

is uncertain and difficult, most of these statements are not convincing.

It now remains to make brief mention of the etiology of acute poliomyelitis. There can be no doubt that acute poliomyelitis is an infectious disease dependent on a specific micro-organism. This at least is true of the epidemic cases, even if the possibility must be admitted that the sporadic cases may be due to a different cause. What is this virus? In the fall of 1905 Geirsvold<sup>12</sup> succeeded in demonstrating in the cerebrospinal fluid and in the throats of patients with acute poliomyelitis, in a whole series of cases, the same micro-organism. It was a diplococcus, or tetracoccus, with certain morphologic and cultural characteristics. It differed from Weichselbaum's meningococcus. This micro-organism was found in three of our cases in the cerebrospinal fluid, but was lacking in the majority of the cases. We also made one attempt to cultivate the organism in the spinal cord substance, but there was no growth nor were we later able to demonstrate organisms of any kind in sections from the piece of cord.

In all our cases we have examined for bacteria in histologic specimens from the cord, medulla oblongata, etc., but all our efforts have been in vain, although we have used all common methods, such as the Loeffler, Gram and Giemsa stains, weak carbol-fuchsin, thionin, toluidin blue, at times avoiding the use of alcohol in the fixation and dehydration. We believe it at present to be impossible to speak definitely on the question of the specificity of the organism demonstrated by Geirsvold, the more so as Geirsvold himself makes certain reservations.

The frequent demonstrations of the same microbe is noteworthy, however, and further investigations are indicated. The failure to demonstrate micro-organisms in sections does not in itself argue against the presence of micro-organisms in the inflamed areas. We are justified in assuming that we are dealing with an organism which it is difficult to demonstrate. It seems to die rapidly; after from ten to fourteen days the cultures from the cerebrospinal fluid regularly became sterile. Experience also shows that micro-organisms die rapidly in the nervous system, as, for instance, has been shown to be the case in epidemics of cerebrospinal meningitis. Here Weichselbaum's meningococcus is found in large numbers in the exudate and is easily cultivated, but it has been shown, and here we speak from personal experience, that this organism is difficult to find in sections, especially when the necropsy has not been performed immediately after death. It is possible that a similar condition may exist in the case of the organism of poliomyelitis.

It is our opinion that poliomyelitis is due to a specific virus, and, further, that we are not dealing with the remote effect on the central nervous system, but that the organism is present in the nervous system itself, in the meninges, in the cerebrospinal fluid and probably in the nervous substance, and that it is the direct cause of the extensive inflammation. As has been stated, many facts favor the assumption that the atrium of the infection is in the digestive tract and that the nervous system becomes infected either by the lymph stream, along vessels and nerve trunks (though no anatomic proof of this exists) or, what appears more likely to us, by way of the blood, which also appears to be probably the case in cerebrospinal meningitis.

## GASTROSCOPY: REPORT OF ADDITIONAL CASES.\*

CHEVALIER JACKSON, M.D.  
PITTSBURG, PA.

The principal object of this paper is to report such cases as have presented themselves for gastroscopy since my paper<sup>1</sup> read before the New York Academy of Medicine in January, 1907. Discussion with different physicians and expressions of surprise by spectators at different demonstrations have shown that I had not sufficiently emphasized certain important points, and it is well to speak of them here.

### THE EXPLORABLE AREA.

There is a widespread impression that a solid tube passed through the esophagus is held rigidly in position and that we can view through it only such small area of the gastric mucous membrane as happens to lie opposite its extremity. To show how erroneous this view is I present a radiograph (Fig. 8) made in the office of Dr. Russell H. Boggs of Pittsburg. The plate contains two exposures, one with tube lying to the left, another after it had been moved to the right. This shows the range of motion that may be secured by moving the head from side to side. That this case was an extreme example of dilatation and ptosis, and that the normal stomach would not permit such deep introduction of the tube, is not pertinent to our present consideration. The limitations on motion are imposed by the shape and size of the stomach and not by any rigidity of the pharynx, esophagus or diaphragm. It is impossible to show graphically the extent to which the explorable area may be increased by skilful palpation of the abdominal region, particularly if a tumor be present, but experience shows that this is a very useful maneuver. The explorable area varies in the normal adult stomach from one-half to three-quarters of the total mucous membrane, the field being considerably larger in infancy, dilatation or prolapse.

### TECHNICAL DIFFICULTIES.

Since it has long been held impossible to pass a straight rigid instrument into the stomach, it is perhaps not remarkable that the procedure is still assumed to be an exceedingly difficult one. There is a distinct disposition to regard gastroscopy as an exhibition of individual dexterity rather than the demonstration of a practical clinical method. If this error involved nothing more serious than an unmerited compliment it might be allowed to pass with bare denial. Since it involves, however, a limitation of the usefulness of a valuable method, more detailed statement may be given. I can not deny that I have encountered many difficulties in gastroscopy, but wider experience fully confirms my previous opinion that they are not inherent, but due to faulty technic. Careful attention to two points eliminates nearly all of them.

The first of these is that profound anesthesia is essential. Pain is not great and would not demand general anesthesia. Inspection of the esophagus may well be preferred under cocaine, but when a tube enters the stomach, straining and retching are uncontrollable, annoying and dangerous. Convenience and safety alike demand that anesthesia be complete. The difficulties of

12. Epidemisk Poliomyelit. Bakteriologiske undersøgelser. Norsk Magazin for Lægevidenskaben, 1905, No. 12.

\* Read in the Section on Laryngology and Otology of the American Medical Association, at the Fifty-eighth Annual Session, held at Atlantic City, June, 1907.

1. Medical Record, April 6, 1907.

anesthesia are considerable, as the anesthetist works at a great disadvantage after the tube is once started. For this reason and also because relaxation rather than analgesia is our object, chloroform would be more advantageous than ether. A man who uses chloroform under any circumstance should choose it here. I have, however, almost invariably chosen ether for the reason that I am most unwilling that the harmlessness of gastroscopy shall be obscured in this present stage by any death from anesthesia. Gastroscopy can bear with ease responsibility for all the deaths it will ever produce, either by vagus reflex, perforation, hemorrhage or otherwise, but it would be most unfortunate if we had to explain any accidentally associated death.

#### POSITION.

The second point is the position of the patient. In all work success demands that the mouth, pharynx and esophagus be brought into a straight line, not by a crow-bar-like action of the tube, but by holding the head steadily in extreme extension with the mouth widely open. Not only does lateral pressure add to the operator's difficulty, but it also entirely prevents any sense of what the point of the tube is touching. Trial with an unanesthetized patient will show that if the head is simply allowed to hang over the edge of the table not only is an unnecessary strain thrown on the ligaments of the neck, but full extension is not as well secured as by proper supports of the head.

It is further to be remembered that no mouth gag is absolutely self-retaining and a slight slip while the tube is in position may have undesirable consequences. For this reason it is best to detail a second assistant to hold the head and steady the mouth gag, impressing him with the importance of the matter and his entire responsibility therein. To carry him out of the operator's way it is necessary that he shall hold the head at arm's length, and to hold it in this position for fifteen or twenty minutes a support is necessary. The weight of the head is so little that the matter seems easy, but if the assistant's arms are unsupported about the time the most critical point of the examination or operation is reached his muscles will be trembling. Nor is it possible to rest him by any shift of position after the tube is started.

After many unsuccessful trials it has been found that the best position is as shown in Figure 9. The patient is drawn forward until the tops of his shoulders clear the table by from four to six inches, and the mouth-gag is inserted on the left side. The assistant is placed on the right side of the patient's head on a stool of appropriate height, as though on a side saddle, his right leg beneath him in the kneeling position, his left foot supported on a stool twenty-six inches lower than the top of the table; his right forearm is passed beneath the patient's neck, supporting it; his right hand grasps the mouth-gag, drawing it strongly at or in front of the bregma, bending it backward and exerting a certain degree of upward pressure. The exact proportion of backward and upward pressure can not be described, but it is readily appreciated on trial, especially if the assistant has actually experienced the differences in sensation when the head hangs free and when it is properly supported in extreme extension.

The foregoing points having received attention, certain difficulties remain. They lie, however, altogether above or opposite the cricoid cartilage and are surmountable with slight practice by any one who is capable of

learning laryngeal intubation. Thorough and systematic search of the explorable area by introducing the tube into one fold after another, missing none, demands something of experience and more of patience, but these will very readily be yielded by the enthusiasm of one who has for the first time perceived a beautiful picture of the living membrane as obtained at the first introduction of the tube.

#### REPORTS OF CASES.

**CASE 1. History.**—A. N., aged 39, admitted to the Western Pennsylvania Hospital, suffering from an attack of typhoid fever, which under the care of Dr. J. D. Milligan, ran a short course. Patient had complained for fifteen years of gastric symptoms consisting of pain, sharply localized in the epigastrium and not bearing any constant relation to the taking of food. A feeling of heaviness and distension after eating. Some nausea, but no vomiting. Moderate tenderness. For last nine months symptoms had been worse, pain more constant, and there had been much loss of weight. The Ewald test meal showed deficient digestion; hydrochloric acid diminished, but not absent. This history suggested to Dr. Milligan that numerous cases in which malignant disease develops insidiously after a long period of functional dyspepsia and he referred the cases for gastroscopy.

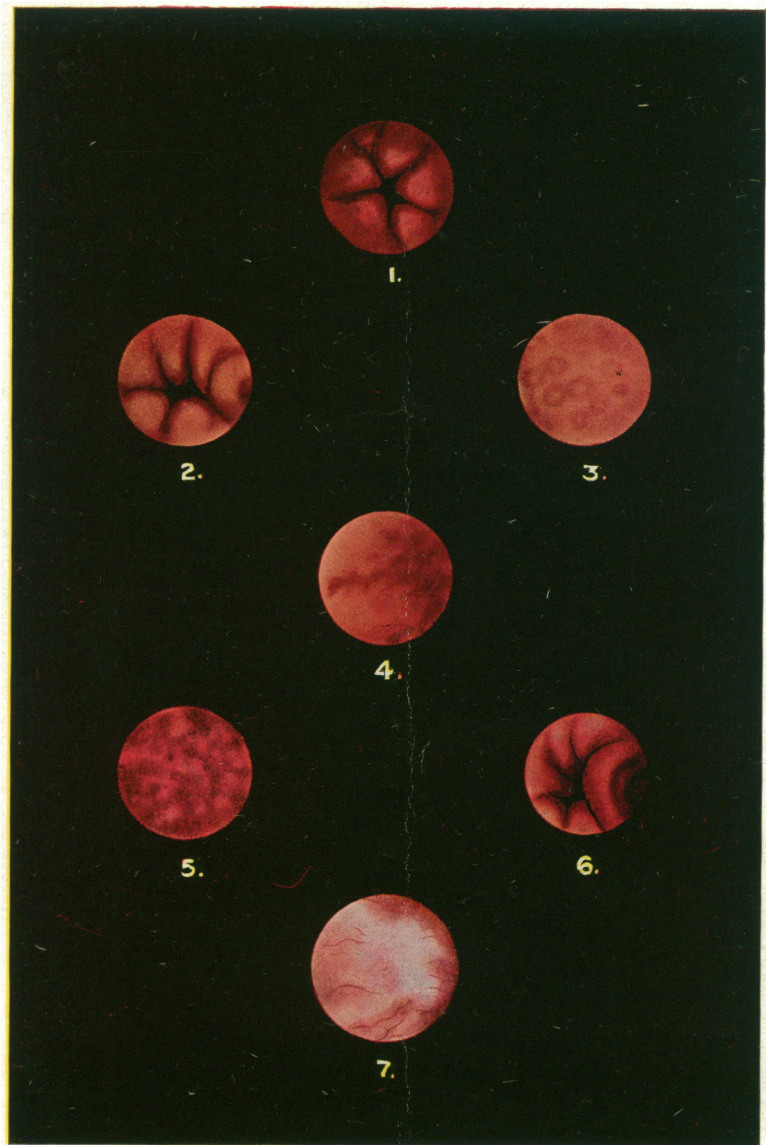
**Gastroscopy.**—At my request Prof. Gustav Killian passed the gastroscope with the same ease and precision that renders his bronchoscopic work a delight to the spectator. Though inspection of the stomach showed normally in gross appearance, this negative finding is, of course, subject to the limitation that it is not absolutely decisive. A cancer may be developing in the lesser curvature. This point that any negative finding is not absolutely decisive I must recognize as the one important limitation of usefulness of this method. I trust, however, that it will not destroy its usefulness any more than does the similar fact in regard to the ophthalmoscopic examination in brain disease, the lumbar puncture in meningitis, the sputum stain in tuberculosis, or the physical examination of the chest in children. The gastric mucosa was a delicate pink color, with a slightly mottled appearance at one point (Fig. 3).

**CASE 2.**—This will be reported elsewhere in greater detail as the removal of a foreign body by tracheoscopy. It is included here as a striking example of the harmlessness of gastroscopy.

**History.**—The patient was a child aged 1 year and 2 days. One month previously this child had swallowed a safety-pin which a skiagraph had shown high in the neck. The mother had been instructed to bring the child for further ray study, but neglected to do so and presented it at a public clinic at the Harper Hospital, Detroit, for extraction of the foreign body.

**Gastroscopy.**—From the absence of symptoms referable to the respiratory tract the pin was assumed to lie in the esophagus, which locality was accordingly searched first. On a negative result the tube was passed into the stomach and the most thorough examination made. All accessible membrane was gone over twice, a period of at least one-half hour being devoted to this proceeding. On account of the long duration of chloroform anesthesia the child was allowed to rest. Two hours later it was sitting up on its mother's lap, hungry, and could readily be amused to the crowing and laughing point. This constitutes the point of interest in the case, as it demonstrated that the most thorough gastroscopy I have ever made did not cause even transient soreness. Further radiographic study by Dr. Preston M. Hickey of Detroit indicated that the pin lay in the trachea, and it was recovered with some little difficulty by the upper bronchoscopic method. Two weeks later Dr. Hickey reported the child as in the best possible condition, having had no bad symptoms whatever. The stomachal mucosa, after the milk that it contained was pumped out, was of normal color and appearance, the folds larger, relatively to body weight, than in the adult. (Fig. 6.) The color became paler as the examination proceeded, presumably because emptied of food.

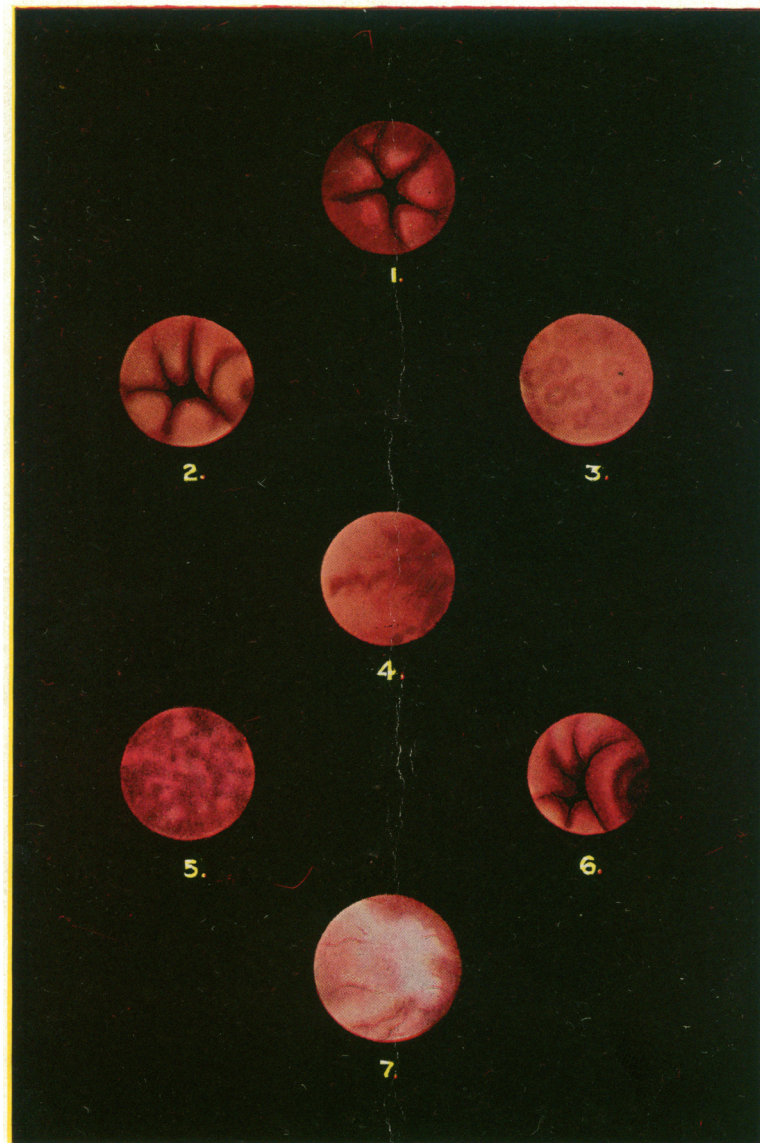
**CASE 3. History.**—P. A., aged 30, was admitted to the West-



FIGS. 1 TO 7.—GASTROSCOPIC VIEWS.

ILLUSTRATING ARTICLE BY DR. CHEVALIER JACKSON ON "GASTROSCOPY."





FIGS. 1 TO 7.—GASTROSCOPIC VIEWS.

ILLUSTRATING ARTICLE BY DR. CHEVALIER JACKSON ON "GASTROSCOPY."



ern Pennsylvania Hospital Feb 2, 1907, service of Dr. John W. Boyce. The patient had been complaining for weeks of severe pain in epigastrium and left hypochondrium, not affected by eating. Examination after test meal showed no serious disturbance of digestion, but pain steadily grew worse in spite of treatment and patient seemed to lose ground. Dr. Boyce suspected that he might have an ulcer with anomalous symptoms, and as a matter of exclusion referred the case for gastroscopy.

*Gastroscopy.*—At his insistence chloroform was employed, which rendered introduction of the 70 cm. tube a matter of the utmost ease. The gastric mucosa was normal, throughout the explorable area, about two-thirds of the entire mucosal surface. He had in some way obtained food and the stomach was found to contain potatoes, meat and other unidentified materials. Fifteen minutes after these were pumped and vomited out, the gastric mucosa, which before was found to be a dark crimson (Fig. 1), was found to be a pale pink (Fig. 2).

*CASE 4. History.*—Mrs. T., referred by Dr. Weschler, complained of numerous and anomalous symptoms. She was found to have a cervical rib and a condition of laryngoptosis, very interesting, but not important to our present consideration.

*Gastroscopy.*—General anesthesia was given for direct inspection of the larynx, trachea and esophagus. During the latter proceeding the tube was introduced to the bottom of the greater curvature and the normal mucous membrane viewed widely without encountering any difficulties or adding anything to the severity of the examination.

*CASE 5. History.*—A. L., aged 21, laundress, was admitted to the Western Pennsylvania Hospital Jan. 12, 1907, service of Dr. K. I. Sanes. Complained of severe pain in epigastrium

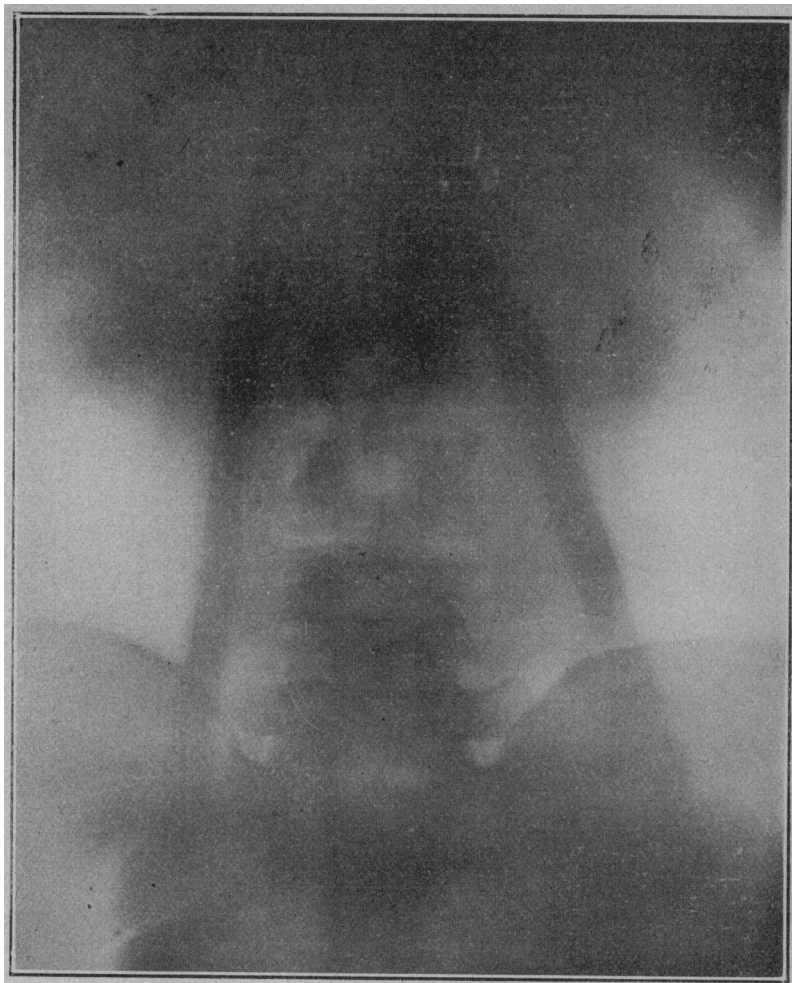


Fig. 8.—Radiogram of gastroscopy in two different positions in a case of gastroptosis, the patient under ether. Coin locates the umbilicus.



Fig. 9.—Illustrating the best position for the patient in gastroscopy.

and lumbar region. The patient was of distinct splanchnoprotic type and her severest pain seemed to be connected with a movable right kidney. Medical and hygienic treatment proving ineffective, she was transferred to the service of Dr. J. Hartley Anderson, who, April 12, firmly anchored the offending kidney. The patient professed great benefit from this operation, but the epigastric pain continued.

*Gastroscopy.*—She was referred by Dr. Anderson for gastroscopy, which was done at a public clinic at the Western Pennsylvania Hospital. In passing the gastroscopy the lumen of the esophagus was not exactly followed, and much groping was done for the diaphragmatic opening. After the tube entered the stomach the patient's respiration became alarmingly shallow and feeble. An interested spectator whose opinion commands the highest respect considered this a vagus reflex. An assistant to whom the general care of the patient had been delegated feels certain that it was from an overdose of anesthetic. He points out that anesthesia was profound at this time; that we have never witnessed anything similar before, though gastroscopy has frequently been done with imperfect anesthesia when reflexes should be more readily excited. The tube was, of course, withdrawn and simple restoratives applied, and respiration promptly became normal. After a few minutes, relying on the opinion of my assistant, I again introduced the tube and completed a very satisfactory inspection of the stomach without unpleasant incident. If this were a vagus reflex it was exhausted by the inhalation of oxygen and a very brief period of waiting. No additional anesthesia was necessary through a deliberate inspection of the stomach. As this case was assumed to be a pure neurosis, I was surprised to seek a dark purplish, mottled appearance (Fig. 4) as the tube mouth moved from left to right along the greater curvature, widening and darkening as the tube moved. The water

color drawings give a fair idea of the appearance. After about two inches of travel from the point where the discoloration was first noticed, the extreme right limit of exploration with the aid of external manipulation was reached (Fig. 5). Antero-posteriorly the extent was also about two inches. Prof. Gustav Killian, who was present, examined this area and expressed the opinion that it was not normal, though neither he nor I could make a positive diagnosis.

**CASE 6. History.**—Male, aged 23, was referred by Dr. Aaron of Detroit, Mich., with the following history: For fifteen years he had had constant distress, worse after taking food. Flatulence was constant, hyperchlorhydria 110; there was no melena and motility was normal.

**Gastroscopy.**—This was done under ether at the Harper Hospital, May 24, 1907. Anesthesia was imperfect and the case can not be considered an easy one. Yet when the tube had been passed below the cricoid cartilage, Dr. Aaron, who had never seen a gastroscopy and whose interest in the stomach diseases is mainly from the clinical side, found no difficulty whatever in following the lumen of the esophagus and passing the tube clear to the greater curvature of the stomach; nor did he find any difficulty in focusing his vision through the long tube so as to get a beautiful view of the stomach. The gastric mucosa was in a state of chronic inflammation, and at one point I saw what seemed to be a scar. The mucosa was pale, in an irregular area about 2 cm. ( $\frac{3}{4}$  inch) in diameter near the edges a few dilated capillaries were visible. There did not seem to be any thickening or infiltration. The appearance is well shown in the color drawing (Fig. 7).

#### DISCUSSION.

PROF. GUSTAV KILLIAN, Freiburg, Germany, said that in 1868, in Freiburg, Kussmaul made a gastroscopy, introducing a tube. Professor Killian has that tube; it is a historical instrument. Many others have introduced tubes through the cardia. He thinks that the first to attempt to give a method of gastroscopy was Mikulicz in 1881, but his tube was not straight; it had an angle. Rosenheim of Berlin also tried to make a gastroscope; his tube was straight. About ten years ago Rosenheim attained success with the application of a gastroscope, and now we have a new one from Dr. Jackson. The first case in which Professor Killian saw a gastroscope demonstrated was in the case of a woman whose head was hanging over the edge of a table. Dr. Jackson placed his gastroscope, a long tube, in Dr. Killian's hand and asked him to introduce it. For a moment Professor Killian was afraid; then he took the tube and inserted it very easily; only in the cardia was there resistance and he had not the courage to go further, so he asked Dr. Jackson to do it. Dr. Jackson introduced the tube with a very little pressure and Professor Killian could easily see the interior of the stomach. In the next case, he was successful in introducing the long tube and placing it in the interior of the stomach. If there is an ulcer in the stomach, not too small, he thinks that one must find it. It has been thought that a tube could not possibly be brought into contact with the stomach walls so that we could do more than see the wrinkles on the sides, but Dr. Jackson has shown that it is possible to bring the stomach into direct connection with the tube.

**Autointoxication in High Altitudes.**—Sewall, in *Colorado Medicine*, states that recent pathologic chemistry has taught us that the critical symptoms of many of the diseases with which we have to deal are due to intoxication, with an excess in the body of waste products which the body is powerless to oxidize to their normal condition as excreta. Zuntz and others, Sewall states, have developed the extraordinary paradox that though at very high altitudes the actual consumption of oxygen is greater than on the plains, there is more or less marked accumulation of suboxidized "fatigue" products in the circulation which irritate the nerve centers, and in turn affect metabolism. The production of these substances is greatly augmented by physical exercise, is subject to great individual differences, and is done away with after thorough acclimatization.

#### CONGENITAL SQUINT.\*

WILLIAM CAMPBELL POSEY, M.D.

PHILADELPHIA.

Like all other phases of the muscle problem, that of which I treat in this paper can scarcely be said to be solved; indeed, it may well be doubted if a distinct discrimination is always made between this variety of strabismus and concomitant squint. It is not easy in infants and young children to detect a limitation in the movement of an eye, which is the usual diagnostic point of difference between congenital and concomitant squints, though it will be remembered that while in concomitant squint the deviation of the ocular axes persists as the eyes are moved through the different meridians of the field of fixation, the degree of the deviation remains constant, and the angle of the squint is always the same, whereas in congenital squint the degree of the deviation and the angle of the squint vary according as the eye with the defective muscle or muscles is moved in the direction supplied by those muscles.

And, again, even though the paralytic nature of the squint be detected, it is often imputed to a postnatal cause, cognizance not being taken of the fact that, though the conditions occasioning the squint may be present at birth, the actual deviation may not manifest itself until weeks or months later. For the ocular movements in all infants are at first purposeless and incoördinated, and it is only later when the eyes attempt to converge in response to the impulses of an educated center that the flaw in the mechanism becomes apparent; moreover, in deviations due to central causes, the cerebral lesions, while congenital, often require further development to occasion actual paralysis of the eye muscles.

In addition, however, to the limitation of motion which is present in congenital squint, there are other ways of discriminating between it and concomitant strabismus. In the latter, as is well known, both primary and secondary deviations are equal, while in the former, though the rule is not invariable, the secondary deviation is often greater than the primary, just as is observed in cases of acquired palsy of the eye muscles.

According to Kunn, the secondary contraction which is present in acquired palsies is absent in the congenital, though it was Graefe's experience that, while this is usual, it is not invariable, and secondary contraction may be absent in acquired and present in congenital paralysis. Corresponding to this absence of contraction is the fact that there may be either no deviation in the primary position or one contrary to what would be expected. Such anomalous position of the eyes in congenital paralysis seems often, however, to be due to complications which would produce a like result if the paralyzes were acquired.<sup>1</sup>

As other differential points in diagnosis may be mentioned the absence of involvement of the iris and ciliary body in congenital palsies, and the reaction of degeneration in the levator in acquired cases when ptosis is present.

Finally, I have often been aided in my diagnosis of congenital squint by the detection of nystagmus in this class of cases, a symptom which is usually absent in

\*Read in the Section on Ophthalmology of the American Medical Association at the Fifty-eighth Annual Session, held at Atlantic City, June, 1907. About half of the article and its illustrations are omitted for lack of space. The entire article appears in the author's reprints and in the Transactions of the Section.

1. Duane: The Eye and the Nervous System, edited by Posey and Spiller, p. 224.