thread for tying about the vein and artery when raised, a threaded needle suitable for sewing up incisions, a bulb syringe, a large bottle filled with the embalming fluid, a sponge, a supply of cotton, etc. Sink the suction end of the tubing of the bulb syringe into the embalming fluid contained in the bottle and squeeze the bulb several times in order both to fill it with the fluid and to force out the air which it contains. When these objects have been accomplished the discharge end of the syringe should also be introduced into the bottle, in order that no leaking may take place.

"III. Connect the aspirating pump, by means of tubing and a gooseneck, with an empty aspirating bottle suitable for holding the blood to be withdrawn from the body. Then attach to the free end of the tubing a long silk-covered vein tube, or, better still, a flexible wire catheter.

"IV. Expose the femoral vessels in Scarpa's triangle over an area two or three inches in length and dissect them clean. Then, with one of the lengths of thread already prepared, tie the artery at the lowest possible point with a firm knot, for the injection is to be made only in an upward direction.

"V. Next, pick up the vein and treat it in the same manner as the artery, remembering, however, that the structure of the vein is fragile and that it may easily be punctured or torn. Make a slit, about a quarter of an inch long, lengthwise in the vein. As blood will escape from the vessel when it is thus opened, it is well to prevent this by making pressure upon the vein with the finger or with a blunt hook. Insert the vein tube into the opening in the vein and push it upward to or near the right auricle of the heart. Pass a piece of the thread snugly, but not too tightly, around both vein and tube, and tie it with a simple knot. Attach the tubing of the aspirating pump and begin to pump the air from the bottle. When the air has been withdrawn from the bottle, the vacuum will draw the blood from the body by way of the vein tube. If no blood flows into the bottle after the air is pumped out, it may be assumed that a clot of blood has probably entered the free end of the tube in the vein, or else that there was no blood at the point where the end of the tube rested. Draw the tube slowly downward, and, if there is still no flow of blood, push the tube as far back into the vein as it will go, detach the rubber tubing from it, and, by means of the bulb syringe, inject a bulbful of aqua ammoniæ, for the purpose of dissolving the clotted blood. After this has been done, resume the operation of aspirating. When all the blood that can possibly be removed in this manner has been aspirated, withdraw the tube for about one-third its length, and let it remain in the vein. (Always keep a vacuum in the bottle.)

"VI. Next, pick up the artery, slit it, and insert the arterial tube with care. Then pass the remaining piece of thread around it as far up as you can, and tie it with a simple knot. Attach the bulb syringe (previously made ready) to the tube and begin the injection slowly. When about one-third of a quart of the preservative fluid has been injected, stop and begin once more to aspirate the vein, for by this time the fluid injected into the artery is forcing the blood ahead of it, and the blood will flow again more freely.

"VII. Administer the injections and the aspirations in alternation until a quantity of the preservative fluid varying from three pints to five or six pints, according to the size of the body, shall have been injected, and also until a clear fluid, and not a bloody one, escapes from the vein tube as a result of the aspiration. Any discolorations of the face, ears, or neck, will probably by this time have disappeared. If it should be found, however, that a slight discoloration still remains in the lower part of the ears, or in the neck, a slight rubbing will in most cases remove it.

"VIII. After it is seen that only clear fluid flows into the blood bottle, draw out the vein tube and tie the vein tightly.

"IX. Continue the injection of fluid into the artery until the veins of the temple, the large vein on the forehead, and the jugular vein, as well as the veins in the arms and hands, indicate that they are filled. Then re-

move the arterial tube and tie the artery tightly with the same thread that held the tube in place. Pack the wound well with moist 'lintine,' and sew up the incision with the 'baseball' stitch, drawing the edges snugly together.

"The arterial work is now completed.

"X. For successful work on the cavities of the body there will be needed a twelve-inch trocar, an instrument that will reach every point where it is desirable to apply the preservative fluid. At the same time it must be remembered that much damage can be done with a trocar of these proportions if it be not used with care. It is therefore important to avoid injuring the trunks of arteries and veins, and the various organs.

"Insert the trocar just far enough to penetrate the abdominal wall, and connect it with the aspirating pump. Draw the gases and liquids through it into the empty bottles. Through his knowledge of the anatomical relations of the different organs the physician should be able, without removing the trocar from the opening in the abdominal wall, to carry out successfully the following procedures: He should puncture the stomach and draw from it all the gases and liquid contents, and then, after he has accomplished this, and without removing the trocar, he should inject two bulbfuls of the embalming fluid into the cavity of this organ. The aspirator should then be re-attached to the trocar and the latter should be made to pierce the intestines, both the large and the small. In this way it will be possible to remove any gases or fluids which these organs may contain. The bladder should be treated in the same manner. Never puncture the liver, as it cannot be aspirated or injected, and the original arterial injection may be trusted to preserve it from decomposition. As a final step connect the trocar with the syringe and copiously flood the intestines with the preservative fluid.

"Where death occurs from pulmonary tuberculosis or from pneumonia, turn the point of the trocar upward toward the lungs and cause it to penetrate into the thoracic cavity as far as it will reach. Aspirate first from one pleural cavity—for example, the right—and then from the other; care being taken, after the aspiration of the first pleural cavity, to withdraw the trocar well into the abdominal cavity before the attempt is made to push it on into the second. When both pleural cavities have been thoroughly aspirated, flood each of them with embalming fluid in a cautious manner and then withdraw the trocar altogether.

"With needle and thread close the opening in the abdomen by means of a drawstring suture. Pack the nose with lintine thoroughly moistened with embalming fluid, and pack the rectum and vagina in the same manner. The embalming will then be completed."

While Mr. Campbell does not state which particular preservative mixture he considers the best, it is fair to assume that sufficiently good results may be obtained by the employment of any one of the half-dozen or more standard embalming fluids which are offered for sale in the shops. *William Sohier Bryant.*

EMPHYSEMA, SUBCUTANEOUS.—By this term, or pneumatosis, is meant the presence of air or other gaseous compounds beneath the skin.

The resultant SYMPTOMS are these: a swelling covered with skin of either normal appearance or, if the pressure upon it be great, rather pale; this tumor pits upon pressure, as in the case of anasarca, but the pitting more quickly disappears when the swelling is due to the presence of air. Palpation causes a peculiar crackling or crepitation in the subcutaneous tissues. If the air have entered from without, a wound or puncture can generally be discovered; if from within, expiratory efforts with closed lips and nostrils will generally produce immediate increase in size. It is possible for the whole subcutaneous tissue to become inflated from any superficial part of the body as a starting-point.

In case the emphysema is that of decomposition, there may be an altered hue of the integument; but the discoloration, of course, is entirely independent of the emphysema.

Subcutaneous emphysema may result from causes either traumatic or pathological. Among instances of the latter may be mentioned ulcers or abscesses communicating with the air passages, and, as already suggested, gangrene.

We may include in the discussion of this subject emphysema of other parts external to the lungs, such as mediastinal and submucous collections of air.

In the *head*, orbital emphysema sometimes follows a blow of sufficient violence to break one of the thin and fragile bones of the inner wall of the orbit—the lachrymal or the orbital plate of the ethmoid. If, soon thereafter, the patient blows his nose, the compressed air finds a ready exit from the nose into the orbit, and distends the lids.

Eustachian emphysema: here an ulcer of the tube, or a rupture following awkward Eustachian catheterization, has led to distention and approximation of the pharyngeal walls by the dissecting air. Blowing the nose and the Valsalvian experiment increase the emphysema in these cases. Von Tröltsch[1] mentions a case, within his own experience, in which dysphagia consequent upon such emphysema persisted for five days.

In the *neck* we may have escape of air as a result of foreign bodies, ulcers, or abscesses perforating the œsophageal, laryngeal, or tracheal wall; but emphysema will not be produced if, as a result of the perforation, a broncho-œsophageal fistula be established.

Ulcers of the larynx or trachea may lead to submucous dissection by air. Wounds of the neck penetrating these parts may be followed by subcutaneous emphysema if there is not free escape for the expired air. Under these circumstances inflation of the skin has been known to occur over an area extending from the head to the scrotum.[2]

As a rule, the consequences are not serious; but Holmes[3] quotes Hilton as stating that emphysema about the phrenic nerves may so interfere with their functional integrity as to cause death.

During tracheotomy, and afterward if much inspiratory difficulty be present, Champneys[4] finds that anterior mediastinal emphysema, and even pneumothorax, are liable to occur; and this is especially so if artificial respiration by Schultze's method be employed.

In the *chest* we may have the surgical symptom in question produced in several ways. Pathologically, as by the opening of a vomica or abscess of the lung into the parietes of the chest, the two pleural surfaces being adherent at the point where the abscess perforates. (If the parts were not adherent at this point, there would, of course, simply be a peumo- or a pyopneumothorax.) Emphysema sometimes complicates wounds of the chest-wall, both the penetrating and the non-penetrating varieties. In the latter instance, the air which enters the wound from without during one movement of respiration is prevented in a valvular way from escaping during the opposed movement, and is disseminated by the muscular and tegumentary pressure upon it during this movement. In the case of wounds penetrating the parietal pleura only, we may, besides the consequent pneumothorax, have a subcutaneous emphysema from the same reason.

Wounds that penetrate the lung, and a puncture of the lung by a fractured rib, are alike liable to produce emphysema, air escaping from the lung with the same result as in the case last given.

An additional and rare variety of traumatic emphysema of thoracic origin is that consequent upon rupture of air cells by violent expiratory efforts, with a closed or partially closed glottis, as while coughing, straining, or blowing a wind instrument. Here the air makes its way between the lobules, and, unless it ruptures the pleura, producing pneumothorax, it escapes at the root of the lung into the mediastina, and thence into the cellular tissue of the neck, becoming subcutaneous.

Guttman[5] says: "Most of the cases of this variety of emphysema are observed in connection with croup, diphtheritis of the larynx, whooping-cough, and bronchitis in children, and with advanced pulmonary emphysema in the aged."

In 1884 I met with the only case which, as yet, I have found complicating whooping-cough. The patient, a child of two years, had been suffering for about three weeks, the parents said, from violent fits of coughing. I was called to treat the sudden appearance of "dropsy" in the case. I found the skin of the head, neck, and chest distended, crepitation everywhere well marked, and no dropsy. Whenever the child coughed the swelling increased in size suddenly, apparently causing distention first in the left supraclavicular region. The respiration was rapid, but seemingly free; the pulse rapid and feeble. The child died within a few hours. Unfortunately, no autopsy was allowed.

In the *abdomen* we may have subcutaneous emphysema from ulcerative perforation of the stomach or intestine at a point previously adherent to the abdominal wall. Unless such adhesions prevent it, gas will escape from the viscera into the peritoneal cavity.

TREATMENT.—As a rule, air beneath the skin is of slight consequence and requires no treatment, becoming absorbed after a time. If, however, important parts—as the phrenic nerves, or the larynx, trachea, etc.—are subjected to a degree of pressure injurious to respiration, or if the subcutaneous air is spreading further and further, we may employ pressure at the point of escape, or may make incisions through the skin to give relief to tension, or both.

Subcutaneous emphysema possesses an interest for us outside of its pathological or accidental causation. It has often been induced intentionally by the malingerer; and, moreover, its production has been seriously advocated by Dr. H. R. Sylvester[6] in an article entitled "On Life-saving from Drowning, by Self-inflation." Here it is recommended that those in peril of the deep shall make a small puncture or cut in the cheek, leading *from* the mucous membrane about opposite the first molar *to*—but not through—the superficial fascia and skin; and then, closing the lips tightly, they shall proceed to blow themselves up, until the skin of the head, neck, and chest is distended. Dr. Sylvester alleges that a moderate and quite painless and harmless inflation is ample to keep one afloat without effort.

It seems probable that Vidocq refers to such a practice when, in his memoirs—as mentioned by Gavin,[7]—he asserts that he could make his head swell like a bushel, without giving pain, and that he could remove all traces of it by the day following.

In order to test the degree of pain, and the subjective effects of such distention upon the skin, I some time ago performed the following experiment, assisted by my friend Dr. F. A. Manning: Having connected, by a piece of rubber tubing, a hypodermic needle with my compressed-air receiver, I forced air beneath the skin of my left forearm until the limb was much increased in size, the skin tense, and emphysematous crepitation could be felt from wrist to armpit. The pain was very trifling in amount. The distended skin was somewhat anæsthetic; whereas before the injection I could distinguish separate points on the anterior surface at an average distance of 4 mm., immediately thereafter I could name them only when they were 10–15 mm. apart. Still, pinching and pricking were distinctly painful. The emphysema thus induced was slow in disappearing. It was still somewhat noticeable on the third day after the experiment.

As regards the production of emphysema upon the human subject with intent to deceive, it has been employed to simulate hernia, hydrocele, hydrocephalus, ascites, etc. Gavin (*op. cit.*, p. 389) says: "It is a trick used every day by butchers, and has been known from time immemorial by the Ethiopians and mendicants of Abyssinia." Beck[8] quotes Sauvage's "Nosology" regarding a mendicant who "gave his child all the appearances of hydrocephalus by blowing air under the tegument of the head near the vertex." He also cites a case of emphysema of the abdominal parietes, induced by a woman who wished to feign dropsy.

Sir George Ballingall[9] declares that the artificial production of this for the simulation of other diseases is regulated by a recipe current in the British army.

The differential diagnosis of the tumors so caused presents no difficulty. *Robert H. M. Dawbarn.*

[1] Treatise on the Diseases of the Ear.
[2] Plaies du larynx, de la trachée, etc., par le Dr. Paul Heurteloup, Paris, pp. 53–77.
[3] Surgery, vol. ii.
[4] Med. Chir. Transactions, 1882, p. 75 *et seq.*
[5] Handbook of Physical Diagnosis, p. 27.
[6] London Lancet, January 3d, 1885, and August 29th, 1895.
[7] Gavin on Feigned Diseases.
[8] Medical Jurisprudence, vol. i., p. 74.
[9] Military Surgery, p. 584.

ENTEROPTOSIS.—(Synonyms: Glénard's Disease, Splanchnoptosis [Stiller].)

INTRODUCTORY AND HISTORICAL.—Anomalous downward displacements of the abdominal viscera were described by Virchow, Leube, and others, several years before Glénard's monograph appeared. In this article, which was published in 1885, Glénard set forth his views upon enteroptosis and connected therewith certain nervous phenomena which have since borne the name of "Glénard's disease." Prominent among the features of this symptom complex, which Treves is pleased to call "that medley of symptoms," are downward displacement of the stomach, a movable right kidney, various digestive disturbances, and often very typical neurasthenic symptoms.

The interest thus awakened in postural anomalies of abdominal organs by Glénard's article is as keen to-day as it was eighteen years ago, and many physicians have verified the statement of that author which he made with such enthusiastic earnestness at the close of his early monograph. "I can affirm," wrote Glénard, "that the physician who will follow my directions and strive to verify my statements in such cases will find in his practice the satisfaction which a positive diagnosis gives to both physician and patient, from which alone a proper prognosis can be made, and that satisfaction, the greatest of all, which directs the treatment and avoids for the patient the trial upon him of so many remedies, while at the same time it secures him relief and prevents the physician himself from falling into therapeutic scepticism."

The investigations made by the French were rapidly followed by similar work among the German clinicians, with the result that another view of the cause of the displacements was advanced. Then the English and American writers contributed articles and case reports upon the subject, dealing with the nature and anatomy as well as with the etiology and treatment of the disease. One cannot close this introductory historic note without mentioning the fact that the lectures of Arthur Keith on the nature and anatomy of Glénard's disease comprise one of the best studies upon this phase of the question yet published and will be duly recognized later in this article.

The application of the term Enteroptosis.—It would appear that Glénard's original article included a description of a displacement of the intestines alone. The Germans broadened the application of the term and made it to include, in most instances at least, ptosis of all the abdominal viscera. Schwerdt, however, pleaded that the term was applicable when at least two of these organs suffered downward dislocation. If, on the other hand, one would wish to be specific, the organs so displaced might be specified by *gastroptosis*, for instance, or *nephroptosis*, and so on.

ETIOLOGY.—The study of visceral ptosis, from the etiologic standpoint, has provoked a variety of theories differing so widely that it is manifestly impossible to find one theory broad enough to explain all cases. It has been urged that enteroptosis is a congenital anomaly (Stiller); that it is a constitutional ailment (Schwerdt), a general atony of nervous system and muscles; that it is the result of wearing corsets, or tight waistbands with heavy skirts (Meinert); that it is a result of a neurasthenia basis (Charcot); that rapid emaciation or a severe illness

may account for it; that to overlifting or frequent pregnancies many cases may be traced; that adhesions, the result of peritoneal inflammation, may pull down one organ after another (Treves); that it is a reversion to a fœtal or an embryonic type (Rosengart); and the latest, and by no means the least ably supported theory, is that which would regard enteroptosis as "a result of a vitiated method of respiration," and assign it to a place among respiratory diseases (Arthur Keith).

It is admitted, we believe, that there are several factors which maintain the various abdominal organs in position, and of these the most important are: (1) The intra-abdominal pressure, and (2) the ligamentous attachments of the viscera to the body walls. These two are so important that when either fails ptosis may result. Hence it may be said that these factors are those by which the normal postural relations of the viscera are maintained. It is not difficult then to believe that any cause, or number of causes, which lowers the intra-abdominal pressure by exhausting the muscular tone, or which weakens or stretches the supporting ligaments, would readily alter the relation of the organs—especially of the heaviest organs or of those with weakest supports—and result in ptosis.

Thus, as one reviews the various etiologic factors suggested above, one finds most of them—perchance all of them—applicable to a large number of cases. The last theory suggested, however, "enteroptosis as a result of a vitiated method of respiration," certainly requires some explanation. When Dr. A. Keith remarks that enteroptosis is a result of a vitiated method of respiration, he means, doubtless, that faulty movements of the diaphragm, resulting from a variety of causes, determine visceral ptosis, and that whereas under normal relations of the muscles of inspiration—the diaphragm, the external intercostals, and the interchondrals—to the muscles of expiration, and chiefly those of the abdominal walls, there is but slight downward displacement of the viscera. The organs swing and move upon each other, often as much forward as downward, maintaining their normal positions and postural relations. As a result of various conditions the inspiration muscles may "gain the upper hand and the muscles of expiration yield," and ptosis is induced. This writer strongly emphasizes the importance of the diaphragm in bringing about the changes incident to enteroptosis. He remarks that the inspiratory downward displacement, if once the diaphragmatic supports commence to yield, is one of the factors in the causation of visceral ptosis; and while minimizing the function of visceral bonds in the causation or prevention of enteroptosis, he maintains that the active contraction of the crura is the most important factor in the production of visceral ptosis, acknowledging in the same article that while the supports of the diaphragm are threefold—abdominal, costal, and thoracic—doubtless that derived from the abdominal muscles, the muscles of expiration, is of the most importance.

At all events, one is justified in ascribing highest importance to the action of these muscles, since it appears that the normal respiratory swing of the organs, the stomach, liver, and spleen, gives place to downward displacement in the presence of relaxation of the abdominal support, or what is even worse, perhaps, when the body cavity is constricted by corsets or distorted by disease, the action of the diaphragm pushes the organs down. Corsets when applied prevent an inspiratory downward displacement of the liver, but when removed the relaxed condition of the muscles—being too weak to oppose the dropping—favors ptosis.

"The condition essential to the displacement of either kidney is a diminution of the subdiaphragmatic space which may be accounted for, (1) by compression of the thorax with clothing, (2) by a partial collapse of the thoracic walls, following chest or spinal disease, and (3) by the permanent contraction of the diaphragm, which follows a relaxed or paretic condition of the abdominal walls." The left kidney is not displaced so frequently as the right, from the fact that "the left hypochondrium is provided with a safety valve in the shape of the splenic flexure of the colon." So that when the subdiaphragmatic space is lessened, the "colon is extruded and the other organs are left undisturbed." Again, the close attachments of kidney to spleen, and of spleen to diaphragm, prevent dislocation. From the domain of comparative anatomy one may gather some clew also to this condition. It is affirmed that with the evolution of the orthograde posture and the orthograde type of respiration, mesenteric adhesions, which appeared one after the other in five different areas, spread out and bound the alimentary tract more and more to the abdominal wall as the animal became more and more orthograde in posture. Hence, various degrees of extent and strength of mesenteric adhesions due to arrest of development or otherwise, may help to account for visceral ptosis, in some instances at least.

Whatever the active causes may be which bring about enteroptosis, it may be said that the intra-abdominal pressure is lowered, the organs may be pulled down, and there is more than a mere probability that a congenital predisposition exists in the character of the supporting tissues of the organs, whether these be ligaments or muscles, or both.

Clinical Features.

Symptoms.—Enteroptosis does not invariably give rise to symptoms, or, in other words, a considerable degree of downward displacement of one or more of the abdominal organs may exist without calling forth any complaints. On the other hand, however, whether as a result or not cannot always be established, one finds a variety of symptoms referable to the digestive tract, the nervous system, the condition of the blood, and so on; in a word, all manner of subjective symptoms may exist, from the severest abdominal pain, usually spasmodic, to the mildest paræsthesia.

It must be admitted, however, that, prominent and more frequent among the complaints urged by the subjects of enteroptosis, are those of digestive disturbances—distressful weight after food, referred to the right upper quadrant; sometimes spasmodic pain; sometimes vomiting, flatulence, constipation, and throbbing in the abdomen. The distress, which in pronounced cases is for the most part constant and referred to the upper quad-

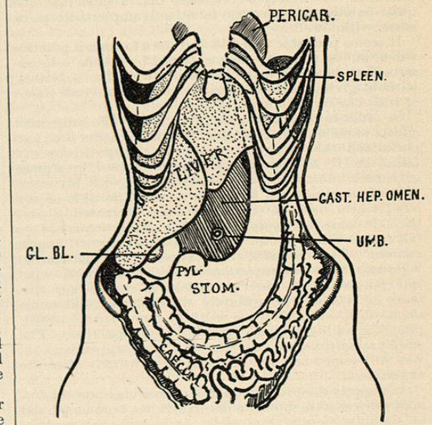

Fig. 5125.—Partial Ptosis of the Viscera in a Woman Aged Forty-five Years. The duodenum descended as far as the brim of the pelvis. (Keith.)

rants, is promptly relieved on assuming the horizontal position, only to return again on getting up and walking about. Hence some persons make this complaint prominent while speaking of their symptoms. It is interesting, in this connection, to note that constipation, which in one case under the writer's observation was very obstinate, at different periods always disappeared when the patient lay in bed for a few days.

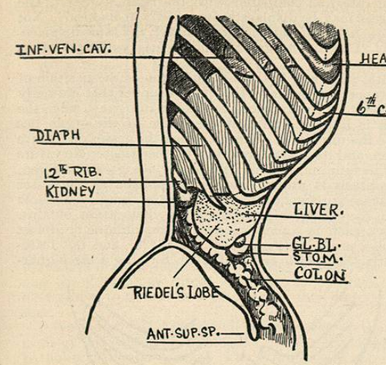

Fig. 5126.—Lateral View of the Same Subject. (Keith.)

It has been seen that the subjects of enteroptosis are mostly women. Those in whom the condition is marked are usually tall and thin, with no compactness of form, while the facial expression in many instances bespeaks a "neurasthenia basis," and, according to Keith and Williams, in cases of visceral ptosis, there is commonly a marked forward curvature of the cervical region of the spine—"ewe-neck."

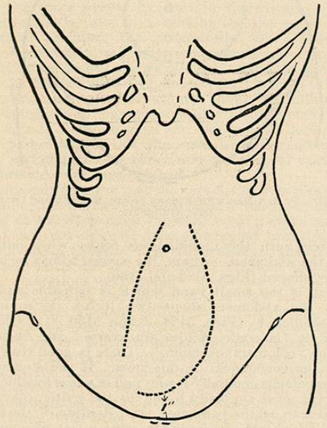

Fig. 5127.—Stomach Vertically Situated and Prolapsed. Located by illumination.

The examination of the abdomen should be made in both the upright and dorsal positions. In the former attitude one finds, in typical cases, the lower part of the abdomen flaccid and prominent, overhanging the symphysis pubis—the "Hängebauch" of the Germans (Fig. 5126), contrasting strongly with the upper quadrants which are usually flat or hollowed out. Meinert holds that such a pendulous abdomen holds a dilated stomach and not a dislocated one. It is in the dorsal position, however, that one gets positive evidence of the postural anomalies of enteroptosis. The epigastrium is usually flat and somewhat scaphoid, with widespread pulsations, while the peri-umbilical region is prominent. Peristaltic waves may be seen crossing the abdomen from side to side; the recti abdominales are frequently widely separated, as may be shown either by palpation or by directing the patient to lift the head and

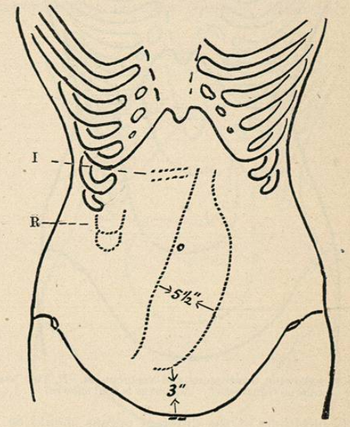

Fig. 5128.—Stomach Vertical or Nearly So. Located by illumination. The "corde colique transverse" is well shown. Right kidney (*R*) is prolapsed.

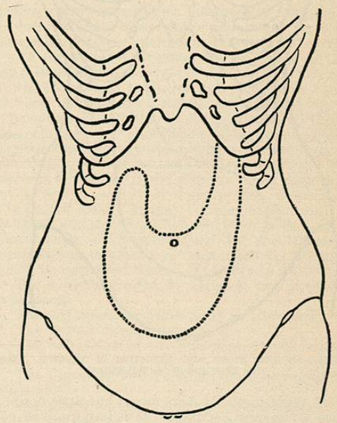

Fig. 5129.—Showing Tendency to V-shape of Stomach on Inflation.

shoulders unaided by the hands or elbows, when a prominent central ridge appears running from the ensiform cartilage downward. The usual methods for determin-

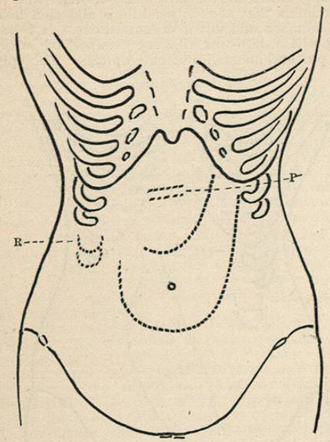

FIG. 5130.—Showing Gastroptosis and Nephroptosis. *P*, The "corde colique transverse." (Pancreas is well shown.)

ing the positions of the different organs should be resorted to: palpation and percussion for the solid organs, while inflation and illumination, as well as auscultatory percussion, may determine the situation of the stomach,

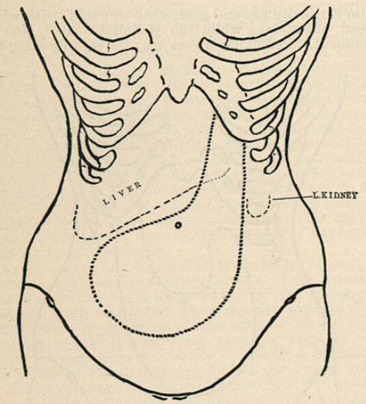

FIG. 5131.—Showing Ptosis and Dilatation of Stomach. Ptosis of the liver and of the left kidney.

etc. Of these methods there seems but little doubt that inflation is the most accurate. It is important of course to distinguish between a displaced stomach and a dilated stomach. Indeed, when that organ is displaced it is usually dilated to some extent.

The organs usually found prolapsed, in cases of enteroptosis, are the stomach, the right kidney (movable or floating), and the colon (Fig. 5125). There is, however, increasing evidence to show that the liver is much more frequently dislocated than was at one time supposed. The left kidney and the spleen are implicated in this condition rarely as compared with the right kidney. The pancreas may be displaced also, chiefly at its head. Not infrequently the pelvic organs suffer the same displacement. The diaphragm and heart may participate in a general ptosis.

With reference to the determination of the position of the stomach, it is important to remember that normally the lesser curvature does not come into view when the organ is inflated, and that the whole of the organ lies above the umbilicus. Hence, when the lesser curvature is seen, and its normal relation to the greater curvature (four to four and one-half inches) is not greatly altered, gastroptosis is present, and in proportion as the lesser curvature approaches the umbilicus, or goes even below it, an increasing degree of gastric dislocation obtains. The stomach is sometimes seen in the oblique or almost vertical position (Figs. 5127 and 5128), and not infrequently the pyloric end is dilated, forming a three-quar-

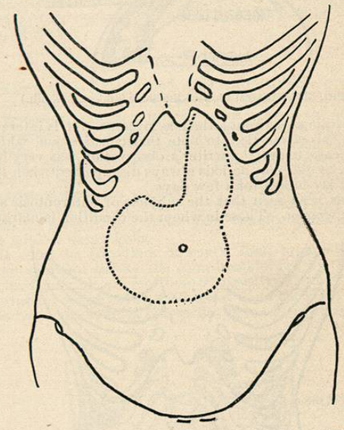

FIG. 5132.—From a Man with Kidney Freely Movable and Characteristic Symptoms.

ter circle with the umbilicus as centre when outlined upon the abdomen. Again, the stomach may be somewhat V-shaped (Figs. 5129 and 5130).

What is the small band which is palpable running across the abdomen about two inches or so above the umbilicus? (Figs. 5128, *I* and 5130, *P.*) Glénard termed it "la corde colique transverse," and regarded it as the "colon transversum." There is good reason to doubt the correctness of this view. If the stomach is low the colon is generally lower, and in a case in which the band was most typically found by the writer, operation proved it to be the pancreas. In palpation of the abdomen Glénard laid special stress upon a test of considerable diagnostic value. The examiner, standing behind the patient, who is also in the erect position, places both hands flatly over the lower zone of the abdomen and applies firm and gentle pressure upward and backward. In the great majority of cases of enteroptosis this act affords considerable relief to the distressing dragging sensation felt in the epigastrium and abdomen. At the same time the result when "l'epreuve de sangle" is applied, is an index to the treatment. (I am greatly indebted to my house physician, Dr. J. R. Byers, for the accompanying illustrations.)

Stiller's Sign. (Costa fluctuans decima.)—Stiller regards enteroptosis as of a neurasthenic origin, and looks upon the presence of a floating tenth rib as indicative of the presence of a neurasthenic tendency. Observations upon this point reported by Meinert, Zweig, Arneill, and others, go to show that this sign in the diagnosis of enteroptosis, or neurasthenia, is scarcely so important as Stiller would have it.

With respect to the relation of enteroptosis, more especially gastroptosis, to chlorosis, it must be said that it is not that of cause and effect—no characteristic blood condition is found in cases of enteroptosis, and many cases of chlorosis occur in which there is no evidence of visceral displacements.

Jaundice, which has been seen in several cases, may result from a variety of causes. "Gall stones are commonly, if not always present, in cases of enteroptosis." This statement, made by Dr. A. Keith, seems rather too broad, although it must be admitted "that the condition of visceral ptosis favors their formation." However, there can be no doubt that the altered relation of the bile ducts and organs, especially the right kidney, the liver, and the duodenum, might in a variety of ways cause obstruction to the outflow of bile and thus induce jaundice.

PATHOLOGY.—It may be well before taking up the diagnosis of this condition to consider more particularly the pathology of enteroptosis. The symptoms of enteroptosis may be accounted for by various theories, which for convenience fall under three headings:

1. The mechanical theory of Glénard.
2. The neuro-mechanical theory of Meinert.
3. The neuro-intoxication theory of Schwerdt.

The first theory, though not a purely mechanical one, does not ask for any antecedent nervous cause, but implies a weakness of the suspensory ligaments of the transverse colon, especially the colo-hepatic ligament. The descent, Glénard claims, begins at the hepatic flexure and the other events incident to the disease follow—entero-stenosis, due to a kinking of the colon at the point of prolapse, the gastroptosis, the constipation, auto-intoxication, the neurotic manifestations, etc.

Under the second theory Meinert attributes the symptoms associated with dropping of the viscera to the constant stimulation and irritation of the sympathetic nerves, as a result of pulling and stretching of these nerve fibres. The blood-forming organs and the general nervous system participate in this abnormal irritation and stimulation, and chlorosis, neuroses, and a variety of vaso-motor disturbances are thus induced.

Schwerdt believes that the nervous system is primarily at fault; the fibre of the individual is toneless, the functions of the abdominal muscles, both parietal and visceral, are not normal; intra-abdominal pressure is lessened, ptosis follows. There is a stasis in the blood and lymph vessels, the bowel contents stagnate and decompose, excretions accumulate; absorption of poisonous products goes on, and intoxication is the result—dyspepsia, headache, anæmia, palpitation, neurasthenia, etc.

DIAGNOSIS.—In the great majority of cases one may suspect the condition from the complaints made by the patient—digestive disturbances, distress, not necessarily pain, in the stomach on getting up in the morning, or after being in the recumbent posture for some time, dragging under the right costal margin, a feeling as if something falls over to the left side when the patient turns on that side, constipation, lack of energy, and other neurasthenic symptoms. The patient is generally slender and of lean habit.

An examination of the abdomen, however, is necessary to correct or justify the suspicion derived from the complaints. The contour of the abdomen may further suggest a condition of splanchnoptosis and inflation of the stomach by means of tartaric acid and bicarbonate of soda, or air cautiously pumped in, readily and accurately serves to locate that organ. The solid organs may be palpated, and it is recommended to examine the liver while the patient is in the upright position. Displacements of this organ are doubtless much more frequent than might be supposed, judging from the results of examination in the dorsal position. The right lobe of the liver in some cases projects in a tongue-like process below the costal margin. It has been described as Riedel's lobe, and may occasionally be somewhat misleading. The test known as "l'epreuve de sangle," already described, should be applied in all suspected cases. It is scarcely possible, after a careful examination, to mistake enteroptosis for any other condition. Doubtless many

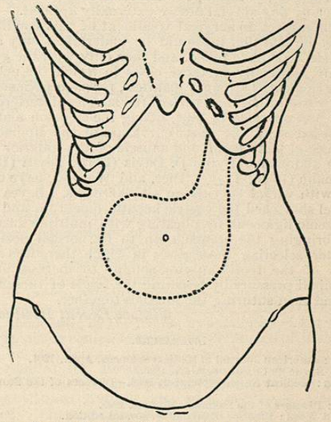

FIG. 5133.—From a Case of Pulmonary Tuberculosis. Gastroptosis with dilatation of the pyloric end, showing as a three-quarter circle; the umbilicus as centre.

cases of gastric neurasthenia and of nervous dyspepsia would be cleared up by a careful search for visceral ptosis.

Among others at least two instances of mistaken diagnosis coming under the writer's notice may be recorded. In one, a diagnosis of malignant disease of the stomach led to a laparotomy revealing the pancreas as the palpable misleading mass, while in the other, recurrent jaundice was thought to be due to gall stones or a "sluggish liver," and the horseback riding, rowing, walking, canoeing, recommended for its relief, aggravated all the symptoms. On the other hand, there is danger of attempting to explain too many symptoms by visceral ptosis.

PROGNOSIS.—Many patients recover entirely, losing all symptoms and signs of the disease. The majority may recover from the evil train of symptoms, the ptosis existing in part at least. It may be fatal as the result of the exhaustion and intoxication in extreme cases.

TREATMENT.—The indications for the treatment of enteroptosis as originally recommended by Glénard can scarcely be improved upon. They are as follows:

1. The intestines must be elevated and kept in their new position.
2. The abdominal pressure must be increased.
3. The bowels must be regulated.
4. The secretions of the intestinal glands must be increased.
5. The digestion and nutrition must be regulated and stimulated.
6. The whole organism must be strengthened.

If a cause can be fixed upon as inducing or aggravating the displacement, let it be removed. Those measures will best meet all these requirements which increase the strength and raise the tone of the whole musculature. It seems in most cases to be a question of nutrition, rest, good food, mild yet efficient purgatives, or better still enemata, occasionally gastric lavage, with drugs directed