magnification of 450 diameters, in normal fluid not more than two or three lymphocytes will be seen in each field, and not a single polymorph.

In certain morbid affections of the central nervous system and its meninges there is a great increase in the cell count. In acute inflammatory conditions, such as meningococcal or streptococcal meningitis, polymorphs are present in enormous numbers, producing turbidity as a rule. It must be remembered, however, that a considerable number of polymorphs may be present with a perfectly clear fluid.

The lymphocytes are increased in the more chronic infections of the central nervous system, notably syphilis —including so-called parasyphilis—and tuberculosis. It used to be considered that these were the only conditions which gave a cerebro-spinal lymphocytosis, but it is now recognized that in certain mental diseases an increase in the lymphocytes may occur. I have encountered nine cases of dementia praecox in which a marked lymphocytosis was present, and in one case of pituitary tumour accompanied by marked dementia there were over 1,000 cells per field. I examined this tumour microscopically, and it proved to be of a sarcomatous and not of a syphilitic nature. With such rare exceptions, however, lymphocytosis in the cerebro-spinal fluid indicates tuberculous meningitis, general paralysis, tabes dorsalis, or cerebro-spinal syphilis. It also occurs in the meningitis which sometimes accompanies mumps.

In tuberculous meningitis lymphocytosis is the rule, but in some cases a considerable proportion of the cells present may be polymorphs. Demonstration of tubercle bacilli in the coagulum, which usually forms when the fluid is allowed to stand, will settle the diagnosis.

It is now generally admitted that the earliest, the most easily recognized, and the most certain of all the physical signs of general paralysis and tabes dorsalis is lymphocytosis in the cerebro-spinal fluid. Further, the earlier the case the more marked is the lymphocytosis, so that in those cases which are most difficult to diagnose this sign is the most marked. We all know how puzzling and how worrying a doubtful early case of general paralysis may be. The question of prognosis is so grave and the physical and mental signs often so indeterminate, that any assistance in clearing up the diagnosis is welcome. I have no hesitation in saying that the presence of a lymphocytosis, together with a positive Wassermann reaction in the cerebro-spinal fluid, is worth all the other physical signs put together. Although it is the lymphocytes which are increased polymorphs may also be present, especially after a seizure. They are rarely met with in tabes.

In tertiary syphilis of the central nervous system lymphocytosis usually occurs. This, as a rule, is not nearly so marked as in general paralysis and tabes. Moreover, it tends to disappear under antisyphilitic remedies, which is not the case in the parasyphilitic conditions. Finally, the Wassermann reaction, although present in the blood, is very often absent from the cerebro-spinal fluid in cerebro-spinal syphilis, whereas in general paralysis it is present in about 95 per cent. of cases. In the earlier stages of syphilis, even before the end of the first year, involvement of the central nervous system is by no means uncommon. Indeed, at the recent International Congress, Neisser stated that no one should be passed as cured of syphilis until the cerebro-spinal fluid had been reduced to a fully normal condition.

The fact that eosinophilia occurs in the blood of patients infected with intestinal and other parasites is well known, but hitherto eosinophiles have never been found in the cerebro-spinal fluid. Quite recently, however, two cases of *Cysticercus cellulosae* in the brain were reported, in each of which there was eosinophilia both in the blood and the cerebro-spinal fluid. Cerebro-spinal eosinophilia is probably pathognomonic of this condition, but it is little more than a pathological curiosity.

PROTEIN CONTENT.

In the normal fluid there is no albumin and only a trace of globulin; the protein content, therefore, is extremely low. In general paralysis and tabes dorsalis, and to a lesser extent in cerebral syphilis, it is greatly increased.

A multitude of tests have been devised to show this increase, but I shall only mention one, the ammonium sulphate ring test, which consists in running the cerebro-spinal fluid on to the top of a saturated solution of pure neutral ammonium sulphate. A white ring at the junction of the two fluids indicates that the protein is increased. As regards quantitative estimation, I have found that by using this test, and by diluting the cerebro-spinal fluid till a ring is just obtained, and noting the dilution used, a very good indication of the amount of protein present is obtained.

BACTERIOLOGY.

Various micro-organisms have been described as occurring in the cerebro-spinal fluid. Those most often found in acute meningitis are the meningococcus, the pneumococcus, and the streptococcus. In tuberculous meningitis the tubercle bacillus can usually be demonstrated in the cerebro-spinal fluid if special methods be used. Many other organisms have been found, such as the *Bacillus coli*, typhoid bacillus, influenza bacillus, etc., but all these are of rare occurrence. Sometimes a vaccine may be prepared from the infecting organism. A small girl was recently admitted to the Wolverhampton General Hospital under the care of Dr. Codd, to whom I am indebted for permission to publish the notes. The patient was supposed to be suffering from some indefinite form of meningitis, and from the cerebro-spinal fluid, which was perfectly clear, an actively motile bacillus was isolated on two occasions; it was clumped by the patient's serum, even when diluted 120 times. On admission the patient was in a stuporose condition, with severe headache and frequent attacks of vomiting. Widal's test was negative. An autogenous vaccine was prepared and given with most gratifying results, for the child speedily became bright, lost all headache, and ceased to vomit. After six weeks the vaccine was stopped, and the child relapsed into her former state —torpor, headache, and vomiting. The vaccine treatment was resumed, and the symptoms speedily disappeared. The spinal fluid became free from organisms, but there remained some weakness of the right arm and unsteadiness in walking.

THERAPEUTICS.

The operation of lumbar puncture may be performed as a therapeutic measure. In cases of meningitis, whether purulent or tuberculous, great good has sometimes resulted from the withdrawal of large quantities of cerebro-spinal fluid and the injection of such an antiseptic as a 1 per cent. solution of lysol.

Lumbar puncture may take the place of a decompressive operation for lowering the intracranial pressure in cerebral tumour, but in these cases the operation is not unattended by danger. Uraemic coma and convulsions, and cases of puerperal eclampsia, are sometimes relieved by lumbar puncture in a remarkable way, and the coma which follows cerebral haemorrhage is sometimes amenable to the same treatment.

One of the greatest therapeutic uses of an examination of the cerebro-spinal fluid is the determination of the causal organism in meningitis. If the case is proved by the discovery of the meningococcus to be one of cerebro-spinal meningitis, the patient must be isolated, and large doses of Flexner's antimeningococcic serum injected directly into the spinal canal. As the mortality of this disease has been reduced to less than a third by the serum treatment, the great importance of an accurate bacteriological diagnosis is evident.

MENINGITIS IN CHILDREN.*

BY

W. MITCHELL SMITH, M.D.ABERD.,

TEAN, STAFFORDSHIRE.

MENINGITIS is one of the most hopeless diseases with which we have to deal, and it is also one in which an early diagnosis is difficult and which is liable to be confused with other conditions.

Modern diagnosis and treatment of meningitis in children include as to diagnosis lumbar puncture followed by the examination of the fluid obtained from it by cytological and bacteriological methods, and as to treatment the intraspinous injection of a suitable serum.

In the adult the spinal cord terminates at the lower border of the first lumbar vertebra; in children it extends a little further down. The spinal cord is supported in the

* A paper read at a meeting of the Staffordshire Branch.

theca and is separated from it by a layer of fluid which is the cerebro-spinal fluid. Below the termination of the spinal cord the thecal sac extends down into the sacral bone, and this part of the sac is occupied by the lumbar and sacral nerves before they enter the foramina, through which they gain access to the body. It is in the space below the termination of the spinal cord that lumbar puncture should be performed. The fluid which fills this sac is secreted by the cells covering the choroid plexus; it passes from the ventricles of the brain through the foramen of Magendie in the posterior aspect of the floor of the fourth ventricle to the thecal sheath of the spinal cord, whence it passes down the whole length of that sheath. It is obvious that an occlusion of this foramen will prevent the fluid getting from the ventricles into the thecal sac, and in those cases in which this obstruction occurs lumbar puncture will be of no use in relieving the symptoms of intracranial pressure. The lumbar puncture is best done with the patient lying on one side, and the needle should be introduced at a point half way between two spines of the lower lumbar vertebrae, ¾ in. from the middle line, and directed forwards, slightly upwards, and inwards. The needle should be of a fair size and of about 5 in. in length. The ligament connecting the posterior arches of the vertebrae is rather tougher than the overlying tissues, and by the touch it is quite easy to tell when this structure has been reached. Should the bony lamina be touched the needle should be withdrawn two thirds of its length, and then inserted in a slightly different direction. Occasionally, no fluid is obtained, and a stilette should be passed down the needle to remove any blood clot which may be obstructing it. Should the first drops of fluid be bloodstained they should be discarded and no collection made until the fluid is quite clear, or until it is obvious that it contains the same quantity of blood after an interval as it did to commence with. The fluid is received into a sterilized tube. The tube and a tight-fitting cork, to which a weight sufficient to sink it is attached, are boiled for fifteen minutes; the water is then emptied out of the tube and the cork fitted securely in. It should be noticed whether the puncture fluid comes out drop by drop or in a stream, the former being normal, and the latter denoting an increase of pressure. The consistence of the fluid should also be noted; normally it is limpid like water, but may exhibit all degrees of cloudiness, even up to that of pus, the opalescence varying according to the number of cells present in a given quantity.

The important points to determine are: (1) The number of cells present in a cubic millimetre; (2) what variety of cells, if any, are present; (3) the cultural reactions of any organism which may be present. In a few cases it may be advisable to determine the presence of urea, as in the case of convulsions due to uraemia. Puncture to obtain cerebro-spinal fluid may also be performed in the lower cervical region, but, on account of the presence of the spinal cord, it is obviously less desirable than the ordinary puncture in the lumbar region. The operation of lumbar puncture is so simple as to come within the range of every man in general practice. Two points may be accentuated—the needle, the syringe, and the stilette must all be sterilized by boiling in water or salt and water, and the patency of the needle should always be tested before commencing sterilization and again before making the puncture. In many cases it is advisable also to give a little general anaesthetic, for it is well-nigh impossible to make a puncture on a child struggling violently.

Diagnostic Value of Lumbar Puncture.

Most of the conditions simulating meningitis occur in adults, whereas the true forms of meningitis are more commonly found in children. Diabetic and uraemic coma may develop very rapidly and simulate meningitis, as may also the status epilepticus and acute delirious mania. These can be distinguished from meningitis by lumbar puncture and finding that there is no increased number of cells in the fluid. Haemorrhage into the ventricle of the brain or around the medulla and pons will also give rise to symptoms which may cause difficulty of diagnosis. The fluid obtained by lumbar puncture will be tinged with blood and the depth of the tinge will be the same at the beginning and at the end of the flow. In addition cells will be found which contain semi-digested red blood corpuscles. The difficulty of diagnosis is, however, much greater in the condition termed "meningism," which is a result of toxaemia from different causes, and is most frequently associated with acute febrile diseases, such as pneumonia, or in conditions of heat-stroke. In such cases the cerebro-spinal fluid is colourless and quite normal. The structure of the thecal sac is very similar to that of other serous membranes. Acute inflammation produces an influx of ordinary pus cells, namely, polymorphonuclear corpuscles, while chronic inflammation stimulates the lining cells, which reproduce their own species, namely, mononuclear cells. In a subacute case both varieties of cells will be found in varying proportions. This cytology would afford the basis for a classification of meningitis into the acute cases, which produce a polymorphonuclear cytology, and chronic, in which mononuclear cells are found in varying numbers. We can also subdivide cases of meningitis into those in which recovery is possible and those cases in which recovery is very exceptional. The third classification, that suggested by Sir William Osler, is now usually accepted. This I have set out in the following table, in which the features associated with the various forms are given also.

Meningitis in Children.

Meningitis.	Onset.	Initial Symptoms.	Cerebro-spinal Fluid.
Epidemic meningococcal (spotted fever)	Generally sudden	Basal	Polymorphonuclear leucocytes, Weichselbaum's *Diplococcus intracellularis.*
Sporadic meningococcal (posterior basal)	Sudden	Basal	Polymorphonuclear leucocytes, non-Gram stained organisms, *Diplococcus intracellularis.*
Pneumococcal ...	Sudden	Cortical	Polymorphonuclear leucocytes, Fränkel's diplococcus.
Traumatic	History		Blood.
Pyogenic	Sudden	Cortical	Polymorphonuclear leucocytes, staphylococci or streptococci.
Rheumatic	During attack of acute rheumatism or history of rheumatism	Cortical	Polymorphonuclear leucocytes, *Diplococcus rheumaticus.*
Other forms of infection (typhoid, influenza, etc.)	Sudden	Cortical	Polymorphonuclear leucocytes, infecting organism.
Syphilitic	Insidious	Generally basal	Excess of lymphocytes. Wassermann reaction positive.
Tuberculous ...	Generally insidious	Generally cortical	Excess of lymphocytes generally; may be polymorphonuclear leucocytes if acute infection. Tubercle bacilli.
Serous	Sudden	Cortical	Excess of lymphocytes, no organisms. Fluid at increased pressure.
Meningism	Generally insidious	Cortical	Normal fluid generally at increased pressure.

Initial Symptoms: (*a*) When cortex first invaded are intense pain, headache, convulsions, and mental symptoms. (*b*) Where base first invaded are tonic muscular spasm, paralysis, constant vomiting, and optic neuritis.

The onset of meningitis may be extraordinarily acute or, on the other hand, may be slow and insidious, and the symptoms vary according to the site in the central nervous system at which the disease develops. Should the infection be on the cortex of the brain, the illness will be characterized at first by intense pain, headache, convulsions, and mental symptoms; if, on the other hand, the bulb or spinal cord are chiefly infected, tonic muscular spasm, paralysis, constant vomiting, and optic neuritis will be the most marked conditions. When the cortex is the first attacked, the bulb and the spinal cord will be later affected; whereas, when the base is first affected,

the occlusion of the foramen of Magendie will produce obstruction of the outflow of the fluid from the ventricles, and so cause symptoms of pressure in the cortex, passing into coma.

In those forms of meningitis which attack the base and the spinal cord lumbar puncture will not only reveal the cause of the disease at a very much earlier date than where the cortex is involved, but will relieve some of the severer symptoms until such time as the foramen of Magendie becomes obstructed.

In addition to the facts mentioned in the table, there are special features connected with the various types of the disease:

1. *Epidemic meningococcal meningitis* is sometimes called "spotted fever" on account of a peculiar scattered haemorrhagic rash which appears about the third day; it is present only in the fulminating type of the disease. A rash resembling herpes is, however, present in about half the cases, but does not appear till the end of the first week. Deafness is often a prominent symptom, and may be permanent.

2. *Sporadic meningococcal meningitis* generally attacks infants and young children, about 70 per cent. of the cases occurring during the first nine months of life. The child lies on its side with the legs and arms flexed; it screams with pain, and resents any movement of the head and neck; the fontanelle is bulged and tense. The eyes are generally open and staring; the pupils are active to light, but the child takes little notice of objects moved before its eyes, and indeed may become quite blind; this is a very striking feature, and is evidently not due to optic neuritis, as the discs may be apparently normal. It may be permanent, or after it has persisted for weeks the child may make a perfect recovery. Hearing is very acute, and in marked contrast to the deafness of the epidemic type. Tenderness in the region of the spine and pain on movement of the joints is often marked. Retraction of the head, which is an early and very characteristic symptom, occurs also in cases of pneumonia, otitis media, thrombus of the longitudinal sinus, mumps, retropharyngeal abscess, and enlarged cervical glands. Lumbar puncture, however, settles the question. The disease runs a variable course, often proving fatal within the first week. In other cases the child may remain well nourished but semi-conscious for two or three weeks, when it begins to waste, the symptoms become aggravated, the child becomes emaciated, and dies in a state of exhaustion.

Influenzal Meningitis.—The rarity of reported cases is possibly due to the difficulty in isolating the organism, which may easily be overlooked unless cultures on blood agar are made. Batten reported five cases in Great Ormond Street Hospital from 1908 to 1910.

Syphilitic Meningitis.—There are two types of this infection: (1) In infants, the child being apparently normal till about the eighth or ninth month, when it should begin to hold up its head and take notice of its surroundings, but fails to do so. It has little power of movement, arms and legs may become rigid and fits may occur; other symptoms of syphilis may be present. (2) In older children the disease generally manifests itself about the eighth or ninth year, and passes into juvenile general paralysis.

Tuberculous meningitis is essentially a disease of childhood, and is most common from the second to the sixth year of life. Its symptoms are too well known to call for description here.

TREATMENT.

Many forms of treatment for meningitis—surgical, by means of decompression operations, constant drainage by the lumbar puncture tube, washing out the spinal canal with saline or weak antiseptic; and medicinal, by all sorts and conditions of drugs—have been tried but with little success. In epidemic meningococcal meningitis the results of the intraspinous injection of a suitable serum have justified the treatment, and the mortality has been reduced from 70 to about 20 per cent., and, indeed, might be lower were all the cases treated within the first two or three days. A large injection of Flexner's serum—about 20 c.cm. even in a child—is given for two or three days, and repeated later if rapid improvement does not take place. In chronic cases with persistent headache and vomiting the injection of the serum is likely to be attended with satisfactory results.

In the other forms of meningitis intraspinous injection of a serum is worth trying when the case is seen early, but the results so far are by no means satisfactory. Batten reports a case of meningococcal meningitis in which he injected 10 c.cm. on six consecutive days in an infant, with a favourable result. (The bulging of the fontanelle in infants is a useful guide as to the necessity for the operation.)

In the chronic forms of meningitis due to syphilis treatment is now being introduced in which the serum of a patient after treatment with salvarsan is injected into the spinal theca after the withdrawal of an amount of cerebro-spinal fluid equal to that which is to be injected. This is an important point. Repeated lumbar puncture in the hope of minimizing the evil effect of pressure, is indicated, especially in those cases which run a protracted course. In serous meningitis and meningism lumbar puncture is generally attended with excellent results.

Urotropine is the drug which is most likely to be useful. It appears in the cerebro-spinal fluid, and is said to have an inhibitory effect on the growth of organisms. It may be given in 10-grain doses every four hours, even in young children. Bromide and chloral, trional or morphine may be given as necessary for relieving headache and inducing sleep.

General treatment runs on the ordinary lines—a water bed, the child being moved as little as possible, tepid sponging, and the usual attention to the bowels. Persistent sickness in the chronic cases may be alleviated by washing out the stomach, and, if the vomiting persists, feeding with the nasal tube should be tried. The act of swallowing in some cases seems to cause a tendency to vomit, whereas the nasal tube passed below the pharynx has not this effect. During convalescence, so long as the tongue is clean and the bowels regular, a liberal diet should be given.

PROPHYLAXIS.

We are gradually acquiring some definite knowledge of the method in which organisms which produce meningitis gain their entry into the body. The portal of entry of the organism in the epidemic meningococcal form is almost certainly the nose and tonsils, and these structures, when deranged, also harbour pneumococci. The pyogenic form of meningitis is very frequently associated with suppuration in the middle ear. Syphilis is the subject of a Royal Commission, and other forms of meningitis, due to the typhoid and *coli* forms of organism, are so rare as to be almost negligible. Obviously their prevention depends on sanitary conditions.

This leaves sporadic meningococcal and tuberculous meningitis for consideration. In the former the path by which the infection enters the system is unknown, but in the latter the infection is always secondary to a focus elsewhere in the body. Mr. Harold Stiles, in opening the discussion upon tuberculosis in children, at the International Congress, stated that his two assistants in Edinburgh had investigated a large number of consecutive cases of glandular tuberculosis and tuberculous infection of bones and joints, and had found that 90 per cent. of cases of glandular tuberculosis and 67 per cent. of tuberculosis of bones and joints were due to infection by the bovine type of bacillus. He stated, further, that bovine tubercle was found in 19 per cent. of apparently healthy tonsils which were examined, where no other focus of tuberculosis was discovered in the body. He added that in Scotland tuberculous disease was as common in rural as in urban districts, whereas, owing to the environment of the patient, one would have expected the reverse to be the case. He accounted for this by the fact that in towns the municipal authorities exercise stricter control over the milk supply than is done in country districts, whilst the inhabitants themselves are more alive to the necessity of sterilizing their milk. I think those of us who practise in country districts will agree with both findings, for the control of the milk supply in country districts from a hygienic point of view is practically *nil*, and it is almost impossible to persuade country people that it is necessary to sterilize their milk.

Some time ago I was discussing the subject with a well-to-do dairy farmer in my district, and quoted Mr. Stiles's figures. He would not agree with them at all, and, in support of his view, pointed to his own experience. He had reared all his family, and had not lost one during childhood; they had had as much milk as they could drink, and it had never been sterilized. "But," I said, "it is only four or five years since I excised a tuberculous gland from the neck of one of your boys." He had never thought of that. I do not know what the experience of other men in country practice is, but when I come to think over my own, after this conversation, I was surprised at the comparative frequency of single cases of tuberculous disease in the families of well-to-do farmers, where there is an abundance of fresh air, good food, warm clothes, and unsterilized milk.

Personally I feel sure that neglect of the ordinary precautions of sterilizing milk is due to ignorance more than anything else. The laws of this country in respect to the milk supply are extremely lax, and it is scarcely reasonable to expect that those engaged in a trade which is partially controlled by law will do more than the law demands. There can be little doubt that in young children where milk is the chief article of food, infected milk is responsible for the greater part of the dissemination of tuberculosis.

Under existing conditions, therefore, it is imperative that the milk used in the feeding of infants and young children should be sterilized. Such sterilization can easily be carried out by pasteurization, or more certainly by boiling.

The experience of those authorities who advocate the use of sterilized milk in the feeding of infants proves that the associated risks are negligible and can readily be counteracted. On the other hand, the danger of infection from unsterilized milk is real, and the result of such infection is ineradicable.

In order to introduce this precaution into the country-side, it would be necessary to circularize the inhabitants, and this might well be done by sending out leaflets to the parents on the registration of the birth of a child, indicating the dangers of infection, the results which may happen after such infection, and the ease with which precautions to prevent infection can be adopted. This duty would necessarily fall on the medical officer of health.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

ADRENALIN IN ASTHMA.

A Personal Experience.

THE effects of subcutaneous injections of adrenalin have recently been discussed in a number of papers and letters in the JOURNAL and elsewhere. From a considerable personal experience I have come to the conclusion that the dose generally used for asthmatic attacks is much greater than is necessary. The first dose I ever gave myself, about two years ago, was 3 minims of 1 in 1,000 solution of adrenalin chloride. The relief of the asthma was almost instantaneous, but I felt extremely ill for some minutes, my hands shook so much that I could hardly put the syringe away, and my pulse became very rapid. Since that date I have given myself a large number of injections, but never more than 2 minims, and rarely more than one; for slight attacks half a minim has been sufficient. With these small doses the only effect I ever experience is relief of the asthma, and this is invariable. No attack has kept me awake for longer than five minutes, except on one occasion on which I broke the syringe, and was consequently awake all night. My pulse is hardly accelerated, and I do not feel the slightest discomfort. The relief is so rapid that I fall asleep within a minute or two of putting the syringe back into its case. Small doses of this kind have the further advantage that they are unlikely to have any permanent ill effect, such as the production of atheroma. Even if three or four doses are required in twenty-four hours, which is most unusual, the total amount injected is less than is commonly recommended for a single injection.

I may add that, so far as my experience goes, similar small doses have generally proved effective in other patients.

London, W. ARTHUR F. HERTZ, M.D.

PREGNANCY WITH IMPERFORATE HYMEN.

ON March 16th I was called to attend a primipara aged 32, two years married. On examination, my finger passed through a closely constricting orifice about 2½ in. up the vagina before coming in contact with the fetal head. A sort of pouch could be hooked out by the finger, and was found to consist of a toughish membrane with an aperture at its centre. Coitus, I take it, had evidently stretched the hymen into a miniature vagina through the orifice at the top of which my patient had become impregnated. Labour was quite normal in other respects, and no difficulty was found in lacerating the hymen when the fetal head was on perineum. This is the second case precisely similar I have had during the last twelve months. I have seen no others in twenty-five years' midwifery experience.

Birmingham. NORRYS D. BEST, M.R.C.S.

AN UNUSUAL CASE OF ANKYLOSTOMA INFECTION.

THE patient, a middle-aged Englishwoman, was first seen on October 17th, 1913, when she complained of intense itching in various parts of her body; it was most intolerable when on the hands and feet. This itching, which spared no part of the body, was always intense in the afternoon, lasting a few hours, then passing off. She looked white and ill, and had a furred tongue, but no rise of temperature. She complained, not only of want of appetite, but of severe pains in the epigastric region. Her history was that she had been some years in Cairo and had come back from England with her husband, who had leave, arriving on June 11th. On August 29th she felt very ill, having attacks of stomach pain, sickness, and diarrhoea of an intermittent kind. She could not eat and lost several stones in weight. Shortly afterwards, the itching came on daily in bouts which compelled her to scratch and rub the places till, as she said, "she got something out," when the itching stopped. I gave alkalis, bromides, and salicylates without benefit. One day, a week later, she brought a grown-up daughter with her, who described how she had seen on her mother's finger-tips a sharp needle-like object push its way through the skin at the point of itching. I asked them to bring me some if they could. A day later I got three small thread-like objects in spirit much macerated, and under the microscope showing a structure of some sort not recognizable by me. Next day they brought some more of these in a small box. One had been taken from the edge of the upper lip, and under the microscope proved to be a perfect specimen of an embryo of *Ankylostoma duodenale*. Subsequently these appeared in enormous numbers in the mouth, throat, cheek, windpipe, where they caused much cough and retching. They also pushed their way out of the tongue. The treatment was by thymol, followed by the administration of sulphur tabloids for several days. All the drug was thoroughly absorbed. The cure was rapid, and I heard nothing more of my patient subsequently when the itching had stopped, which seemed to indicate that this huge migration of embryos to the periphery had stopped.

As far as I am aware this case is unique. Looss has proved that these embryos will penetrate the skin and find their way to the duodenum. I can find no cases recorded of the converse, and I could not elicit from my patient any determining factors which would have impelled the embryo worms to leave the duodenum and push their way from the arterioles right through the various surfaces of the body. Nor can I advance any theory for my own satisfaction. She was anaemic, with a large increase of white blood corpuscles.

Heliopolis, Cairo, Egypt. JAMES DUNBAR-BRUNTON, M.D.

BELLADONNA POISONING.

AT 9 p.m. on March 15th I was called in to see a gentleman aged about 71. His wife informed me that he had seemed out of sorts all day, was slightly drowsy, had eaten practically nothing, and seemed slightly confused in his ideas. The patient himself told me that he had had some difficulty in passing urine during the day, this being the first time that he had ever been troubled that way.

I found that the bladder extended to 2 in. below the umbilicus. I placed the patient in a hot bath, where I discovered that he was wearing a belladonna plaster over a raw surface which had been caused by a mustard leaf applied for lumbago. Finding his pupils dilated, I told him that the belladonna plaster was probably the cause of the trouble, and asked him to pull it off, which he did. Leaving him in the bath I went downstairs to order a hot-water bottle for his bed. I came upstairs again after about two minutes, to find the patient with a flushed skin sitting naked on the staircase, not knowing his own bedroom, talking incoherently, and quite unable to walk. I carried him into his room, where he collapsed for a few seconds.