much easier after the abscess burst. Death occurred on Sept. 4th.

In further support of the advisability of such interference I will cite another case, which, though not of the same class, illustrates well the benefits of free openings.

Alex. G—, post-runner, Fraserburgh, was under my treatment about two years ago. He had remittent typhoid fever, pleurisy, and pleuro-pneumonia for upwards of four months. He was then affected with profuse clammy sweatings; diarrhoea; very high temperature, at times 105° F; pulse 140; hectic flush; and complete dullness of the left chest. He was seen by several of my medical friends during the course of his illness, and of seven of these all agreed he was doomed. On two occasions I aspirated him, but with only a slight improvement; he could not latterly allow of a drainage-tube; and, growing desperate, I made a free incision of three-quarters of an inch into the chest at the lower border of the sixth rib. Shortly after pus was discharged freely, and ran for some weeks. In about two months from the date of my last operation he resumed his arduous duties.

In the first case related the operation had, as was proved post mortem, no blame in hastening the end; the second case did not admit of interference; and the third was happily terminated by the means employed. I do not advocate operation except it be certain that the cavity is sufficiently *near the surface* to ensure our reaching it. If the opening could be made posteriorly, so much the better; but should an abscess point, or were a cavity near the surface anteriorly, I would not hesitate to second the efforts of nature. Taking three of our best works on modern medicine,³ we find the operation theoretically approved of in empyema. In practice no difference, except in degree, is appreciable between true empyema, false empyema, or abscess, and the caseated lung tissue in its ultimate stage of degeneration; the prognosis may be better in one than in another, but actually the treatment does not admit of great variety. A case suitable for the treatment counselled is unquestionably exceptional at present, but it is possible, with due skill, care, and precaution, that artificial aids to the emptying of phthisical cavities may yet be employed more frequently with success; and with this hope I commit my experience to those who have the more fertile field of hospital practice at their command.

Dunbar, N.B.

REMARKABLE OSCILLATIONS OF TEMPERATURE WITHOUT APPARENT CAUSE.

By WALTER ILIFFE, F.R.C.S. Ed.

THE problems of medical science are undoubtedly great and various, and one of the most interesting, if not the most important, is to be found in studying the exact sources and modes of origin of animal heat. A definite knowledge regarding it would give us much valuable and needed information upon many points, and more particularly as to the exact signification of temperature alterations in specific and other fevers, in lesions of the nervous system, &c. This must be my apology for bringing the following interesting and exceptional case before the readers of THE LANCET.

Early last spring I was called to see a young lady, Miss L. I—, aged eighteen, and found her suffering from measles, which at that time was epidemic in the school where she was. The attack was one of moderate severity, the maximum evening temperature 102·5°, and the rash well out; in about a week she was convalescent, the evening temperature normal, and all symptoms having disappeared, she had my permission to get up the following morning, but at an early hour I was sent for, and found her much worse. There was a high pulse (120), quick respiration, flushed face, a nervous fidgety manner, dry skin, the tongue thickly covered with a white fur, bowels constipated, no inclination for food, the thermometer registering 105·4°. I suspected some inflammatory condition, and made a careful examination of each organ, but could detect nothing abnormal. The patient was tall and slightly built, and may perhaps be described as belonging to the nervo-

phlegmatic type of temperament. She was somewhat excitable and perhaps hysterical, limiting the meaning of that word to a condition of weakness of will with emotional sensibility and ready excitability. I was informed she had commenced menstruating at fifteen years, but after the first month the discharge had entirely ceased and had never returned even in the slightest degree. Her complexion had become dusky, the face covered with an acne rash, and the skin under the eyes especially dark; she had never suffered from feverish illness of any moment, but she had been for some few months under my care with the object of bringing about the periods. I had tried various remedies, all of which had been unsuccessful.

During the following ten days the temperature (which was taken with the greatest care both in the axilla and in the mouth) underwent the most extraordinary and erratic changes, without my being able to find any specific cause. In the course of the twenty-four hours it would vary from the normal to 106°, and upon one occasion 107°; the period of the highest temperature being variable, sometimes at night, at other times in the morning or afternoon; and not at all during the course of the illness did the temperature rise or fall at any uniform hour. With the increase of heat the pulse and respiration rose more or less proportionally, the tongue became coated, the patient acquired a restless, fidgety manner, would answer questions in a short, abrupt tone, finger the bedclothes, and wander with her hands about the wall close to the bed. As the temperature fell these phenomena would subside, and it was truly marvellous to notice how, in some instances, the tongue, quite foul with the high temperature, would become perfectly clean in even so short a time as half an hour, as the latter approached its normal character. I subjoin a few temperature readings, which will serve as an illustration so far as the temperature, pulse, and respiration are concerned:

			Temp.		Pulse.		Resp.
March 24th	...	9.40 A.M.	101°	...	104	...	40
"	"	2.30 P.M.	104°	...	120	...	36
"	"	5.30 P.M.	106½°	...	130	...	45
"	"	9.45 P.M.	104°	...	120	...	38
"	25th	9.45 A.M.	99°	...	88	...	28
"	"	3 P.M.	107°	...	130	...	60
"	"	6.45 P.M.	106°	...	120	...	50

The treatment comprised cold-packing (this was always adopted when the temperature rose to 106°), and the administration of such drugs as aconite, digitalis, and bromide of potassium.

At the end of ten days the elevation of temperature began to abate, and in a few more it became normal and remained so, the patient recovering her health gradually; and now, speaking generally of her condition, she is much better than she had been for many months previous to this illness. Amenorrhoea still persists, but the complexion is clearer, the lethargy and tiredness are much diminished, and the acne rash is gone.

I will not offer comments upon this case further than to point out the probable connexion with the hysterical temperament and the condition of amenorrhoea. I may mention that Dr. Hamilton, of Windermere, saw the case with me, and failed to find any cause to which we could refer the peculiar features characterising it.

Kendal.

ON ELASTIC PRESSURE IN THE TREATMENT OF INFLAMMATION OF THE JOINTS, AND ON A MODE OF ACCURATELY MEASURING THE FORCE EMPLOYED.

By C. B. KEETLEY, F.R.C.S.,

ASSISTANT-SURGEON TO THE WEST LONDON HOSPITAL, AND LATE ASSISTANT-DEMONSTRATOR OF ANATOMY AT ST. BARTHOLOMEW'S HOSPITAL.

THE object of this paper is to call attention to the proved, but neglected, powers of elastic pressure in the treatment of chronic inflammation and of "dropsy" of the joints. There will also be described in it a new method of applying this elastic pressure, by which new method the amount of pressure can be measured, regulated, and recorded to a nicety, and to which the author proposes to apply the name of "hydraulo-elastic pressure," because its nature is partly

³ Flint's Practice of Medicine, p. 164, third edition; Aitken's Science and Practice of Medicine, p. 867, sixth edition; Watson's Lectures on the Principles and Practice of Physic, vol. ii., p. 151, fifth edition.

hydraulic and partly elastic. The plain india-rubber bags, which are the peculiar characteristic of the plan, may be named "hydraulic bags."

CASE 1.—On July 1st, 1878, W. T—, aged seventeen, was admitted into the West London Hospital suffering from chronic synovitis of the right knee-joint of about six months' duration, and following a blow. There was considerable effusion into the cavity of the joint, considerable thickening of the soft tissues round the joint, and also slight pain, tenderness, and local heat. He had hitherto been an out-patient, and treated ineffectually with blisters, Scott's dressing, and other agents, of which no record remains.

After his admission the blistering was repeated vigorously, but vainly, and a back-splint was used. Still no progress was made. The knee was then fired, but not severely. Before this firing was effected I conceived the idea of applying to the knee the strong elastic bandage (named after Esmarch, because that distinguished surgeon first used it for hæmostatic purposes). I did apply this bandage immediately after the firing, and in about three days every trace of intra-articular effusion had gone; only synovial thickening remained.

Now this first case was not conducted in practice quite so smoothly as it reads. I put the bandage on too firmly, and the patient, resenting the pain (he was but a poor, foolish boy), became thenceforth no ally of a treatment, which, after all, even by its very success, could only hasten his departure from a comfortable institution, for which he had conceived great affection. I had immovable faith in the ultimate result, and I stuck to my plan in spite of opposition. "My plan" I have written, but not quite fairly. In "Billroth's Surgery" is the following sentence: "The latter [i.e., compression] is the most effective remedy, but it must be strong and continued (forced compression, according to Volkmann); we may apply firm dressings with moist or elastic bandages." That is whence the idea came.

Well, this case, as is reported above, quickly got well; but the firing which had been administered just before the bandage was, of course, in a position to dispute the credit of the cure.

CASE 2.—Wm. H—, aged twenty-nine, a brewer's workman, was admitted into the West London Hospital under my care on August 1st, 1878. He remained there fifteen days. His case was a typical hydrops articuli of the knee of two years and ten months continuous duration. He had generally walked about and worked with it, but it was very weak, easily tired, and, when tired, painful. There were one or two tender spots about the hamstring tendons. The fluid filled out the bursa beneath the semi-membranosus. The patella rode freely, and must have been half an inch from the surface of the condyles. He had been treated in various ways, chiefly by rest and counter-irritation, but never by any form of pressure.

The patient was at once placed on his back in bed, and the elastic bandage firmly applied over cotton-wool, covering the whole knee and a distance of two or three inches both above and below the joint. The foot and leg were previously bandaged with common calico binders. The limb was placed on a back splint, and elevated on a pillow. He bore the treatment well for several hours. It then became too painful, and the house-surgeon, Mr. W. H. Brown, judiciously removed the bandage. This proceeding of keeping it on for several hours at a time was repeated for several days, sometimes twice a day. Upon one occasion, I am told, quite alarming symptoms of faintness supervened, which disappeared with the speedy removal of the bandage. In the intervals between the applications of the rubber he wore a common roller.

In three days the patella had quite ceased to ride; but, in consequence of a continuation of distinct fluctuation beside the ligamentum patellæ, the treatment was continued for a week or ten days. Eventually I had sense to discover what I ought perhaps to have known before—namely, that except in persons of very firm fibre, slight fluctuation is always to be got by placing one finger on each side of the ligamentum patellæ. Moreover that is not the spot where the last traces of redundant sero-synovia would collect, but rather the back of the joint, and the bursæ beneath the flexor tendons.

This was a very docile patient. From the moment he saw that he was going to get rid of his three-years'-long affliction, he took a deep, scientific interest in the use of what he called "Bismarck's bandage." He went out of the hospital with the bandage on, as a loan, till he bought a few yards

of common elastic bandage. He continues to wear this common elastic bandage, and had, a month after his discharge, no return of the complaint.

But W. T—, the first patient who had gone out with his knee in a plaster case, came back in a week or two as bad as ever. I had not a bed for him at the time, and he plunged once more into that Cimmerian darkness whence and whither so many interesting out-patients come and go.

The treatment was undeniably painful throughout the whole of the first and at the commencement of the second case, but then I think it was probably unnecessarily severe. Therefore, after the second day of the second case, I placed beneath the elastic bandage and on each side the patella an india-rubber Barnes's dilator with a long tube attached. It had a moderate quantity of water in it. Now, when the bandage was wound over this bag, the bag was of course compressed exactly as much as the knee; therefore the perpendicular height to which the water rose in the tube of the bag exactly indicated the amount of bandage-pressure to the square inch. Moreover, by raising the mouth of the tube and pouring more water into it through a funnel, the pressure could be increased; and, conversely, by lowering the tube and letting the water partially run out, it could be diminished. When the pressure had been in this way satisfactorily adjusted, a tape was tied round the mouth of the tube, and the tube placed in the bed beside the knee. Therefore the correct name for the treatment used in the case of W. H— is "hydraulo-elastic pressure."

The elastic bags employed for this purpose should extend from the very lowest to the very highest coil of the bandage. Messrs. Arnolds offer to supply them at a charge of 10s. 6d. the set of half-a-dozen. When used for this purpose, they may conveniently be named "hydraulo-elastic bags" or "strophometers" (*stropho* and *metreo*).

Whoever has been interested by the above remarks, and, indeed, everybody else who takes interest in the progress of surgery, should read a pamphlet by Lieut.-Colonel Henry A. Martin, M.D., entitled "Surgical Uses, other than Hæmostatic, of the Strong Elastic Bandage," published in America this year. I accidentally met with the work three weeks ago. Colonel Martin cures ulcers, articular inflammations, erysipelas, rheumatism, neuralgia, and many other affections by the judicious use of the elastic bandage. I recommend every English surgeon to read the book for himself. It certainly is a work of high importance. Dr. Martin has been employing the strong elastic bandage for fifteen years. The antiphlogistic virtues of pressure are much neglected, and more especially, I am sorry to say, in this country. They are not even noticed in some of our most popular text-books of surgery.

It is worthy of notice that "blood-pressure" is hydraulo-elastic in its nature. This fact, when considered in connexion with the treatment applied to W. H—'s knee is not to be regarded as a mere curious coincidence.

I append an account of the rules followed in W. H—'s case:—

1. Envelope the knee-joint in cotton-wool. (This is a step probably not necessary, and perhaps not desirable. Experience will decide.)

2. Take an hydraulic bag long enough to extend from two inches below the tubercle of the tibia to three inches above

the upper border of the patella. Place it longitudinally along the joint, towards the front, but on one side of the patella, having previously not quite half filled it with water.

3. Apply an ordinary broad Esmarch's bandage of good quality over all, while an assistant holds the orifice of the

strophometer tube at a definite height. The height I used in W. H——'s case was twenty-eight inches (that is, perpendicularly above the level of the patella). But obstinate cases might require a greater pressure. It may just be noticed here that the blood-pressure in the carotid artery is about 100 inches, but that in the smallest arteries and in the veins is much less. Well, when the bandage has been applied, the water in the strophometer tube should just overflow its orifice. If the water does not reach high enough, a little more water may be poured into the tube through a funnel. But if the water will rise much higher, a little (only a little) should be allowed to escape. If the pressure cannot be accurately adjusted without adding or subtracting more than a small quantity of the water in the bags, the bandage had better be reapplied altogether. The above process may seem a troublesome one. I do not think it would be found so in practice. I believe some means of gauging the force mathematically is essential if the use of compression is to be ever cultivated into a perfectly safe and painless process. The bags should be made of the softest rubber, and without rigid, unpleasant seams.

4. With regard to the length of time of a single application, I may state that the patient, W. H——, could bear, without much discomfort, a pressure of twenty-eight inches of water for eight hours continuously.

5. A common, cheap elastic bandage should be worn months after the cure of chronic cases, to prevent relapse. Martin's advice may be followed, and aspiration be combined with elastic pressure when the effusion is great and the case obstinate.

NOTE ON THE OCCURRENCE OF CEREBRO-SPINAL MENINGITIS.

BY DR. H. V. CARTER,
SURGEON-MAJOR H.M. INDIAN ARMY.

THE local epidemic of fever consequent upon immigration of the famine-stricken, still lingering (mostly through contagion), all serious cases admitted into the J. J. Hospital continue to be watched; and amongst those seen last month was the following:—

R. Y——, aged thirty-five, resident, a labourer, living in an infected locality; somewhat emaciated, feverish (temperature 102°, pulse 120), and only semi-conscious. There was tenderness on pressure over the back and limbs; chest-sounds normal; abdomen supple; hepatic and splenic tenderness, with slight splenic enlargement; no jaundice; tongue coated, white, moist; state of the bowels unknown; bladder not distended. No spots could be seen in his very dark skin, nor were spasms observed; the symptoms, in short, being those of advanced "remittent" fever, with cerebral oppression. History and duration unknown. No spirillum in the blood. On the third day there occurred a distinct fall of 3°, without sweats, dry cough, and incipient consolidation of the base of the left lung going before. Temperature 99·8°; pulse 128, and the patient became slightly conscious. Immediately afterwards, however, the pyrexia returned (temperature 101° to 102°), with renewed insensibility, and death on the fifth day of admission. The treatment consisted of ice-bags, enemata, and stimulants.

Necropsy, twelve hours after decease.—Rigor mortis present; blood dark and semi-fluid.—Brain: Great congestion of the meninges, no hæmorrhages, some turbid serum in the arachnoidal sac, and all over the convexity of both hemispheres a thin layer of thick, greenish-yellow pus, which was located between the pia mater and arachnoid, following the bloodvessels, and accumulating in the sulci and fissures of the cerebrum. At the base of the brain the matter was especially abundant in the inter-peduncular spaces, there enveloping the cranial nerves; it had passed round the middle cerebellar peduncles and collected above, over the valve of Vieussens, and it encroached upon the upper surface of the central lobe of the cerebellum. The ventricles of the brain contained turbid serum; the brain-substance was somewhat congested, softened, and wet. Spinal cord hardly changed in the cervical region, but further down the subarachnoid space was occupied with puriform lymph similar to that found upon the brain, and this could be traced nearly as far as the lumbar enlargement. The effusion was not quite

uniformly disposed, and it was limited almost wholly to the posterior surface of the cord; it gave me the impression of being continuous with the cerebral collection, although the streaks seen alongside the vessels of the pia mater in the cervical region of the cord were only narrow and sparse. The spinal membranes were congested, but neither arachnoid nor pia mater was much thickened; the substance of the cord somewhat soft and pale. Weight of brain 2 lb. 15 oz.; of cord 3 oz.—Chest: The left lung was more or less consolidated throughout, but mostly below; right lung healthy; clots in the heart, valves healthy.—Abdomen: Liver rather small, of normal tint, but showing disseminated patches of fatty degeneration; spleen shrunken, healthy-looking; kidneys of normal aspect or only slightly congested; mucous membrane of large and small intestines healthy-looking. (Notes of the assistant-surgeon in charge, with some additions.)

Remarks.—If the notes taken during life (when I frequently saw the patient) do not record much that is pathognomonic of cerebro-spinal *typhus* (?), yet this circumstance renders the case all the more striking, and its real character seems to be placed beyond doubt by the results of the autopsy. I am not aware that similar instances have been published in India (Morehead, in his first edition, vol. i., p. 144, has a case of meningitis, in which the cord unfortunately was not examined), but even if it be so, the occurrence of this species of continued fever in connexion with ordinary and recurrent typhus (not to mention enteric fever, which is by no means rare) is well worthy of notice; and the discrimination now made is to some extent confirmed by milder cases of cerebro-spinal fever lately seen here, which have survived under care of the able physicians of the J. J. Hospital.

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DESCRIPTION AND SKETCH OF CONDENSING VENTILATOR.

BY SURGEON HENRY M. LEVINGE, M.B., R.N.

(Communicated by the DIRECTOR-GENERAL OF THE MEDICAL DEPARTMENT OF THE NAVY.)

I BEG to forward a drawing of a piece of apparatus which appears adapted for ventilating ships in a most economical and perfect manner—I say economical, because, in steamers and those ships making their own drinking-water, no expense need be incurred; for, as in ordinary modes of distilling, "the latent heat of evaporation" is given to water, so I propose giving it to the air, at least so much as may be required for ventilating purposes.

Anyone may have observed jets of heated water issuing from steamers under weigh, while people on board are shivering with the cold and blocking up ports, hatches, &c. Why should all this heat be allowed to escape when work still remains to be done? If, during a breeze, the force of the wind were employed to drive air against a heated surface, such as the conical top of the condensor, it might be heated to any degree required *before* arriving at the place to be ventilated, thus removing the objections to a draught; for only *cold draughts* are objectionable. It is a known fact that small overcrowded places cannot have their air changed sufficiently often (to ensure even a moderate degree of purity) without causing draughts.¹ Stoves, steampipes, &c., in cabins and saloons heat the air only *after* arrival, thereby presupposing delay, vitiation, &c., going on while the air is being heated, as well as delaying its escape; for heated air,

¹ Vide Parkes's Manual of Hygiene, p. 139-40.