plastic motors are thoroughly well grounded. Cinematic plastics are entitled to be placed amongst the most brilliant of the discoveries of orthopaedic surgery, deserve to be accepted with perfect confidence, and to be tested on a large scale by all those whose aim it is to restore to the disabled man his functional activity.

II. The preparation of plastic motors is a well-defined surgical act that must be performed in accordance with its own special methods, which have already stood the test of experience.

III. From a physiological point of view plastic motors have been proved capable of giving both the quality and quantity of action of which the muscular masses that stimulate the said motors are capable. Yet, practically considered, plastic motors will yield the full measure of their value only if the artificial limb is perfectly adapted to their shape and their strength.

IV. As the principal aim of cinematization is to attain the vitalization of the artificial limb, it is essential that the surgeon and the artificial limb maker should work in harmony, in order to solve satisfactorily this most interesting but difficult problem.

Demonstration of Moving Pictures.

Professor Putti exhibited a number of moving pictures to illustrate the results of cinematic amputations. They included arm and forearm stumps with plastic motors, and demonstrated very well the power the man had over single or double (flexor and extensor) plastic motors. In other cases terminal "ansa" motors of the forearm were shown, and the power of the patient to lift a weight demonstrated. The films showed both the bare stumps and the same men fitted with artificial arms and hands. Two other films showed cases of cinematization of thigh stumps, plastic motors being obtained by tunnelling the quadriceps femoris. The patients were also shown wearing artificial legs. The case with which they could raise the limb with the knee in extension, and the advantage the plastic motor gave in walking were clearly shown.

THE RELATION BETWEEN HEAT-STROKE AND MALIGNANT MALARIA.

(Preliminary Note.)

BY

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HAVING been intimately connected with the study of heat-stroke and malaria throughout the record heat in Mesopotamia during the summer of 1917, I feel bound to record certain conclusions to which I have been forced as a result of observation.

That there is a close relation between the two conditions is beyond question; and this paper is written (in full consciousness of its heterodoxy, and in confident anticipation of much adverse criticism) in order tentatively, and with all humility, to suggest that heat-stroke as a clinical entity is non-existent, and is nothing more than a symptom, on a hot day, of malignant tertian malaria.

One of the clinical pictures with which one soon became familiar was that of a thick-necked, middle-aged man, who would be admitted to hospital, in the cool of the evening, still unconscious, and with a temperature of about 108° F.

In his own camp, about middle day, this man would have been seized with sudden headache, vertigo, and unconsciousness—sometimes with violent maniacal delirium. He would have been treated locally by means of cold sponging, and perhaps an ice-pack—for this year (1917) there has been no shortage

CHART 1.—A. On admission.

of ice—and he would have been transferred to hospital as soon as ever the heat of the day were over. (It were certain death to attempt to transfer such a case before 4 in the afternoon at the earliest, with a maximum shade temperature of 125° F., such as we had

in July of this year.) Such a case would, on admission, be taken direct to the heat-stroke station and treated symptomatically in the usual routine manner—by means of venesection, infusion, rubbing with ice, and copious ice enemata.

Another common picture was that in which the heat-stroke "super-vened" upon another disease. And in this the characteristic thick-necked, middle-aged, rather alcoholic type was conspicuous by its absence. This time the patient would be already in hospital suffering from some quite other complaint—sandfly fever, dysentery, even malaria itself. And there was no type that one came to recognize as being especially associated with this form of heat-stroke. The patient would feel the heat a great deal in the early afternoon—might even beg one to give him "something to make me sweat, sir," and was almost

CHART 2.—A. On admission, 6 p.m., the temperature was 108.2°; it did not rise above normal after September 5th.

CHART 3.—q. Quinine gr. x, thrice daily.

CHART 4.—q. Quinine gr. xv, thrice daily.

invariably constipated. One afternoon he would become very restless in bed, and in a very short time unconscious, with a rectal temperature of 108° or 109° F.

This year there were two formidable heat waves—the one in July and the other in August (1917). It was not

CHART 5.—July, 1917.

CHART 6.—August, 1917.

until the second of these that it became the custom in this hospital to make an immediate routine examination of a blood film for the presence of malaria parasites. In view of the very high percentage of heat-stroke cases whose blood was found to contain the parasite of malignant

tertian, it became the practice during the second heat wave (even before receiving the laboratory report) to administer an intramuscular injection of 8 or 9 grains of bihydrochloride of quinine.

The mortality during July was as high as 25.65 per cent.; that during August, when quinine was always administered immediately, was only 11.76 per cent. This, to my mind, is the most striking factor pointing to malignant malaria as being the primary cause of hyperpyrexial heat-stroke. For it was not until the second heat wave that quinine was given as a routine, and during this period the death-rate fell by well over 50 per cent.

Starting with the physiological assumption that there is a heat-regulating centre, it is reasonable to suppose that one of the symptoms of an infection with the parasite of malignant tertian malaria is the intoxication of this area. It readily follows that, when once the heat-regulating apparatus is upset, the body must naturally assume, as nearly as possible, the temperature of the atmosphere. Thus it is a fallacy to suppose that heat-stroke supervenes if one stops sweating. The truth is, on the contrary, that a patient ceases to perspire because he has got heat-stroke, because he is suffering from paralysis of the heat-regulating centre, due to intoxication by the parasite of malignant tertian malaria.

The clinical charts 1 to 4 will serve to illustrate the marked hyperpyrexia which has been observed even in cases which have recovered, and which have appeared mentally to be none the worse for their illness. All the charts are of cases which were regarded as "heat-stroke," in which were observed the classical symptoms described as being those of heat-stroke, and yet in the blood of each and every case were found the characteristic ring forms of the *Laverania malariae*, the parasite of malignant tertian malaria.

Charts 5 and 6 show the maximum dry and wet bulb thermometer readings for July and August, 1917.

BASAL LEPTO-MENINGITIS RESEMBLING BOTULISM.

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WHILE so much interest is being aroused by cases which resemble botulism, it may be well to record the particulars of the following case, which for a few days was thought to be that disease:

F. P., a girl aged 5 years, was admitted under my care on May 14th, 1918. There was a history of ten days' previous illness; she had seemed drowsy, and had vomited repeatedly for the first two days. For a month previously she had been feeding on "porridge, bread, sausages, chitterlings, and ham."

On admission, the temperature was 99° F., the pulse 100, and respirations 20. She was drowsy, but by no means comatose, and realized her surroundings sufficiently to "want to go home." She was very irritable, and complained of pain in the head and back. There was no paralysis; the eyes were kept closed, though she could open them; the pupils were dilated. There was very slight head retraction, but Kernig's sign was absent. The tongue was very foul, and the breath fetid. The bowels had not been open for at least four days previous to admission. She was incontinent of urine. Castor oil was administered without effect.

On May 15th calomel gr. $\frac{1}{2}$ was given hourly for twelve hours, with the result that the bowels were open three times the next day, when she seemed more wideawake and sat up in bed, but was still very refractory and resistive so that the reflexes could not satisfactorily be determined.

On May 17th the respirations assumed a Cheyne-Stokes character, combined with marked slowing—at midday they were only 7. This continued for three days, the respirations never rising above 16 till the evening of May 19th, when they were 20. I performed lumbar puncture in the afternoon; the cerebro-spinal fluid came away under greatly increased pressure; it literally shot out; about 28 c.cm. were removed. Immediate microscopic examination showed it to contain fresh red blood corpuscles, presumably the result of the puncture. The fluid was sent to a pathologist, who discovered no other abnormality in it.

On May 18th there was low delirium; respiration continued slow, the tongue still furred, the head still a little retracted, the pupils still somewhat dilated, and Kernig's sign still absent. There was left-sided facial palsy with inability completely to raise the left upper eyelid. The knee-jerks were absent. At times the child cried out, but not with

a typical meningeal cry; at others she lay "as if dead," as the sister put it. From this day onward hexamine in 5-grain doses was given three times a day.

On May 19th she seemed a little improved. Both eyes were well opened, and the facial palsy was much less marked. The mouth was still dry, but she took milk much better. She lay quieter, and her forehead, which hitherto had been constantly wrinkled into a fixed frown, was placid. During the night of May 19th-20th some blood-stained muco-pus came from the nose and mouth. The stench was horrible.

On May 20th she was incontinent of urine and faeces; her brow again assumed the frowning expression, and she cried out continually. The pulse was running and somewhere about 200.

On May 21st the discharge from the nose and mouth continued. The heart was failing, the pulse was still running, about 200, the respirations were 62, and she was deeply cyanosed. Kernig's sign was still absent. At 10 p.m. the chest was full of coarse râles, and there were generalized convulsions. She died a few minutes later, with a temperature of 104.8° F. A morning and evening temperature chart is attached. The four-hourly chart was no further help.

Post-mortem Examination.

The pia mater showed general hyperaemia, whilst over the base of the brain, especially over the optic chiasma, pons, and front part of the medulla, the meninges were swollen, oedematous, and jelly-like. There was no definite pus, though between some of the convolutions there seemed to be a little turbid fluid. On section the brain showed no gross naked-eye changes. The other organs were healthy.

The signs and symptoms which were thought to point to botulism were vomiting, transient facial palsy, transient ptosis, absence of spinal paralyses, drowsiness, absence of temperature, and constipation with dryness of the mouth and nose.

THE EARLY AND EFFECTIVE REDUCTION AND FIXATION OF GUNSHOT FRACTURES OF THE FEMUR.

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THE adoption of the Thomas splint in the treatment of compound fractures of the femur caused by gunshot wounds has done much to alleviate the suffering resulting from the injury, has saved many lives and limbs, and has led to much improved functional results.

From the casualty clearing station at the front to the general hospitals at the base there is every facility for the application of the splint and the carrying out of the principles which its use entails. In front of the casualty clearing station, however, these facilities are not forthcoming, and the full value of the splint has not been obtained owing to the difficulty of applying simple and efficient first-aid extension.

At the regimental aid post the use of extension by adhesive strapping or glue and calico bandage, applied to the skin, is out of the question; nor is it advisable, having in view the fact that an anaesthetic will have to be administered and an operation performed at the casualty clearing station, to adopt these measures at a field ambulance.

The ideal method of procedure, then, would be to employ so simple a method of extension that it can be applied at, or as near as possible to, the spot where the casualty occurs; and which is at the same time easy and rapid of application, efficient, and need not be changed till the patient is on the operating table at the casualty clearing station.

Before describing any method in detail, it may be well to devote a little time to the following considerations.