one had died eight years after operation, and one forty-seven days after operation of tuberculous enteritis.

The record of the work achieved by this surgeon, working alone upon new problems and in a new field long before other minds had begun to stir, is one of the greatest triumphs in the history of scientific surgery. In the year 1884 Bennett and Godlee reported a case of cerebral tumour treated by operation, and in 1886 Victor Horsley reported three cases of cerebral surgery to the British Medical Association.

Great Britain may therefore make an undeniable claim to priority in respect both of the scientific work which made operation upon the brain possible and purposeful and of the procedures by which such operations were carried out with safety and accuracy. Germany here also has been a follower, not a founder. Her entrance into this field was of later date than that of the British, French, and Italian physicians and surgeons, but her work in it has been arduous and helpful.

The development of the surgery of the spinal cord was also dependent upon early experimental research. Galen, as is well known, had shown that there must be nerves of sensation and nerves of motion. Willis had made it certain that the nerves did convey sensation "and instincts to movements," but, as Sir Victor Horsley says, "no further determination as to the particular part of the nervous system which might be occupied in providing for such transmission of sensations and movements was made until 1811, when Sir Charles Bell, by his numerous investigations, was led to believe that separate parts of the brain and spinal cord subserved these two functions." Sir Charles Bell knew, of course, that the spinal nerve had two roots, anterior and posterior; he found by experiments that it was irritation of the anterior roots only that gave rise to the movements of the muscles. He says: "I now saw the meaning of the double connexion of the nerves with the spinal marrow." Bell's work was the first to prove that there was undoubtedly a principle of localization of function in the nervous system. When it had once been shown that this localization of function existed in the conducting nerve channels it was not difficult to see that the same difference must exist in those central parts to which, and from which, the nerves must pass. The surgery of the spinal canal was inaugurated by Sir Victor Horsley, who in 1887 was the first to open the spinal dura mater and to remove a tumour of the cord. In December, 1888, Bennett first divided the posterior nerve roots in a case of inveterate sciatica. In 1889 J. L. Faure performed the same operation for the relief of agonizing pain in a case of cancer of the uterus. Foerster's operation, the division of the posterior spinal nerve roots for the treatment of gastric crises and spastic paralysis, based largely upon the work of Sherrington and Head, dates from 1908.

CONCLUSION.

What, then, has been Germany's part in all the astounding progress of modern surgery? It has been the same in surgery as in every other science. Almost all fundamental discoveries in science, Dugald Clerk tells us, have originated in England, France, and Italy. In capacity for original thought the German mind is lacking. The brilliant and happy inspiration, the penetrating insight, the new vision are things for which we seek almost in vain in all German scientific literature. The fertile new thought giving a fructifying impulse to the work of others is rarely indeed of German origin. The German mind is of quite a different order. It is avaricious, industrious, methodical; it collects, if it does not accurately appraise, the work of others. It tabulates and registers and explains; it furnishes an intricate analysis, and illustrates by copious reference any subject with which it may deal. The new idea, originating almost always elsewhere, is given eager hospitality, is dissected and discussed at inordinate length; it may be put into practice with various alterations of technical procedure, and before long be claimed as a home product. For this act of intellectual dishonesty many of the German writers were not to blame; for a study of the literature of almost any subject in medicine chosen at random will show the amazing infrequency of any reference to the English or American literature, and very few indeed to the French. Thus in Riegel's work, the article on ulcer of the stomach has four and a half pages of references, seven references are to English writers, five are to papers by Riegel himself.

The name of Brinton is not even mentioned in this list, and yet it is probable that in his small book there is more of the truth of the matter of gastric diseases than in all the interminable treatises published by all the German physicians since his death. This almost exclusive reference by German writers to the works of their own countrymen was greatly helped by their publishers. In the last few years I have heard more than once from friends of my own in the medical profession in Italy, in Spain, and in Norway, that it was impossible to obtain from an English or American publisher a copy of any medical work on approval. A surgeon, desirous of seeing a new work in any special department of surgery, could only do so by purchasing the book outright and taking his chance as to the contents being to his liking. Any German publisher would send him all the books or journals he desired to see on approval. The copies of new German works on medicine were always sent to the editors of foreign journals for review. A new medical work in English was rarely, if ever, sent to Scandinavian countries, to Spain or to Italy, and to France or to Germany only in the case of a work of outstanding importance. To put this matter quite briefly, reference could always and quite easily be made by foreign physicians or surgeons to works published in Germany. It was difficult to hear of English works, and almost impossible to obtain them except by a speculative purchase. To the claims which Germany makes for intellectual supremacy we may therefore, speaking of scientific surgery, retort by a firm and flat denial. Not one single discovery of the first importance in the science or in the art of surgery can be placed to the credit of Germany. Nor, if we omit the Semitic element in the Germany of to-day, should we expect this to be the case. For the German mind is deductive; it is patient, laborious, massive; but it is not original. The German is not an innovator, but a renovator; not an explorer, but an exploiter; not a creator, but a collector.

A RECONSIDERATION OF THE PRINCIPLES AND METHODS OF HUGH OWEN THOMAS.*

II. SOME REFLECTIONS ON THOMAS'S SPLINTS AND PRACTICE.

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I INDICATED in my first communication (July 15th, 1916) some of the many new resources which the genius of Hugh Owen Thomas devised for the improvement and advancement of a branch of surgery which since his time has failed to get its proper place in the sun owing to the birth, rapid growth, and brilliant youth of modern abdominal surgery. Nevertheless, Thomas's boots for the prevention and the correction of flat feet, Thomas's wrench for dealing with congenital and acquired deformities, such as club feet, neglected or unreduced Colles's fractures, and Thomas's "splints" for treatment of injuries, deformities, and diseases of the lower extremities very slowly but surely found a place in the records of the progress of orthopaedic surgery.

One of the factors which made Thomas's success in this department so unique was the personal attention he gave to every detail in the construction of the many devices or machines which he invented; it would have been impossible for him in his busy life in pre-telephone days to follow the orthodox but ineffectual fashion of resting dependent upon the services of a surgical instrument maker living at a distance from his consulting-rooms. He solved the problem by what appears to be a true inspiration—he had workshops built closely attached to his consulting-rooms. It was only by this means that he was enabled to carry out the enormous amount of experimental work entailed in working out the models of orthopaedic appliances; when he had perfected them he was able to recommend them with confidence to the profession. Orthopaedic surgery owes a lasting debt to Thomas for this bold if heretical act; for him it was the only way

* Continued from vol. ii, 1916, p. 72.

to reach a practical solution of daily perplexing orthopaedic problems. The majority of the Liverpool leechcraft of the eighteen-seventies treated him as a prophet is traditionally treated in his own country. However, it is pleasant to record that the names of Dr. A. F. Ayton and Professor Rushton Parker are to be remembered as disciples in the local wilderness.

Although Hugh Owen Thomas's name is associated with some of his own orthopaedic inventions, nevertheless in justice to him it must be recorded that, as a historical fact, neither English nor American authors of books on surgery have down to the present time given him credit for evolving an epoch-making contribution of another kind to surgery. Not only have they omitted to do this, but they have committed the additional and extraordinary blunder of attributing it to a man who was a medical student when Thomas published his method! I refer to Thomas's method for the treatment of delayed union of fractures and disease of joints by what is known to-day as "Bier's method," but which was called by its originator "damming the circulation."

In a book published in 1886 by Thomas on the *Principles of the Treatment of Fractures and Dislocations*,¹ he wrote (pp. 29-30) as follows:

"During the early part of my practice I invariably interfered with the instances of delayed repair by either rasp, saw, wire, or pegging, operating upon an average of eight to ten cases annually, but during the last ten years I have better succeeded without direct interference although most of the cases submitted to treatment were less hopeful of success than any of my earlier cases. My change of opinion and practice commenced March, 1874."

In a footnote he adds:

"My view on the treatment of delayed union first appeared in the Liverpool and Manchester Surgical Report issued 1876."

It is worth while to give here an abstract of one of the many cases Thomas recorded in his book as evidence of the value of "damming." The story of one particular case and the drawings by which it is illustrated are in themselves enough to convince the most sceptical that the claim made for Thomas is well founded. This is the remarkable case of J. W. Jones, Wisconsin, U.S.A. The full story is given on pp. 46-47 of the book from which I have already quoted. The drawing with which Thomas illustrated the method is reproduced in Fig. 1, and his report of the case is as follows:

"Three years previously he was driving in a double horse wagon down a hillside road. The load proved more than the horse could control, and the wagon began to descend at a rapid pace, which so alarmed the driver that he attempted to leave the wagon, and while trying to do so fell and fractured the left humerus. He was attended to by a neighbouring practitioner, but the result of six months' treatment was failure of repair. From this defect several surgeons of repute in his own State tried to cure him, but they failed to remedy the fault and also declined resection. Consequently, he remained contented with the defective and useless arm, the condition of which much hampered his usefulness. In the early part of May, 1881, having ascended an elevation on his farmyard, the helpless condition of his arm caused him to overbalance himself and he fell down. This so annoyed him that he immediately left home, and arrived at my surgery sixteen days after the mishap. The forearm being placed at a right angle to the arm, as seen in Fig. 1, was slung by the wrist from his neck, and subjecting the points of fracture to mild percussion every four or five days, and the keeping up of a prolonged tumefaction for a distance around, above, and below the fracture, by means of india-rubber bands. No method of fixation was employed. This treatment was

watched daily for about three months, when the patient visited the Principality and spent some weeks with his friends, continuing the treatment; and on his return there was apparent progress towards consolidation, which gradually improved, so that after eight months of treatment repair was perfect and the patient returned home. He, in March 1882, reported his arm as now useful and gaining in muscular power."

In commenting upon the above, Thomas says, "This case, I think, may be accepted as testimony that we can, in the treatment of delayed repair, introduce a little more physiology with gain."

Any one who reads the first fifty-three pages of the book from which I have quoted would, I am sure, feel astonished that British surgeons should have allowed credit to be given to any other man than Thomas, and also would be surprised to find, considering how unsparingly he criticized American surgeons such as Sayre and Hamilton, that the same fiction has become established in the States. In the *History of Medicine*, by Garrison, Thomas's name is not even mentioned; but to Bier, who qualified two years after Thomas published his book, is given the

credit of introducing passive hyperaemia as an adjuvant in therapy (1903). In the same book Bier is also credited with introducing intraspinal anaesthesia with cocaine (1899), although in a later paragraph it is added that in this method he was preceded by Corning of New York City (1885). In dealing with this aspect of professional blindness of the old London school to advancements made in the provinces, I venture to quote Thomas's views from Part III of his *Contributions to Surgery and Medicine* (December, 1883):

"But the fact that the details of treatment, advised by me, have in a short space of time become so widely accepted . . . gives me presumptive evidence that my theories are correct, and will in time become generally accepted . . . indeed, in some instances my opinions have been adopted but in a manner I did not expect. For example, I have this day received a reprint of a lecture in which the whole of my teachings relative to diseased articulations have been adopted. The lecture is a skilfully condensed epitome of my writing upon the subject, and which I know the lecturer to be conversant with, and which are opposed to the views published by him

in the *Medical Record*, July 7th, 1883. To remove from the minds of his audience any suspicion of retailing second-hand information, the lecturer informs them: 'I have none of my fellow workers in view. We have all been followers of Dr. H. G. Davis.' This informed me that while the lecturer could ignore the source of the information he was circulating, yet he could lug forward a surgeon whose teaching has so injuriously influenced the practice of the surgery of diseased joints, and from whom he now joins me in dissenting. . . . Some six years back one of our Gallic neighbours published my views as his own, and they were thought so meritorious that a watchful foreign correspondent of an English medical journal gave us a reimportation. I could point out more examples of the 'by night' sort of compliment, but refrain lest my readers should suppose I believe that the most intelligent among us are also the most unscrupulous plagiarists."

Thomas's patience in resolving surgical and medical problems was of a rare type. I indicated in a previous communication that he had utilized an invention over a thousand times before recommending it to others. Thomas, dealing with problems of peace deformities, warned innovators to study and master his appliances before proceeding along a path in which he spent weary years of experimenting before perfecting and recommending them. And a further example may here be quoted as a warning to those who modify his inventions to refrain from so

FIG. 1.—Thomas's method of damming the circulation in a case of ununited fracture.

doing until they are sure that they have mastered the principles guiding the construction of his original surgical appliances. He relates that "the club-foot shoe, simple as it appears, was not adopted in a day; it is the outcome of thirty-two years' experience."

The tragedy of a summer scene (1916) of this war with over six battalions of disabled sailors and soldiers in their prime (30,000 to the end of May, 1916) is a thrilling logical reply to men who lack prevision and even now somewhat scornfully animadvert upon the new term, "military orthopaedics." Many of our soldiers who have been placed on the scrap-heap by medical boards are either curable or can be made more useful citizens; the permanent disabilities of a still larger number could have been prevented if the principles and practice advocated by Thomas had permeated our medical schools a generation ago.

The creation by the War Office of military orthopaedic centres, embodying Thomas's plan of establishing workshops in direct connexion with hospitals, is a development full of potentiality for good.

As an apt illustration of the value to me of new light from the Liverpool School of Orthopaedics, I would instance the treatment of ischaemic, or Volkmann's, paralysis. By appropriate treatment founded on Thomas's principles the patient's hand can be restored to full use and prevented from becoming a withered, shiny, atrophic, almost useless appendage. In connexion with this matter, I may quote from a letter received from Dr. A. A. Warden, Paris, dated March 2nd, 1916, as it reminds me of the occasion upon which I first gleaned information upon this subject. "It was a great disappointment to me," he writes, "not to see you and Robert Jones on your flying visit to Paris. I was reminded of you both the other day by a young Chasseur d'Afrique fresh from the trenches. Do you remember a good many years ago (1901) you and Jones were lunching with us and I got a small boy to show you a nasty fracture of the humerus involving the elbow-joint, with wrist-drop, trophic ulcers on his knuckles, palmar contracture, etc., and Jones told me about the hyper-extension of the wrist? Well, this was the boy; a strapping young fellow of 24, come back from cowboy life in America to serve his time . . ." My own advice had already been given to my friend according to the orthodox treatment of the day with the proviso that he should warn the parents as to the disappointing end-results of these cases. Since that time I have cured many such cases upon the lines he then indicated, and which have recently been published in the BRITISH MEDICAL JOURNAL by Colonel Sir Robert Jones, C.B., Inspector of Military Orthopaedics.

Such a fact encourages me to recall other methods initiated by Thomas which have proved exceedingly useful in the treatment of injuries, some of which under the treatment usually followed involve varying degrees of permanent disability. The war has made this matter doubly urgent. Modifications of Thomas's methods have to my knowledge been followed by results which, from an economic and wage-earning point of view, have been unsatisfactory, not to say disastrous. Most of the subject-matter to which I draw attention has already been referred to in the series of valuable articles recently contributed to the BRITISH MEDICAL JOURNAL by Robert Jones, but the particular items I would venture to add or to amplify have reference to:

1. Fracture of the femur.
2. Thomas's method of reducing simple backward dislocation of the ankle-joint.
3. Thomas's method of setting a Pott's fracture.
4. Thomas's method of reducing dislocation of the hip.
5. The after-treatment of amputations at or above the knee-joint.
6. Thomas's diagnostic method for detecting flexion deformities at the hip-joint.

1. Fracture of Femur.

Treatment of fracture of the femur in any situation except in the upper third is readily and efficiently carried out by following all the details of the method introduced by Thomas.

The time has come for an expression of opinion as to the safest and the best method of dealing with fractures of the femur. Every one who has had the opportunity of seeing

the complicated nature of such injuries in this war appreciates the difficulties with which the surgeon has to contend. After seeing some of the end-results one is nevertheless forced to state that there is no shadow of doubt that if those who were responsible for the treatment had appreciated the use of Thomas's methods, useful limbs would have been the result with normal gait in ordinary boots instead of an ungainly hobble in surgical boots with the assistance of sticks and crutches. I have seen many cases plated by different—not indifferent—surgeons in which the end-results have not been equal to those obtained by non-operative treatment by splinting.

From a fairly extensive personal experience of the use of screws, plates, and Lambotte's appliances, I have come to the conclusion that Thomas's method is better, safer, easier, and speedier. As in the case of open operations, however, the principles which govern the method must be carefully studied, and their application mastered in every detail, before the excellently good results achieved by Thomas can be obtained.

It is necessary to remember that Thomas maintained that extension alone could not be trusted to obtain proper alignment in a fractured femur. In his opinion it was also essential that the limb should have further support either at the back, the side, or front, or a combination of them according to circumstances. It was through these additional supports that proper forces were directed in order to keep the ends of the bone in correct alignment, consequently Thomas's knee-splint was made with lateral iron rods of sufficient strength to withstand the forces acting on the broken limb in three directions, namely, (1) longitudinal, (2) transverse, and (3) antero-posterior.

In order to appreciate how antero-posterior forces more especially act and counteract each other through the lateral bars of Thomas's knee splint, I have reproduced Figs. 2 and 3, with the explanatory letterpress from his book (Part VII).²

"Fig. 2 is a plan of the method of reduction. The fulcrum points are A E, the applied leverage force C D, and the fixed extension is shown at G, F being the adhesive gaiter with

FIG. 2.—Knee-joint flexion deformity; method of reduction.

cord attached to G, a sectional view of the lower end of a bed-splint, just as A is such a view of the lower supporting leather; E and B are also sectional views of the groin ring of a bed-splint, the B part having no duty to perform, as all leverage is gained by the resistance at A and E to the force C D; the dotted line is the supposed external rod of a bed-splint. C D are the reversible pads, which are the points of application of force."

"Fig. 3 shows reduction effected and the joint arrested by B from descending beyond strict extension. In both diagrams the direction of the travel of the arrow points

FIG. 3.—Knee-joint flexion deformity; reduction effected, the joint being arrested by B from descending beyond strict extension.

indicates the direction of force. In Fig. 2 the popliteal support B is absent; consequently the joint descends by the employment of force at the points C D, until the popliteal space comes in contact with the point of rest,

the cross mid-leather at B, the joint can have no rest, nor the sufferer ease from pain, the B support being the key to the position of 'greatest ease' and the reversible pads secure invariability."

Having effected the reduction of the deformity, the knee is fixed and the whole limb is in repose; the muscles, finding their conservative efforts needless, cease their action.

I have seen many tragic cases of preventable disabilities following treatment based on modifications of Thomas's practice.

It is not yet generally realized what an extraordinary amount of force is often required to overcome the shortening of a femur. It is also not yet universally realized that sagging deformities of fractures of femurs can be prevented by the application of antero-posterior forces acting upon the side bars of Thomas's splints according to methods he adopted.

In the whole range of unsatisfactory end-results of treatment of fractures I know of none so lamentable as those of the femur.

Shortening of a lower limb from one to five inches, accompanied by sagging deformities, are grievous calamities; they can almost invariably be prevented, or can often be remedied at a later stage by the application of powerful forces applied through pulleys. Thomas's knee splint made according to his instructions is infinitely the best means of dealing with such cases; its side bars are strong enough to stand a force exceeding that of the weight of the patient in the longitudinal stress; they are strong enough also to withstand the transverse and antero-posterior forces necessary to maintain the limb in the line which ensures absence of sagging or latero-angular deformities. The want of appreciation of the part played by the side-bars is a contributory factor to failure in treatment.

The aluminium splinting which has been used by some surgeons in the treatment of fractured femurs is too weak and pliable to withstand the requisite forces, and it must be condemned as a trap for the unwary in treating the type of cases I allude to; it is easy to demonstrate the relative strength of aluminium splints for the thigh and Thomas's. Once a lateral bar of the aluminium splint is bent its resistance to a powerful longitudinal force is gone—it has no resiliency, an essential point in the maintenance of efficiency—whilst it is never strong enough to withstand the transverse forces which have frequently to be applied to the lateral bars of a Thomas's splint. Any one can satisfy himself of the truth of what I state, and measure the strain by applying the forces mentioned to either type of splint appropriately fixed to a spring balance; a more homely demonstration is obtained by trying to bend both across the knee in order to test the give of the metals to transverse strain; the longitudinal strength of an aluminium or iron splint can easily be tested by pushing against the ring when the foot-end is placed in the corner of a wall. Thomas's knee-splint gives confidence and safety; aluminium splinting neither.

Even Thomas, with his perfected knee-splint, regretfully records that "in the upper third of the femur on several occasions, during an experience extending over thirty-two years, it has been my lot to fail in 'restoring' several fractures of the femur close to the trochanter." It is interesting to observe that this special difficulty which baffled Thomas's ingenuity has since been overcome by the introduction by Robert Jones of the "abduction frame" by which proper alignment of the broken bone can be maintained and the normal length restored.

2. Fractures about the Ankle.

Thomas's method for the reduction of simple backward dislocation of the ankle-joint is shown in Fig. 4. Thomas states that "where delayed extension to two or three weeks in the reduction of the backward dislocation of the ankle-joint, or in cases where no skilled assistance is at hand, the illustration shows how the surgeon can much

increase his individual powers, and succeed without the aid of an assistant or of an anaesthetic. From the illustration it will be seen that

the power of the surgeon's arms is assisted by the efforts of his trunk muscles, through the medium of a bandage passing behind his neck and under the patient's heel; a counterforce is gained by attaching the patient's leg to the surgeon's foot with a bandage. The surgeon, as he finds best, may employ both hands to the patient's heel, or, as in the illustration, one hand to the heel and the other to the leg."

FIG. 4.—Method for the reduction of simple backward dislocation of the ankle-joint.

3. Setting a Pott's Fracture.

Thomas's method of reduction of a Pott's fracture is illustrated in Figs. 5 and 6. Fig. 5 shows the fracture with the common valgus deformity. Fig. 6 shows how Thomas reduced such a deformity six or seven weeks after date of injury. He states "that the reader will notice that the manner of employing the necessary force and counter

FIG. 5.—Pott's fracture, showing common valgus deformity. a, Inside of leg. b, Outer aspect of foot and heel. The lettering in Fig. 6 corresponds.

FIG. 6.—Thomas's method of reduction. a, Site of counter force. b, Site of opposing force.

force, is similar to that for the reduction of an ancient dislocation of the ankle, but with this difference, the counter force attached to the surgeon's foot acts upon the inner aspect of the patient's leg, while the opposing force, the towel over the surgeon's neck, is applied to the outer aspect of the patient's foot and heel, being further supplemented by the surgeon's hands applied to the same locality."

4. Method of Reducing Dislocation of the Hip.

Thomas states, "My general method of reduction is shown in sketch by Fig. [7]. By a glance at that figure, the reader will perceive that the pelvis is fixed to the ground by a looped towel, passing over the patient's groin and under the arch of the operator's foot, while the flexed knee of the patient is drawn over the operator's thigh, who, grasping the patient's leg, flexes the knee more, also using the leg as a lever to strain the fixed point, the groin towel. By this arrangement the operator is personally able to apply an amount of force approaching that to be gained by the use of the 'tripod,' which is probably seldom

procurable. By this plan the operator is free, though aided by extra force, to perform his flexion, rotation, abduction,

FIG. 7.—Method of reducing dislocation of the hip (Thomas).

and sudden extension without interruption. It may happen that the patient to be operated upon may be a very tall man and the operator a short person; the disparity between their respective limbs would much lessen the leverage—extending power of the operator. This hitch can be easily arranged; the operator should pack the upper surface of his thigh, the fulcrum point; this act practically lengthens his leg for the purpose intended."

5. Thomas's Frame for Treatment of Amputations at or above the Knee-joint.

Fig. 8 shows a frame Thomas found to be "labour saving" in the after-treatment of amputations at or above the knee-joint. I have introduced this frame into several military hospitals, and it has given every satisfaction; it is constructed of five-sixteenths inch iron wire, and its mode of application is shown in Fig. 9. The wings of the frame can be altered to fit different limbs, and the angle of fixation can also be altered. The wide lower wings cover a large area of soft bed and do not sink into it, and on them a weight can be fixed to anchor and to steady the frame.

FIG. 8.—Frame for supporting thigh stump.

FIG. 9.—The same applied.

6. Thomas's Method of Detecting Flexion Deformities at the Hip-joint.

I think it desirable to reproduce a diagram (Fig. 10) illustrating the method Thomas introduced over forty years ago for detecting flexion deformities. My reason for doing so is that I have seen a large number of thigh amputations on the Continent with artificial limbs fitted on to the deformed stumps. In this country a large number of stumps with similar troubles are sent by well-known surgeons to be fitted for artificial limbs. There is one factor in determining flexion deformities at the hip which is not perhaps fully recognized. I refer to the posture of the amputated limb in bed; it is almost invariably propped up on pillows during convalescence. Some of the most difficult deformities to correct occur in amputations in the upper third of the thigh. Dr. Mennell very kindly showed me a most ingenious and simple appliance which he has introduced at the Military Orthopaedic Hospital, Shepherd's Bush, for correcting this deformity,

but it is important to prevent the occurrence of this deformity, and Thomas's frame is valuable in attaining this end.

In conclusion I desire to emphasize a fact which is not yet generally realized by the profession, that the amount of force used by Thomas and Robert Jones in the treatment of orthopaedic cases is enormous—far greater than that in general use. For example, the force of the pull reducing dislocations of the ankle or of a Pott's deformity after the method referred to in this paper easily exceeds 300 lb. weight. In wrenching a foot a Thomas's wrench 12 in. long and applied in the way that Robert Jones uses against his hip, I have without much strain raised a dead weight of over a quarter of a ton (564 lb.).

The strength of the side bars of Thomas's knee splints even for children is at least four times as strong as the aluminium splint which is used for adults, whilst Thomas's adult splint will stand more than ten times the force which renders the aluminium rods perfectly useless.

FIG. 10.—Thomas's method of ascertaining the amount of flexion deformity at the hip. The forearm of the sound side is used as a means of fixing the sound lower limb to the trunk during examination of the diseased side, in order to correct the compensating kyphosis.

CONCLUSIONS.

By setting a fractured limb Thomas meant that the limb was to be restored to perfect symmetry, that is, proper alignment and length.

In order to do this he employed forces which ran into hundreds of pounds at the time of the setting, by means of pulleys, levers and special appliances constructed for the purpose. This mechanical treatment is founded upon principles which Thomas published in 1875.

I desire to express my gratitude to my friend Colonel Sir Robert Jones for valuable gifts of books published by Thomas, and I am also grateful for having had so many opportunities of seeing his work, which convinced me that the vogue of operations for plating fractures and for tenotomy is only a passing fashion and will, as soon as the

Liverpool School of Orthopaedics is fully appreciated, die a natural death.

REFERENCES.

- ¹ *Contributions to Surgery and Medicine*, Part VI, June, 1886. *The Principles of the Treatment of Fractures and Dislocations*, by Hugh Owen Thomas. London: H. K. Lewis.
- ² *Contributions to Surgery and Medicine*, Part VII, May, 1890. *Fractures, Dislocations, Deformities, and Diseases of the Lower Extremities*, by Hugh Owen Thomas.
- ³ *Ibid.*

THE annual meeting of the British Dental Association was held on July 28th, in the hall of the Medical Society of London, under the chairmanship of Mr. Norman G. Bennett. The annual report showed that the present membership of the association is 2,600, of whom 600 are serving with the forces, either as dental surgeons, or as combatants. Mr. W. H. Dolamore was re-elected President of the Association, and in his address referred to the excellent work performed by the Canadian Army Dental Corps, which encouraged him to suggest the advisability of instituting an army dental corps for the British army.