rather dealing with a quadrilateral space, something that has more of the configuration of a rectangle. I feel, therefore, that if we get away from the designation of angles in these cases we may be serving cranial topography with more accuracy, so far as this site of predilection for certain tumors is concerned.

In Dr. Grinker's paper, I think that, aside from the complete report of his cases, chief interest centers in the character of his summary, in which he dwells upon the question of glioma and sarcoma, as well as the expediency of lumbar puncture. I think that we as neurologists are quite agreed that lumbar puncture of itself is a relatively innocuous adjunct to our diagnostic technic, but it may prove a decidedly dangerous measure in the presence of a brain tumor. Perhaps this particular fact is not sufficiently impressed on internists or general practitioners. I have not infrequently heard physicians who busy themselves more or less with the modern routine in neurologic examination, ask whether a lumbar puncture has been made, forgetting, I think, that lumbar puncture may be of real danger to the patient when we are dealing with obvious symptoms of intracranial pressure of tumor origin. I should advise extreme conservatism in doing lumbar puncture in this type of case.

I think, too, that in those cases in which cerebral tumor of solid formation is suspected, we are not infrequently surprised to find a cyst, capable of evacuation, and therefore yielding a better prognosis than was admissible from the premises prior to operation. I recall such an experience five or six months ago, when it was my privilege to see a case of brain tumor at the request of Dr. Alfred Murray. I made a localization of cerebellar tumor and the patient was operated on by Dr. Albert E. Halstead, of Chicago. The acoustic findings were of very material value in referring the tumor to the cerebello-pontile space (or angle, if you wish) and on a very extensive decompression, exposing both sides of the cerebellum very widely and spaciouly, it was found that the suspected area was filled with a fairly large cyst, which was properly evacuated, and at a recent date, the patient was doing very well in his own home, and able to be up and about, for a time even following his occupation as a pharmacist.

I agree with Dr. Dana that we should not forsake the old and well-tried clinical criteria in arriving at a localization, but, on the other hand, I feel that we should put due emphasis on some of the newer additions to our technic and credit with importance such a symptom as, for instance, has been advanced by the French school, and called "adiadokokinesia." I have noted it in several instances, and I think, as an evidence of asynergy, it is quite as important as are other symptoms entering into the question of the coordinating function, as it depends upon the cerebellum.

DR. JULIUS GRINKER, Chicago: I wish to emphasize a point of general practical interest, namely, that hysteria and neurasthenia are diagnosed often in cases requiring more extended investigation. I recall several such cases of my own, in which the symptoms at first pointed to functional disease, but brain symptoms developed later and the diagnosis of organic disease had to be made.

One point which has not received due emphasis in this discussion is that cerebello-pontile angle tumor may begin with hemiplegic symptoms. My third case, which for lack of time could not be reported in full, was diagnosed as hemiplegia at a time when there were hemiplegic manifestations in the form of one-sided asthenia, that is, a unilateral weakness resulting from cerebellar atonia. In these cases there is neither exaggeration of reflexes, nor Babinski sign.

I am very thankful to Dr. Dana for correcting my short reference to the historical development of this subject. It is quite true that Drs. Hunt and Franckel were the first to call attention to tumors in the cerebello-pontile angle; they also furnished splendid contributions to the symptomatology.

In my opinion the new cerebellar sign described by Babinski under the term "adiadokokinesia" is not valueless. When present, it is a reliable sign. It is more often absent than present and frequently it only appears after an operation has been performed on the cerebellum, certainly too late to be of value in diagnosis. In one of my cases this symptom was present before any of the others. While, then, this sign may not be of the greatest value, we may nevertheless consider it,

if only the observation may serve to determine its proper place in the symptomatology of cerebellar tumor.

Staggering to one side is not a reliable focal sign. In two of my cases the staggering was on the side of the tumor; in the third case the patient staggered to either side.

Concerning speech disturbance, my first case showed an utterance which might be called "jerky" speech, rather than bradyphasia. The so-called "cracked-pot" resonance I have not found in my cases, but I have often observed it in the hydrocephalus of children.

EHRlich'S BIOCHEMICAL THEORY, ITS CONCEPTION AND APPLICATION *

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It is my privilege in this paper to take up the subject of specific chemical therapeutics, which is equivalent to saying that I am to expound the work that Professor Paul Ehrlich has accomplished in the past seven years, during which time he has done far more than merely lay the foundation of this new science. It can be said that this basic idea, which he has followed logically from the very beginning of his experimental work, down through his present world-stirring discovery; namely, that a specific chemical affinity exists between specific living cells and specific chemical substances, is his main, most valuable, broadest and most suggestive contribution to science.

It was this idea that was at the foundation of his famous studies on the morphology of the cellular constitution of the blood. As is known, Ehrlich was the first to describe correctly the leukocytes, and to teach us to differentiate not only different parts of the body of the leukocyte from one another, but also the different kinds of leukocytes one from the other, by showing that these different parts stain differently with the same dye-stuffs.

Following up this work in the field of morphology he studied vital staining and demonstrated even more clearly the selective action of many different substances for different tissues of the body. The best-known experiment in this connection is the one performed with methylene blue, whereby he showed that if the substance he injected directly into the circulation, on section of the animal some time later, the tissues of the nervous system will be the only ones colored blue. He found further that those cells of the body which demand the most oxygen would not be colored at all, but would turn blue after an exposure to the air. This led to the publication of a work¹ which stands out as a beacon light in the realm of science, and is surpassed only by his original publication of his fundamental theory concerning the distribution and selective action of chemicals in the human body.

Further following out his idea he happened to feed mice with ricin and abrin, the vegetable poisons contained in the castor oil and jequirity beans, and found that he could immunize them against these poisons. Not only was this the first time that animals were highly immunized to vegetable poisons, but it was also the first time that the degree of immunity was definitely known. He also discovered the coagulative action of ricin on the red blood-corpuscles and found

* Delivered by invitation before the Anglo-American Medical Association of Berlin, Sept. 10, 1910.

1. The Oxygen Requirements of the Organism.

that he could prevent this by adding to a mixture of ricin and red blood-corpuscles a small quantity of the blood-serum of a previously immunized animal.

As the opportunity was given to Ehrlich to follow out on a large scale researches that he had long hoped to be enabled to carry on, and to which he was much more forcibly attracted, he left the other fields of research to undertake the study of specific chemical therapeutics.

Ehrlich believed (and this belief found sufficient support in his twenty-five years of experience) that for each specific parasite a specific curative drug must and could be found.

An important question to be solved in starting this work was the selection of a suitable parasite and a suitable animal for experimentation.

Because of the sleeping-sickness epidemic in Africa, and because the trypanosome is easily transferable to mice, Ehrlich began working with trypanosomes. At first he used many dyestuffs, some entirely new, some old. He soon succeeded, in connection with Weinberg, in producing a new dyestuff, trypan-red, which absolutely cured every infected mouse with one injection. This was the first time that a living organism was completely sterilized; that is, that every one of the parasites within the body was completely destroyed by a disinfectant.

The complete sterilization of the animal's body with trypan-red was but the first step forward in this new science. It was found that if a slightly smaller dose was injected than was necessary completely to destroy all the trypanosomes, then these would entirely disappear from the circulation for a period directly proportional to the dose given, but after that period they would again return. If the mouse were again injected with the same dose, the parasites would again disappear only to return after a shorter interval. If the injection was repeated several times, a strain of trypanosomes would be obtained on which trypan-red had not the slightest effect. In other words, the parasites became completely resistant to the largest dose of trypan-red that it was possible to inject into a mouse without causing injury to it, and this resistance was transmitted to the trypanosomes for many generations. It is possible that if a strain of trypanosomes could be brought to the maximum immunity towards a given drug, this characteristic would become constant. For example, we have in our laboratory a strain of trypanosomes which nearly four years ago was made resistant to atoxyl, and is still resistant after three and one-half years passage through normal mice.

And again, I have succeeded after three and one-half years of arduous work in producing a strain of paratyphoid bacilli resistant to arsenious acid. I have grown them on agar containing increasing quantities of the drug. At first a dilution of 1 to 28,000 was sufficient to prevent the growth of the bacilli, but now they grow freely on an agar containing a dilution of 1 to 3,500. The chemical receptors of the bacteria as well as the agglutinative receptors are entirely different from those of the original strain; for instance, the resistant strain is completely resistant to antimony, which the original strain is not. At first when the dilutions were very great it was easy to bring the strain back to normal by passing it several times on ordinary agar. However, we have passed a highly resistant strain on ordinary agar 150 times, without succeeding in bringing it back to normal.

The demonstration that these parasites could so readily become resistant to different chemical substances led to the logical conclusion that in order permanently to

cure a parasitic disease it is necessary to destroy in the shortest time every single parasite with one injection of a drug, as it can readily be seen that if complete sterilization is not achieved, and frequently repeated doses are necessary, the substance would soon lose all effect, and the person or animal treated would then be worse off than before the treatment was begun.

This, then, became Ehrlich's aim: to produce a substance which was so specific for given parasites that they would be completely destroyed by one injection.

Just as a general to make sure of victory when trying to capture a fort on a hill attacks it from all sides, so Ehrlich went to work. As the parasites have many receptors specific for different groups of substances, many different substances are tried out; in other words, a combination treatment is aimed at. Therefore Ehrlich has striven in the last few years to produce more than one drug which would act as specific on the same parasite. This combination treatment also has the additional advantage that much smaller and less dangerous doses can be given than would be necessary if the maximum tolerable dose of one drug were used.

As has always been the case in the treatment of diseases, all possible drugs were tried on animals and people infected with trypanosomes. Bruce was the first to find that arsenic was a drug of appreciable value in the treatment of surra (trypanosomiasis of horses). Soon after Ehrlich started his work on trypanosomes, Thomas found that atoxyl, a compound of arsenic and anilin, would cure a large percentage of infected laboratory animals. Then Kopke used atoxyl in the treatment of human sleeping-sickness in Africa. Ehrlich started to work with atoxyl and found that it was an entirely different substance from what Béchamp, its discoverer, had thought it to be: instead of the arsenic being connected directly with the nitrogen of the anilin, and instead of this combination of anilin and arsenic being a very loose one, the arsenic was directly connected with the benzol ring of the anilin and the combination was a stable one and capable of entering into many different kinds of substitution products.

Almost at the beginning of the work it was discovered that although trypan-red possessed the power of destroying all the trypanosomes in the body of a heavily infected mouse, it had no effect whatever when mixed in a test-tube with a blood-suspension containing trypanosomes even in the strongest dilution. It was also found by Mesnil that atoxyl, which caused the trypanosomes to disappear within several hours from the circulation and glands of patients suffering from sleeping-sickness, possessed absolutely no effect on trypanosomes outside of the body in a test-tube. These two phenomena Ehrlich designated as a paradoxical or indirect action.

In order to explain this phenomenon it is necessary to glance over the general theories underlying this science as they have frequently been expounded by Ehrlich. First, what are the drugs that come under consideration at all? and then, how are these drugs effective?

Of these drugs there are three groups:

1. The arsenic group, examples of which are arsenious acid, atoxyl, and later the new atoxyl substitution products, such as acetylatoxyl, arsenophenylglycin and dioxydiamidoarsenobenzol. To this group can also be added the antimony compounds.

2. Certain azo-dyestuffs, such as trypan-red, discovered by Ehrlich and Weinberg, and trypan-blue and trypan-violet, discovered by Mesnil.

3. Certain basic triphenylmethan dyestuffs, such as pararubinsin, methyl-violet and pyronin.

The mode of action of these different drugs varies, according to Ehrlich, as follows:

1. Some substances have no effect on the parasite in test-tubes and possess no curative properties; in other words, the trypanosomes possess no receptor which fits into the atom grouping of the substances.

2. The substance has a highly destructive action on the parasites outside the body; but has absolutely no curative effect. This is best illustrated by the experiment of Koch with anthrax bacilli and bichlorid of mercury.

3. The substance has absolutely no effect on the parasites outside the body, but shows a highly or completely curative action when within the body. This is the indirect action which I have just spoken of, and under this category can be placed most of those drugs which are of practical interest.

Ehrlich has now brought forth sufficient proofs that this paradoxical or indirect action, which many other dyestuffs and arsenic compounds also possess, is due to one of the following conditions:

The first condition is that the substance, which outside the body has no effect on the parasites, is so changed in the body that it becomes effective. In the case of atoxyl Ehrlich has proved that the effect is due to a reduction of the substance within the body, and that the reduced substance is probably a compound called paramidophenylarsenoxyl. This substance he manufactured in the laboratory by reducing atoxyl, which then destroyed the trypanosomes in a test-tube in the amazing dilution of three or four millions. He theorizes from the results which he has obtained with many hundred arsenic compounds that the trypanosomes have a receptor which will combine only with three-valent arsenic and not with the five-valent arsenic, as it is present in atoxyl.

The second possibility of the indirect action is due to an inhibition of certain functions of the parasite which have to do with its reproduction or the destruction of some of its constituent parts. This is shown by the often repeated experiment in which, when trypanosomes are mixed in test-tubes with weak dilutions of certain basic dyestuffs, the trypanosomes continue to live and move, but if this mixture is injected into a mouse no infection will take place. B. Busk also proved the correctness of this by showing that certain paramecia live for many weeks in a strong solution of trypan-red but fail to multiply as usual.

A clinching discovery was that of Werbitzki, working under Ehrlich, who found that if trypanosomes were treated with certain dyestuffs (pyronin) they would lose very rapidly their blepharoplast, and that this characteristic was inherited by the offspring for many generations.

This brings us to the consideration of the several methods by which specific substances can bring about a lasting cure. Either the drug destroys all the parasites within the body by its direct and specific action, or the curative substance need kill only a certain number of the parasites, when the remaining ones will be destroyed by the rapidly formed antibodies, as has been shown by Wassermann, Schilling and Mesnil.

These are some of the fundamental theories on which a mighty structure has already been erected. Let us turn now to the practical results achieved.

Trypan-red proved a curative agent only for mice. It had no effect when used in the treatment of larger animals infected with trypanosomes. Since then it has been found by Manteuffel and Uhlenhuth to have a distinct curative action on some forms of spirilla. Nuttall

has found that trypan-red is a most effective remedy in the treatment of a widely distributed disease of cattle, known best under the name of Texas fever. It has been possible to produce a drug known as arsenophenylglycin which absolutely and lastingly cures with one injection of a proper dose all animals suffering from trypanosome-infection. It has been tried on human beings suffering with sleeping-sickness with varying success. In West Africa von Raven has succeeded in curing a number of cases of human sleeping-sickness with a relatively small dose. On the other hand in East Africa, where the epidemic really is at the present moment, the results have not been so promising. It is hard to imagine what a difficult thing it is to obtain satisfactory results when the field of action is so far distant; and more important still, when the dose of a new drug that a human being can safely stand is absolutely unknown.

This can be better appreciated when we know, for instance, that the largest single dose of arsenophenylglycin in East Africa has not exceeded 1 gm., whereas lately in the Congo, Broden has given as much as 4 gm. in one injection. Frequently the specific instructions given by Ehrlich are misunderstood or the individual worker tries out his own theories. It has been Ehrlich's wish that the largest possible dose be given in one injection in fresh cases of sleeping-sickness, that have not been previously treated with other arsenic preparations, principally atoxyl. Notwithstanding these specific instructions many cases have been treated in the later stages of the disease in which permanent changes in the nervous system have already taken place or where the eye has already been damaged by a previous atoxyl treatment. Hence the results are variable and it is easy to see why any statement as to the ultimate value of this drug must be of the most conservative nature. Until a large number of fresh cases of sleeping-sickness, in which the trypanosomes have not yet invaded the spinal canal, are treated with the largest possible dose that can be given to a human being without injuring the body, our final conclusions must be withheld. At the present time in Africa two dyestuffs, trypanosan and agridinium, trypanocidal substances of very great value, are being used in combination with the arsenophenylglycin.

After having produced this latter drug and after it had been shown that syphilis could be transferred to rabbits, an animal that is easy to work with in the laboratory, Ehrlich turned his attention to that group of diseases caused by the spirilla: syphilis, relapsing fever and chicken spirillosis. Only a short time elapsed before dioxydiamidoarsenobenzol, better known as "606," was brought forward. Hata soon found that this drug definitely cured chicken spirillosis in a dose fifty-eight times smaller than the *dosis tolerata*, or the largest dose that could be given with safety to any animal. The spirilla of relapsing fever when present in the body of a mouse were also easily killed by one injection of a small dose. One-seventh of the *dosis tolerata* was sufficient to cure a rabbit infected with syphilis. This relatively small dose caused the *Spirochaeta pallida* to disappear completely from the lesions within twenty-four hours. After repeatedly securing these results, Ehrlich decided carefully to start some trials with the substance on human beings. First of all, the drug was sent to Professor Alt, who tried it on dogs, and then on two of his assistants, who volunteered, in order to make sure that it would have no evil effects. It was then tried on patients. To Iversen in Russia, Ehrlich entrusted the substance to treat

human cases of relapsing fever, which he did with signal success. With one injection of 0.3 gm. Iversen was able to cure completely for the first time relapsing fever in 90 per cent. of his patients. Within a few hours after the injection, the patient usually suffers a chill of greater or less severity, followed by profuse sweating and a rapid decline of the fever to normal, at which point it remains indefinitely. The action of this drug on such an important disease as relapsing fever we must not allow to be overlooked in the fury and clamor concerning its action on syphilis.

Now to that which no doubt interests us mostly: the results of the treatment thus far obtained in cases of syphilis.

In order to be absolutely sure of his ground and to know exactly when, how, and how much of this substance could be given, Ehrlich has given away over 20,000 doses free of cost to more than 500 selected physicians throughout the world. And all he asked of them was to treat certain classes of patients (which, by the way, many of them have not done), under certain rigid restrictions which he laid down, to the effect that all patients must be confined to bed in a hospital for several days after the injection in order to be under careful observation; that only syphilitics who have healthy hearts and kidneys and sound eyes, that is, in whom no degeneration is present, be treated. From these physicians he now has records of about 6,000 cases and at least 2,000 additional patients have been treated, whose records have not yet been sent in.

The great majority of investigators are astounded at the completeness and rapidity of its action. Naturally some bad results have already been reported, but to find the cause of this has been an easy matter. For instance, we heard some time ago, that certain investigators had seen in a remarkably large percentage of cases paralysis of the bladder and rectum. As soon as their technic became known it could easily be seen that the symptoms were those of methyl-alcohol poisoning, this having been used in too large quantities to dissolve the drug, and possibly being impure at that. It is remarkable that in some of these clinics where hundreds of patients have been treated, no evil effects have been found (aside from a few necroses due to a too superficial injection of the drug, usually when given in suspension). It must also be impressed on every one that Ehrlich has never claimed that this drug is harmless. On the contrary, he has on every occasion stated that in his opinion *a drug will never be found which will completely destroy all the parasites in the body with one or two injections that will be without its dangers*. He has also frequently stated that the therapist can only do with his chemical knife what the surgeon does with his steel scalpel.

The entire process of manufacturing the substance is a most difficult one, as it must take place under nitrogen and absolutely without contact with the air, being a highly reduced product. It is kept in little glass tubes in a vacuum. In treating patients each tube must be opened and the contents either dissolved or suspended, as the case may be, and injected immediately.

Now as to the dose: We do not yet know how much can be given to a human being without causing injury. If the dose be calculated from the average animal dose (including the monkey), a human being could be given 5 or 6 gm. at one injection. It is, however, possible that a human being can stand less than even the most susceptible animal, and that half this quantity would be the maximum dose. Even should this prove to be the

case, it is clear that the doses now being employed are very small ones (0.3 to 0.8 gm.). One gram has already been given in one intravenous injection without causing any severe reaction. A difference must of course be made between the subcutaneous and intramuscular injections, and the intravenous route; but the doses now being employed are about the same for both. The average doses given are about 0.6 gm. for women and 0.8 gm. for men by the two former, and 0.3 to 0.5 gm. by the last. There are some, however, who never use less than 1 gm. intramuscularly, and 0.8 gm. intravenously.

Under the head of technic it must be mentioned that the substance can be administered in two ways: either in a clear solution or in a neutral suspension. The clear solution of the drug is either acid or alkaline; both of these can cause considerable pain, but their effect is decidedly better than that of the suspension, which is, on the other hand, practically painless. The intravenous injection is not only painless, but in the hands of experienced workers is also without danger. The method of Iversen, recently published, by which he first gives an intravenous injection of 0.5 gm. and two days later an intramuscular injection of a suspension, with the idea of creating a storage of the drug, deserves serious consideration and promises to be the method chosen by careful workers in the future.

The great fear that this drug would have a bad effect on the optic nerve as do atoxyl and acetylatoxyl, experience has proved to be groundless. In about 12,000 cases that have been treated, not one report has been made of injury to the eyes. There have been a number of relapses, due to the smallness of the dose which was administered in the beginning of this work. A repetition of the injection, with a dose even larger than that first given, has also been found to be possible and causes the symptoms again to disappear completely.

It has been found by Hoppe that in the case of the intramuscular injection arsenic can be demonstrated in the urine and feces up to the tenth day, while in the case of the intravenous injection no arsenic can be found on the fourth day. One injection of the drug into infected animals causes the spirochetes to disappear completely within twenty-four hours, and in human beings within three days.

The rapidity of the cure in the primary stage depends on the character of the primary lesion. An erosive one heals completely within four or five days, whereas it requires eight to twenty days for an indurative chancre to be healed. The effects on the secondary symptoms are even better than on the primary. The eruptions disappear in some cases as if by magic, and throat lesions also heal within two or three days. Still more wonderful is the effect of the drug on tertiary lesions. This sounds paradoxical, but Ehrlich thinks it is due to the presence in the body of large quantities of antibodies which have had time to develop. Gummas disappear, and deep ulcers become clean and granulating within a very few days.

These results seem almost incredible, but they are demonstrated daily in the clinic of Wechsellmann in the Virchow Krankenhaus, and in other clinics where the drug has been used. Whether dioxidiamidoarsenobenzol effects a permanent cure of syphilis by one injection in the majority of cases, only observations covering a long period of time can show. One thing, however, is now already certain: that it is not only superior to mercury and iodid of potash in the treatment of syphilis, but that it surpasses any known drug on account of the rapidity and apparent thoroughness of its action.

As I have stated above, acid or alkaline solutions can cause considerable pain, while the neutral suspension is practically painless; but its absorption and effect is slower. The amount of pain and discomfort following an injection varies with different patients. In general, it is said that women seem to suffer less than men, and babies apparently have no pain even from a strongly alkaline solution. It has generally been found that on the second or third day after injection, there is a slight rise of temperature which abates again within a few hours, and a slight tenderness at the site of the injection.

It should be mentioned again that "606" is a powerful medicinal agent, and it should be used only after the various techniques have been thoroughly studied and mastered. It will never be a drug that can be used altogether in office practice like the frequent injections of the different mercurial salts; and the greatest caution must be exercised by those who use it, after it is given to the medical profession at large. An unattainable ideal would be to have the drug used only by trained genito-urinary specialists, just as a laparotomy is performed to-day only by a surgeon.

It is for this reason that Ehrlich has withheld the preparation from the general profession until many thousand cases have been recorded by competent and careful workers. The records of these cases will act as a bulwark against any future misuse of the drug by the incompetent.

Sandhofstrasse 44.

A CASE OF TORSION OF THE GREAT OMENTUM

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Although the case reports of torsion of the great omentum have greatly increased since the recognition of this condition has become more general, still it is of sufficient rarity to warrant the report of all cases, particularly of the intra-abdominal variety.

History.—R., male, aged 45, referred by Dr. W. V. C. Francis, with the following history: Appendectomy during an acute attack five years ago, with suppuration of the wound; since then the patient has had frequent attacks of abdominal pain of a colicky nature. July 22, 1910, an attack of unusual severity was followed by the formation of a tumor in the right iliac region which was tender to pressure. The temperature varied from normal to 101 F. The patient had not vomited. The bowels had moved daily. August 1, ten days after the commencement of his illness, the acute symptoms had subsided. He complained of little pain and appeared quite comfortable. The evening temperature was 100 F. The pulse was not accelerated. The abdominal walls were thick. There was no tympany nor rigidity. In the right iliac region, just lateral to a broad oblique scar, was a tumor about the size of a fist, slightly tender to touch and apparently superficial to the abdominal muscles. A diagnosis was made of strangulated epiplocele and operation suggested.

Operation and Findings.—The operation on August 3 revealed a mass of strangulated omentum about the size of a duck's egg, within a hernial sac, to which it was firmly adherent. The pedicle, two finger-breadths in thickness, was found continuous with a mass of matted and deeply congested omentum within the abdomen. This intra-abdominal mass was about the size of a goose-egg, firmly attached by old adhesions to the intestines, from which it was separated with difficulty. This mass was, in turn, attached by a pedicle the thickness of the thumb to the remainder of the great omentum. Both pedicles showed plainly the marks of torsion, and both omental masses the effects of venous obstruction. The strangulation

was more intense in the intra-hernial mass, but in neither was it sufficient to cause gangrene. The patient probably would have recovered from this attack, as he had from previous less severe ones, as evidenced by the dense adhesions of both masses. Both omental masses were removed and the hernial opening closed by overlapping. Recovery was uneventful.

Adhering to the classification suggested in my previous article,¹ this case belongs to the group of intra-hernial and intra-abdominal torsion about two points.

MYIASIS DERMATOSA DUE TO THE OX-WARBLE FLIES

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Myiasis dermatosa, or infection of the skin with the larval stage of dipterous insects, is fairly common in the tropics though less so in temperate zones, the infection in man most commonly being due to the screw-worm (*Comptosia macellaria*²) or to *Dermatobia hominis*.³ The following case of human infection due to *Hypoderma lineata*, one of the ox-warble flies and a parasite of cattle almost exclusively, merits report because of its rarity.

Patient.—H. S., a white boy, aged 11, of Roanoke, Va., was admitted to Johns Hopkins Hospital, Baltimore, March 13, 1908, complaining of "swelling under the chin." His family and personal history are negative.

Present Illness.—In December, 1907, the boy noticed a small round lump just below the left knee; this lump was slightly red and very tender especially at night. About two days later the lump had disappeared from the original position and was found some three inches above the knee; the following day it was still higher on the thigh and during successive days it appeared at different points along a course up the abdomen, under the axilla, over the scapula, up the right side of the neck, irregularly about the scalp, finally passing back of the ear and to the submental region which it reached about two months after its first appearance; there it remained stationary, tenderness and pain having meantime greatly decreased. During January, 1908, there appeared in the left groin a second similar lump about the size of a finger-nail. This lump followed a course up the abdomen, under the right axilla and up to the back of the neck, reaching the occipital region in about three weeks, at which time it "came to a head"; the patient picked the scab off and pulled out a "white worm about one inch long and as thick as a darning-needle," alive and moving. These lumps were occasionally stationary but generally migrated three to four inches a day. The pain was not extreme but, with the tenderness and a stinging sensation, was more pronounced at night. At times the lumps would increase to the "size of his two fists" and become very painful.

Physical Examination.—In the submental region was a superficial fluctuating mass 2 cm. in diameter about which there was but little induration or inflammatory reaction. The cervical and axillary glands were generally palpable but small. Hemoglobin 75 per cent. White blood cells 7,700.

Differential count:

Polymorphonuclear neutrophils	54	per cent.
Polymorphonuclear eosinophils	8	per cent.
Mononuclears	30	per cent.
Transitional cells	1.5	per cent.
Unclassified cells	3.5	per cent.
Pulse and temperature normal. Urine negative.		

March 13, under cocaine anesthesia, the submental mass was incised, disclosing a small amount of finely granular detritus

1. Torsion of the Great Omentum, THE JOURNAL A. M. A., May 11, 1907, p. 1590.

2. Stiles: Osler's Modern Medicine, 1, 637.

3. Adams, J. Lee: Tropical Cutaneous Myiasis in Man, THE JOURNAL A. M. A., April 9, 1904, p. 947.