the diagnosis of recurrent appendicitis is often made.

Exciting cause of subsequent attacks of pain. — As would be expected, agencies which excite peristalsis may bring on attacks of pain, especially the ingestion of liquid and solids, and the use of purgatives; also manipulation of the abdomen, muscular effort, such as allowing the patient to sit up and dress, injections and inflations of the colon and pathological changes in the invagination itself, especially those changes which obstruct the lumen of the bowel. In these latter cases it is frequently reported that the attacks occurred without evident cause.

In Case I even the ingestion of water caused slight colic of some minutes' duration. In Pohl's⁶¹ case, muscular exercise or indiscretion in diet caused pain. Harrison's¹⁰⁸ case felt perfectly well until he resumed his work. Ilacón's¹⁰ case had attacks every three or four weeks without known cause.

These subsequent attacks of pain are to be sharply differentiated from the attacks of pain due to serious complications, such as perforation with peritonitis.

Localization of pain. — Definite localization of pain is the exception, as is shown by the following table:

	Ileocec.	Enteric.	Colic.	Variety unknown.	Total.
Abdominal,	24	8	4	3	39
Left abdomen,	2				2
Right abdomen,	6	1		1	8
Lower abdomen,	2				2
Navel,	8		2		10
Epigastrium,	3				3
Liver region,	1				1
Right iliac fossa,	6				6
Left iliac fossa,	2		1		3
Lumbar region,	2				2
					76

In 10 cases the pain was referred to the region of the umbilicus, in 6 to the right iliac fossa, and 3 to the left iliac fossa. In the remaining 58 cases the localization is rather vague. In the cases in which no mention is made of the localization of pain, we infer that the vast majority were also indefinite. Again, localization of the pain in the right iliac fossa has led to the erroneous diagnosis of appendicitis. With this exception, localization of pain has but slight value in diagnosis.

Radiation of pain. — Radiation is undoubtedly very uncommon. It is mentioned six times in the ileocecal cases and once in the colic variety. It is itself without value in the diagnosis.

Relief and intensification of pain. — The various means which result in the relief or aggravation of pain in no way assist us in making a diagnosis. Pressure and position may relieve or intensify without any fixed rule. This, of course, refers to cases without peritonitis. In Case I pressure aggravated the pain. In Butand's⁹³ case the slightest pressure aggravated the pain. Fagge's⁹⁷ case was relieved by drawing up the knees and pressing the abdomen with the hands. Hutchinson's³⁷ case could only find relief by hanging by

his hands from a ladder and swinging his leg backward. The same rule holds regarding bowel movements. Constipated cases of the enteric and ileocecal varieties, in which the invagination does not extend beyond the transverse colon, are usually relieved by bowel movements. This will be spoken of more fully under treatment with cathartics.

Vomiting. — Excepting pain, vomiting is the most frequent symptom. While it was noted in but 64 cases, about half of the series, it is in all probability a very constant symptom, as in but 5 of the cases is it positively stated that vomiting occurred at no time throughout the course of the disease.

It is an important sign, since it is excited by the obstruction of the bowel. It apparently has no relation to the site of the obstruction, 42 of the cases being of the ileocolic, 14 of the enteric and 8 of the colic variety. Of the 5 cases in which there was no vomiting, 3 were of the enteric and 2 of the ileocolic variety.

It is more frequent and severe during the attacks of pain, the intensity of both depending to a great degree upon the completeness of obstruction to the bowel lumen.

Cases with gastro-enteric irritability not infrequently vomit during the interval, usually after the ingestion of food and liquids. In one case the vomiting was most severe during the interval of freedom from pain.

Rarely vomiting is an alarming symptom in the absence of perforation, as in Motley's¹⁵ case severe retching and vomiting persisted twelve hours in spite of treatment.

Character of the vomitus. — The vomitus is in no way characteristic. In mild cases, as a rule, it consists of ingesta and stomach juices. With severe or persistent vomiting the vomitus is bile-colored or may macroscopically appear to be pure bile.

(To be continued.)

DISCUSSION OF PSYCHIC AND SOMATIC FACTORS IN A CASE OF ACUTE DELIRIUM DYING OF SEPTICEMIA: NOTE UPON EXPERIMENTAL GUINEA-PIG INFECTION WITH STAPHYLOCOCCUS ALBUS.*

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It seems worth while, in the present phase of discussion as to the causes of mental disease, to analyze closely every case which promises to demonstrate a *psychic*, as opposed to a *somatic*,

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origin. Especially important are those cases in which the data have been completed by death and autopsy. Although many psychopathologists feel that autopsies are of no particular service in their own campaign, it is probable that these men are in error, at least in so far as they disregard the possible effects of latent infection and metabolic flaws which autopsies more or less frequently indicate.

Two years ago a case of dementia precox was reported in this JOURNAL¹ (by Southard and Ayer) in which parallel analyses of the somatic and the psychic course of the disease revealed considerable doubt as to the proper interpretation of the case, i. e., whether it was somatogenic or psychogenic. The autopsy findings rather inclined one's judgment in favor of the somatogenic interpretation.

Again, in the present case, we have attempted to present fairly both sides of the argument. We recognize the serious gaps in each of the parallel analyses. But, if the fundamental "complex" fails to appear on the psychic side, it is also true that many desirable somatic data remain dark.

I.

The *history* of the case is derived from the detailed and reliable observations of a physician who had known the patient well for many years, and from the records of the Boston State Hospital (due to the courtesy of Dr. Mary E. Gill).

The patient was a negress of Massachusetts birth, and thirty-six years old at the time of onset.

Family history.—There is a rumor, probably well founded, that mental disease had existed somewhere in the patient's family, but all details of this nature have been withheld by relatives. The patient's parents died when she was a child, but of unknown causes.

Personal history.—The patient was brought up in a cultured white family, by whom she was given a good education. It appears that the patient was a kind of companion in the house, and her patrons were attached to her because of her kindliness and good nature. No details of her life are available until her marriage, at about twenty-eight years of age. Her husband was a man about sixty years of age and is alleged to have married her so that she might take care of his declining years. Patient's husband was beyond the sexual age. The couple possessed some means, so that the patient never had to work for a living. The patient was accustomed to carry her husband's excessive age constantly in mind and, with the neighbors, harped upon the fact that, though she was provided for in a material way, her husband was not the man she had thought he was before their marriage. The patient was fond of children and helped her friends in domestic duties, such as sewing, at which she was exceptionally skillful.

Our informant often heard at intervals from various neighbors that the patient was complaining about the unsatisfactory character of her married life, but the patient never spoke of this to her physician, although she had been treated at various times for difficulty in menstruation due to retroversion.

Jan. 5, 1907, one year and six months before commitment to the Boston State Hospital, and one year and seven months before her death, the patient first complained of nervousness. It can be very definitely stated that this was the first period at which mental symptoms of any sort can have taken place during the

years following 1900, as the patient was under familiar non-medical observation by our informant throughout this period. At this time the patient ascribed her nervousness to an upset due to the loss of a close friend by death. Again, after three weeks, the patient complained of nervousness, insomnia and a run-down condition. A third complaint dates from Feb. 11, 1907, and consisted of constant severe headaches, insomnia, constipation and nervousness. Sedative treatment relieved these conditions, and there was no further attack until August, 1907, when the headaches recurred. The notes of this date show that the patient recounted the dissatisfactions of her married life at length to her physician. The patient felt that moral strength was required to avoid breaking faith with her husband.

At no time prior to August, 1907, or until March, 1908, was there any suspicion of insanity in the patient, whose feelings and total reactions seemed quite reconcilable with her life and general attitude.

March 10, 1908, there was an enlargement in the posterior cul-de-sac, suggesting either gravid uterus or a tumor mass. On the hypothesis that the mass was a tumor, operation was advised, but this the patient refused.

May 10, 1908, the notes speak of eroticism and severe headache, and shortly thereafter the patient announced to the physician that she was going to get a divorce and marry a certain young man. In June, 1908, the patient complained of itching all over her body and was erotic in conversation and manner.

July 3, 1908, four days before commitment, she became acutely insane, running nude into the yard at her house, screaming loudly, and finally running several blocks to the house of the young man before mentioned, all the while shouting that God had spoken to her and that she had a vision and couldn't contain herself. She possessed the delusion that the young man before mentioned was divine and was induced to clothe herself in garments at his house, on the ground that these garments belonged to God. The patient then quieted down and related her hallucinatory experiences to the physician. She stated that God had permitted her to live with the young man to whose house she had repaired, that she had been told (in hallucinatory state) that he was a holy man, the Saviour. She said that she had been living with him for six months and concluded her story by stating that the Lord had told her that this young man was holy.

The next day the patient visited the physician's office and seemed quiet and somewhat improved. It appeared that for several days the patient had been, according to her husband, hyper-religious, reading her Bible the greater part of the day, contrary to custom. She had also, contrary to custom, neglected to rise and prepare her husband's breakfast. The patient explained her denudative impulses by stating that God had told her not to wear clothing.

It is possible that in some of these attacks the patient was confused, and it is stated that amnesia occasionally followed. There was never any violence or suicidal or homicidal tendency. Convulsions were lacking. The patient was somewhat negativistic, but could be reasoned with, especially if her delusions about God were humored. Just before commitment, July 7, 1908, the patient was in bed apparently in a dull and stupid state, but upon questioning expressed many of the ideas just sketched. Before admission the physician in charge noted a slight degree of swelling in the legs. This was not marked enough to be noticed by the hospital examiners, though both face and hands appeared somewhat puffy. The face showed considerable acne. The pupils were equal and contracted and are said to have been non-reactive to light (examination

difficult in a colored subject). The knee jerks were equal but diminished. There were no other neurological alterations. The tongue showed a moist, heavy, white coat. The urine was negative.

Mental examination.—Consciousness appeared clouded and orientation for time imperfect. The date was stated to be June, 1900. Upon assurance that the date was 1908 she replied, "They say it is 1908 because they don't know their God," but later admitted that it really was 1908. The patient showed every objective sign of auditory hallucinations, sitting at times with eyes closed and not disposed to answer questions for some moments, later explaining that God was talking to her. She was occasionally interrupted in a remark by an hallucination.

During the next few days certain symptoms suggesting katatonia were noted, such as mutism, staring, drooling, resistiveness and assumption of a tense muscular attitude with acts suggesting uncontrollable impulses. The patient would at times sit with eyes tightly closed and appear confused, but would suddenly start up screaming and running about the ward.

July 18, fifteen days after the onset, it was first noted that the left leg was markedly swollen, though without evident discoloration and without deformity. The popliteal space was full and tender on pressure. The slight swelling of legs noted by physician before commitment had not interfered with locomotion and had not been observed in the hospital until this date. The patient was now confined to bed with a temperature of 101°. It is stated that she had at periods been very restless, screaming and resistive, and also showed catatonic stupor before taking to bed. The hypothesis was raised that the swelling was due to phlebitis, although there was no history of miscarriage or even of pregnancy.

July 21, 1908. The patient fell on rising from bed, but sustained no injury. Food was refused and patient was tube-fed. The patient was resistive and noisy at times.

Thereafter the patient became restless and lay tossing in bed with a delirium, with frequent moaning. The temperature never rose above 100°, and a somewhat unsatisfactory examination of the chest, Aug. 1, showed no pneumonia. Meanwhile the swelling of the left leg had almost completely subsided. Tube-feeding had been resorted to at intervals. Aug. 2, temperature 102, pulse of 100, poor quality. Pelvic examination discovered a large mass in front and on both sides of the uterus, stretching well up on the umbilicus. This mass had never before been made out, perhaps because of the resistiveness of the patient. On this date there was rigidity of the muscles and of the abdominal wall, but no tympany. Aug. 3 expert gynecological examination resulted in a diagnosis of multiple fibromyomata of the uterus. By this time the patient had become no longer resistive. The abdomen had become soft and the tumor easily palpated. The mental state showed delirium and patient took no notice of her surroundings. Restlessness and constant moaning. Nourishment was not taken; tube-feeding was difficult. Salt solution enemata were given. Neither heart nor lungs were abnormal. There were no râles. The peripheral circulation was sluggish. The left leg was little larger than the right and not especially tender. Aug. 4, temperature 103, pulse 106, feeble; respirations, 40. After lying quietly and moaning a little at intervals and saying nothing that could be understood, patient died, one month after onset.

In view of the autopsy findings given in detail below, and in view especially of the thrombosis of the vena cava and its branches, it is important to state that the swelling of the legs was at no time, except for a few days

after July 18, extreme and was in fact variable in degree. Possibly, almost up to the last, the edema of the legs was largely due to the pressure upon the rim of the pelvis by the massive fibromyomata. There was at no time any clinical sign of the pulmonary thrombosis until the day before death. Further clinical analysis is given below.

II.

The *autopsy* was performed eleven hours after death by one of the writers (E. E. S.). Following are the

ANATOMICAL DIAGNOSES.

Thrombosis of vena cava, common iliac, external iliac and femoral veins.
Thrombosis of both pulmonary arteries.
Edema and congestion of lungs.
Bronchopneumonia of both lungs posteriorly.
Acute fibrinous pleuritis (left).
Ecchymoses of lesser curvature of stomach.
Injection of mucosa of rectum.
Multiple fibromyomata of uterus with occlusion of Fallopian tubes.
Corpora lutea and corpus hemorrhagicum.
Chronic pelvic cellulitis.
Dislocation of cervix uteri.
Acne and acne scars of chest, forehead, lips and chin.
Ecchymoses of scalp and pericranium.
Mitral sclerosis.
Aortic and coronary sclerosis.
Pulmonary valve, four cusps.
Chronic splenitis.
Acute nephritis.
Slight hydro-ureter (both sides).
Slight chronic leptomeningitis about optic chiasm.

The details of the autopsy are as follows:

Body, 151 cm. long; development and nutrition good; moderate rigor of extremities; moderate edema of both lower legs and thighs, approximately equal on the two sides. Acne and scars of old acne of chest, forehead, lips and chin. Pupils equal, 5 mm. Teeth show several fillings with gold. Abdomen slightly retracted. Firm mass palpable above symphysis. Neck bent to right. Subcutaneous fat of abdomen 3.5 cm. thick.

Peritoneal cavity: Walls moist; considerable venous injection posteriorly. Omentum long and thinly clad with fat. Appendix 8 cm. long, provided with mesentery throughout, attached to inner border of cecum and compressed by pelvic mass. Pelvis filled with smooth mass of fibromyomata (see below).

Pleural cavities: Left normal except for recent fibrin deposit over posterior border of lower lobe and over diaphragmatic surface. The lobes are united externally by recent fibrin. Right normal.

Pericardial cavity: Not remarkable.

Heart: Weight, 255 gm. Pulmonary valve, 8.5 cm.; aortic valve, 6 cm.; tricuspid valve, 11.5 cm.; left ventricle, 1.5 cm.; mitral valve, 10 cm.; right ventricle, .3 cm.

Heart muscle of normal appearance. Valves normal, except mitral, which shows faint patches of sclerosis remote from valve edge.

Lungs: Weight, left, 300 gm; right, 310 gm. The pulmonary arteries of both sides show thrombi somewhat firmly attached at several points to the endothelium and extending into the primary branches. The thrombi are mixed red and gray, of friable consistence and closely molded to the shape of the arteries. The lungs contain no frank infarctions. The posterior part of both lobes of left lung is prominent and non-retractile, but fragments from all parts of lung float in water. The lowermost angle of left upper lobe shows a focus containing externally an abscess greenish in color, covered with fibrin, but on section the lung tissue is merely somewhat dryer than the remainder of lung and shows no point of suppuration. The right lung is almost wholly free from lesions, but shows slight edema and congestion posteriorly. Bronchi of left lung normal. Left lung slightly reddened. Bronchial lymph nodes small and black.

Spleen: Weight, 50 gm. Capsule slightly thickened. Substance of a maroon color, not pulpy, with Malpighian bodies not visible and showing a diffuse increase of interstitial tissue of moderate degree.

Gastro-intestinal tract: Esophagus normal. Stomach shows a moderate number of rugae and is injected over the lesser curvature. Duodenum, jejunum and ileum contain semifluid material. The cecum contains a moderate quantity of formed feces. Large intestine otherwise normal, except for reddening of the tips of the folds in the rectum.

Liver: Weight, 950 gm. Border sharp, capsule smooth, substance plum-colored and well injected.

Gall bladder not remarkable.

Pancreas not remarkable.

Adrenals normal.

Kidneys: Weight, 200 gm. Strip readily; cortex well injected; markings distinct; radial opacities of both cortices especially distinct towards the intermediate veins, suggesting an acute process. Ureters both somewhat distended, but otherwise not remarkable.

Bladder normal.

Genitalia: The uterus is indistinguishably merged in a mass of fibromyomata, roughly oval in shape, with major axis pointing from the right above to the left below. The mass measures 13 cm. x 8 cm. x 9 cm. in diameter, and is composed of several large fasciculated masses, of fibrous appearance, which can be somewhat readily shelled out from loose fibrous capsules. The diameter of the uterus does not seem to be reduced in size. The mucosa is slightly reddened. The cervix is bent into a curve with the concavity anteriorly, by reason of the encroachment of long fibromyomata behind. Cervix contains a small amount of mucus. There are no scars upon the os; vagina normal. Attempts were made to pass probes from the uterine cavity through the tubes, but the lumina of these seemed occluded. The right fimbria is congested. Both ovaries contain corpora lutea, and the right contains a corpus hemorrhagicum. The left ovary is about half the size of the right and is bound down by adhesions,

The pelvic cellular tissue is extremely firm and dense.

Aorta: Posterior surface of aorta shows a few faint patches of sclerosis. The coronary arteries show small early patches, and adjoining the sinuses of Valsalva are a few larger patches.

The vena cava: The lower 5 cm. of vena cava contains a mixed red and gray thrombus attached somewhat firmly to the posterior wall and continuous with similar thrombi of both common iliac, both external iliac and both femoral veins. The lower parts of the thrombi are looser in texture and are much admixed with post-mortem clot.

Head: Hair heavy; scalp shows a few ecchymoses over frontal region. There is a large spot of hemorrhage in the pericranium over left parietal bone, 2 cm. in diameter. Skull of normal thickness, but dense. Dura mater nowhere adherent to calvarium. Sinuses not remarkable. Middle ears normal. Nasal cavities normal. Pia mater well injected, especially in right hemisphere, both in sulci and over tips of gyri. Slight overgrowth of fibrous tissue over optic chiasm. Pia mater everywhere delicate and transparent.

Brain: Weight, 1,200 gm. Consistence throughout normal. Very few annectant gyri. Gyri in general symmetrical. Cortex nowhere shows on section a diminution in thickness. Substance is moister than normal. Cerebellum and pons: Weight, 145 gm. Superior surface of cerebellum extremely soft and without focal lesion. Ventricles show a normal ependyma. Interbrain and midbrain normal on section. Considerable pigmentation of pia mater and spinal cord in cervical region.

III.

At autopsy *cultures* were made upon agar plates from the heart's blood, the brain and a mesenteric lymph node. Both blood and brain yielded numerous colonies of *staphylococcus albus*, whereas the mesenteric lymph node culture remained sterile. (For these data and the organism, we wish to thank Dr. A. H. Peabody, assistant physician, Danvers State Hospital.)

Parallel with previous work in this laboratory,² numerous inoculations were made with the cultivated organism by several routes in guinea-pigs. Subcutaneous and intraperitoneal inoculations yielded no clinical sign of injury in the guinea-pigs. A series of injections of like amounts of the *staphylococci*, grown and suspended in bouillon, was made by way of the orbit, with the object of studying such phenomena of meningitis and encephalitis as might ensue. Animals were killed at intervals of three, six, nine, twelve, eighteen and twenty-four hours, at the end of two, three, four, five, six, seven, nine, eleven, fourteen and twenty-one days after inoculation. Cultures were made upon agar slants from beneath the fore-brain after removal of the calvarium and lifting the brain with sterile forceps. Growths of the *albus* were obtained from this locus in the majority of animals of this series, beginning with the animal killed after twenty-four hours and ending with the animal killed upon the fourteenth day,

Animals killed prior to twenty-four hours after inoculation consequently failed to yield organisms. (From one twelve-hour brain a single colony was obtained.) This work appears to confirm the impression derived from previous work that many types of organisms will grow through or be carried through from the orbital tissue to the meninges in the guinea-pig.

As a control upon the bacteriological examinations in this series, sections were prepared from the brains of a typical series of animals illustrating the various time intervals. The course of the inflammatory process as exhibited by leucocytosis, emigration of leucocytes and diapedesis of blood globules was shown to follow rather exactly the results obtained with cultures. No instances of emigration of leucocytes through vessel walls were obtained until an animal killed twenty-four hours after inoculation was examined. A few of the arteries in this brain showed excessive numbers of leucocytes, with accumulations of leucocytes outside the vessel walls and groups of cocci. The cocci were by no means habitually engulfed in the leucocytes. It was, in fact, unusual to find such evidence of phagocytosis. It is possible that in some instances the access of bacteria to the meninges from the orbit is more rapid than indicated, since in one animal, killed twelve hours after inoculation, blood and leucocytes were found in a few foci in the pia mater, especially beneath the cerebrum. From this brain (as stated above) a single colony of staphylococci had been cultivated; no bacteria were found in section.

The fastigium of the mild hemorrhagic meningitis, characteristic of these inoculations, probably occurs from the third to the fifth day and perhaps rather earlier than later in this interval. These results correspond with previously published results of aureus inoculations.³ Mononuclear cells are not characteristic of these exudates, so that once more the parallel with aureus effects is maintained.⁴

As a control upon the histological study of the exudates, Marchi preparations were made from a representative series of animals. A large number of Marchi preparations were made, representing several areas of the nervous system, including the medulla and spinal cord, so that the occurrence of Marchi degenerations having possibly nothing to do with our inoculations might be observed. The necessity of such control work in all studies of Marchi degenerations outside the field of definite tract or systemic diseases has been emphasized by work done in this laboratory both on the nervous system of guinea pigs suffering from diphtheria toxone paralysis and upon guinea pigs examined in the course of work on anaphylaxis.⁵

It will be remembered that the Marchi degenerations shown in animals subject to inoculation with bacillus typhosus⁶ appeared tolerably late in the ensuing disease, appearing in demonstrable amount about the seventh day and running behind the exudative process by some days. In the present albus series the brains and cords were

negative or virtually negative up to two or three days after inoculation, when a very slight blackening in the fibers of the white matter in the cerebrum appeared. Thereafter little blackening was exhibited, except in an occasional bundle of fibers at the base of the brain. It is difficult to exclude experimental artefact for such occasional degenerations. The whole picture in this albus inoculation series is far less striking than in the typhoid inoculations.

IV.

The microscopic examination of the *organs of the trunk* served largely to confirm the gross diagnoses, but also gave evidence of several additional minor lesions.

Heart. Besides the slight coronary sclerosis revealed in the gross examination, the heart showed a few foci of mononuclear cells of the lymphocyte type in the fat tissue near small vessels, a minor degree of perinuclear pigmentation in the muscle fibers, a few trifling accumulations of fibrous tissue along trabeculae, and little or no evidence of acute change.

Lung. In places, considerable edema without pronounced cellular infiltration; plugs of fibrin and leucocytes in some of the small veins; recent fibrinous pleuritis (section from left lung). A moderate number of phagocytic cells, as a rule containing blood, are found in the alveoli.

Liver. The liver shows an acute degenerative process, confined almost exclusively to the lobule centers. The cell columns here are narrow. There is a considerable free space between the parenchymal cells and the capillary walls, which is filled with granular material. The cell columns in these places are somewhat highly pigmented. The capillaries in the lobule centers are only moderately dilated. There is little or no evidence of acute exudation. The portal veins are all greatly distended.

Hypophysis. The vessels of the hypophysis are distended. There is considerable colloid deposit in some of the acini.

Otherwise the microscopic examination yielded no further points. It is interesting to consider the age of the thrombi. Sections from the pulmonary thrombi showed no evidence of ingrowth of connective tissue into the thrombi.

Gasserian ganglia. There is a mild diffuse chronic lesion involving a great majority of the ganglion cells, which are surrounded by a double or triple layer of capsular cells. There is no evidence of very acute cell destruction. A moderate chronic interstitial process accompanies the cell changes.

The *cerebral cortex* was examined in several areas and everywhere gives the impression of being but slightly, if at all, altered by disease. The white matter everywhere presents the usual regular arrangement of neuroglia nuclei. The neuroglia elsewhere appears quite normal, save that in a few places, notably opposite pial veins, there is a slight fibrillary thickening of the subpial felt work; this change, if it be pathological, seems

to fall logically into a class with the slight cerebellar changes noted below.

The vessels are only in places injected. There is little or no perivascular gliosis. There are a few pigmented cells in some perivascular sheaths in almost every region.

The nerve cell layers present the usual topography, and, although a certain number of "axonal" reactions were determined, there was little other evidence of acute change.

In a few regions were found small areas of fibrinoid change in parts of walls of small vessels, with groups of polynuclear leucocytes clustered near. In several places an accumulation of granular coagulum was found containing mononuclear (endothelial?) cells.

The *cerebellar cortex* is almost completely normal (specimens from each hemisphere). An occasional laminar tip shows a surplus of neuroglia cells in the Purkinje cell belt, but nowhere is there a frank loss of Purkinje cells. The cell elements of the granular layer are also properly maintained, except in a few small foci, where, for a half millimeter or so, some of the granule cells have been lost, as indicated by the drawing together of the eosin structures of Denissenko. No acute changes were demonstrated.

V.

Let us analyze the course of this case in two ways:

ANALYSIS I (PSYCHOGENIC).

Let us emphasize at first, so far as possible, the psychogenic features:

A well-educated negress, with probably some hereditary tendency to insanity, marries at twenty-eight an impotent husband of sixty. Six and a half years later she develops nervousness, insomnia, headaches, with considerable constipation. When seven years married the patient becomes free in recounting sexual dissatisfactions to her physician and begins to think of other men. Fifteen months after nervousness had set in there is discovered an enlargement in the uterus, which doubtless worries the patient much, though operation is refused. Thereafter headaches and eroticism are frequent symptoms.

Suddenly, eighteen months after the initial nervousness, four months after the first symptoms, which her physician was inclined to call symptoms of insanity, the patient develops acute insanity of a type not exactly definable, but perhaps best expressed by the term "acute delirium" (hyper-religiosity, auditory and possibly visual hallucinations, disrobing upon hallucinatory command of God, questionable episodes of confusion and amnesia). Death follows a month later from pulmonary thrombosis following pressure of massive fibromyomata upon the iliac veins.

ANALYSIS II (SOMATOGENIC).

Let us next analyze the case, emphasizing the somatic features:

A well-educated negress, with probably some hereditary tendency to insanity, marries at

twenty-eight an impotent husband of sixty. Six and a half years later she develops nervousness and insomnia, together with headaches and constipation, which the subsequent history indicates are probably due to the growth of fibromyomata of the uterus. Meantime the patient complains at times of sexual dissatisfactions. The uterine growth, which only later was certainly diagnosed as fibromyomatous, becomes palpable fifteen months after the initial train of symptoms had set in. Whether the eroticism which now accompanied the other symptoms is at all conceivably due to impulses from the uterine region is doubtful. Operation is refused.

Acute insanity of delirious type (for details see above) develops, and the only physical symptoms then of note are acne and a slight swelling of the legs (observable by family physician, but not noted by examining physicians unfamiliar with patient).

Following the somatic symptoms, it appears that a marked swelling of the left leg, with fulness and tenderness of the popliteal space, was first noted in hospital fifteen days after onset, accompanied by a temperature of 101°. The swelling subsides to some degree later, so that it became difficult to say that one leg was larger than the other. It is hard to say at what time the iliac vein thrombi began to develop. Possibly the swelling of both legs, noted in the acute outburst, was due to pressure upon the veins by the fibromyomata rather than to the growth of thrombi within the veins. Also it is impossible to say when the septicemia began. Whether the septicemia developed prior to the acute outburst or fifteen days later, it remains certain that in the first fifteen days of the insanity there was evidence of an important somatic disease (massive fibromyomata exerting pressure upon the iliac veins), the results of which became later inextricably mingled with the mental symptoms.

DISCUSSION.

It is possible, by shifting the emphasis in a clinical history, to convey two quite separate notions as to the genesis of a given case of mental disease. Yet an answer to the question whether somatic or psychic (hereditary, individual, social) factors are the more important in many cases of mental disease would be decisive in the inclination of research upon these factors. It is our opinion that research should be inclined upon the side of the bacteria and the toxins in appropriate cases.

Although no single logical step in the process is absolutely safe, we feel that a reasonable account of our case might be as follows:

1. A cluster of nervous symptoms, compounded from the effects of uterine growths and unhappy married life.

2. Latent blood infection (staphylococcus albus bacteriemia) possibly related, through some unidentified atrium of infection, with acne.

3. Rapid and massive enlargement of uterine growths (determining in some obscure way the sexual trend of symptoms?) and pressure upon the iliac veins.

4. Thrombosis of iliac veins and vena cava (date not clear, possibly at the onset of the mental symptoms, possibly fifteen days later) and its sequelae.

5. Acute delirium, difficult logically either to connect with or to disconnect from the thrombosis and bacteriemia discovered at autopsy.

6. Death from septicemia and pulmonary thrombosis.

The case detailed above raises the question whether the incidence of bacteria of low toxicity can determine insanity of the type of acute delirium. Many textbooks seem to admit something of the sort in their groups of *infectious deliria*.⁷ It must be conceded, however, that the precise relationship of infection to delirium in its psychiatric sense is still far from clear.

As to the toxic value of staphylococcus albus, writers are not wholly clear. Genuine cases of albus septicemia are not unknown. The remarkable work of Winslow on the Coccaceae⁸ has served to unify rather than separate the staphylococci of various sorts. Kraus and Pribram⁹ (1906) have shown that many varieties of staphylococci produce a true toxin which will pass into the culture filtrate and produce an antitoxin; the toxin in question appears to poison the heart especially. Panichi¹⁰ (1906) was able to cultivate the albus repeatedly over weeks and months from the blood of two subjects who otherwise gave no noteworthy signs of infection. Similar results with other organisms, especially in convalescence, are serving to overthrow our older notions of the essential injuriousness of bacteriemia. Such bacteriemia of unknown atrium may readily permit infection and thrombosis of tissues under such conditions as those of the iliac veins in the case above described. Moreover, it does not overstep the bounds of probability to state that a variety of symptoms, among them mental, may accrue from such low-grade infections.

The hypothesis that drug-like products of bacteria, or bacteria themselves drug-like in action, may produce mental symptoms, is certainly far from unlikely, though it is also true that idiosyncrasy or special sensitization may be essential to permit the development of such symptoms.

It is obvious, however, that psychiatric clinics are not working this field intensively, and for such work we wish to put in a plea. Routine blood cultures and carefully chosen immunity tests (especially those just recently developed for other purposes as a result of the work of Bordet and others¹¹) in such cases would go far to clear up these obscure relations. Perhaps only by such intensive work can the mechanism of certain types of insanity be learned.

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UTERINE CONSTRICTION BANDS COMPLICATING LABOR.*

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My attention has lately been called to constriction bands in the uterus by their frequent occurrence in my recent cases. In these cases the progress of the labor has been stopped, at least temporarily, by a tonic contraction of a portion of the uterine wall. Of these bands there are two varieties, and comparatively much has been written in the textbooks in the controversy of Bandl's ring versus the constriction or retraction ring.

Bandl's ring is described by Reynolds and Newell as "a thinning of the less powerful lower segment of the uterus by the active contractions and retraction of the more powerful upper part. . . . When seen in a pure state, it is due entirely to the action of the longitudinal and not at all to the circular fibers."

The same authors describe a constriction ring as "due to the action of the circular fibers alone, and is most common around the neck of the child, although it may occur in any horizontal zone of the uterus."

In the discussion of the origin of the band, weight is laid on the character of the cells lining the lower uterus segment. If they are of the type of the cervical cells, then the band becomes Bandl's ring; if decidua in character, the ring is then a constriction ring.

The textbooks devote some space trying to make it possible for the obstetrician in the presence of a band to determine whether it is Bandl's ring or a constriction ring. While Bandl's ring may simply be the junction of the thinned-out lower segment with the retracted portion of the uterus proper, it, with the tonically contracted uterus accompanying it, according to Williams, obstructs labor. On the other hand, some one, I think, states that the constriction ring is nothing more than the lower portion of a tonically contracted uterus, and that the uterus above the thickened portion, called the ring, fits the child tightly. The effects of each, then, on the progress of the presenting part, are identical. Clinically, it makes no difference, to my mind, by what name the band is called when it or the accompanying uterine condition prevents the proper progress of labor. It may be covered with one kind of cell

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