bellum due to arterial thrombi the result of severe malaria; for he has been in this condition for eleven years with only slightly increased impairment recently, and there are no other signs of intracranial disease to lead one to suspect a neoplasm. It is right to add, however, that paresis of the hands and feet is present. Some physicians believe him to have *tabes dorsalis*; but *dysdiodocokinesis* and the above sign show that the symptoms are cerebellar.

A CONVENIENT INSTRUMENT FOR READY CLINICAL INVESTIGATION OF THE SENSIBILITY TO COOLNESS AND WARMTH

By Tom A. Williams, M.D.

When the spinal column is injured, it becomes of great importance to the surgeon to know whether a consequent paralysis or loss of sensibility arises from damage to the cord itself or implication of the roots or of a plexus in the vicinity. Since the researches of Head and Sherren and Head and Thompson, the means for making this distinction are clinically available. It will be recalled that stimuli as they pass from periphery to central end organ, are grouped in quite a different way in the peripheral nerves to the manner in which they are collected in the spinal cord.

Thus, it has long been known that in the latter all the impulses of painful sensations run together in the heterolateral Gowers' tract, and that a lesion which interfered with any kind of pain always interferes with all kinds of pain. As is well known the sensibility to cold and heat is conducted along the same tract as that of pain, although not in the same fibers; for one may be lost without the other, and either or both may be lost, while the sensibility to pain is intact and *vice versa*, although any of these combinations is rare on account of the close proximity and interlacement of the conducting paths.

Again the knowledge of the attitude of our limbs is derived from impulses which mount the cord in the homolateral dorsal column, and they are there accompanied by fibres which make possible our appreciation of the locality of touch and of the distinguishing of the simultaneous touch of two points, at a distance from one another which varies on different parts of the body.

On the hand, this latter test is the most convenient for determining whether a lesion is in the cord or in the periphery; for in the latter case the loss of spacing sense is always accompanied by a proportionate loss of the superficial sensibility for distinguishing light touches and appreciating coolness and warmth, that is, temperatures between about 20° C. and 40° C. In a lesion of the cord, however, there may be a loss of spacing sense without the least incapacity to appreciate either heat or cold and without loss of feeling to the lightest touches with cotton wool; but there is then always a concomitant loss of the sense of attitudes.

In the lower limbs, the compass test is not of great applicability; for the circle of discrimination is very wide, and people are not accustomed to this type of discrimination. The hairiness of the lower limbs, moreover, vitiates the testing of fine touch with cotton wool; for the order of

sensibility excited by the stimulation of a hair is different from the epicritic (as Head has called it) which is resident in smooth skin. Hence, to distinguish between peripheral lesions and those of the cord clinical practicability requires the use of a different quantitative test; and it is for convenience in making this that I have devised the instrument now presented.

For estimating degrees of sensibility to temperature, Head had used silver test-tubes containing water at a temperature ascertained by a thermometer placed in the tube. Now, silver tubes are expensive, and the insertion of a thermometer is inconvenient. Besides, in a small tube, the loss of temperature is rapid. So in my instrument copper is used for it is nearly as good a conductor and much less expensive. It is used in a block, and not as a tube, again saving expense. The thermometer is firmly attached to the instrument, which greatly adds to its convenience; and lastly rapid loss of heat is compensated for very simply; for the desired temperature is reached by plunging the base of the instrument into water in a large vessel, the total body of which retains its temperature much longer than does an instrument of any practicable size unless electrically heated as in the instrument recently devised by Mills, the expense of which precludes its general use.

The apparatus consists of a cube of cast copper $3 \times 3 \times 3$ centimeters tunnelled out in the centre to within two millimeters of the opposite surface. Into the tunnel is inserted the bulb of a thermometer of the kind used in storage warehouses. It registers from 10° F. to 140° F. This thermometer has been selected only for its availability: for the range of temperature need not be so great; but it is a safeguard against breakage. The whole is mounted upon a wooden holder along a groove in which the thermometer is embedded for protection. The scale is easy to read as it lies in the furrow. For convenience of manufacture, the copper block is made in two equal parts furrowed in such a way that the approximation of the grooves forms a circular tunnel for the thermometer. The two halves are clamped together with four copper screws; and the whole is in turn screwed to a strip of brass one eighth inch thick and 3 c. wide. The brass fits along a bevelled-out surface of the block, which extends to within two millimeters of the foot. The brass strip is screwed also to the wooden handle which carries the thermometer scale, thus making the whole solid and giving a uniform surface of copper to place against the skin of the patient being examined.

To use the instrument, it is plunged into a large jug of water at a temperature approximating to that desired, say 25° C., when testing for appreciation of coolness, or 40° C. when testing the appreciation of warmth. It is very easy by adding cold water or hot water to obtain any temperature desired in the large vessels; and this will remain practically constant long enough to enable a series of observations to be taken sufficiently complete for current clinical use. Of course, it is easier to obtain accurate results when two instruments are used, one cool the other warm; for it is then more easy to control the tendency of patients to continue to call all temperature stimuli by the name they use for the first stimulus felt. Any indifferent metallic substance may, however, be employed satisfactorily to eliminate this fallacy.

Of course the instrument does not pretend to be a substitute for clinical acumen; no apparatus can do that; but it is a convenience; and,

furthermore, affords a ready means for ascertaining data for purposes of comparison with the cases of other observers. It is thus useful both in the practice of medical, and especially surgical, art, and in the compilation of the records which further the advancement of science.

AN ANOMALY IN SENSIBILITY DURING ACUTE SEROUS MENINGITIS: A CLINICAL NOTE

By Tom A. Williams, M.D.

After being thrown from a trap when intoxicated, a farmer of sixty-one, during ten days gradually became delirious and quadriplegic with rectal and vesical incontinence. He had been a hard drinker; and for two years had suffered from numb feelings and coldness of hands and feet without pain or loss of power.

Motility.—On examination ten days after the accident, there was complete paralysis below the second thoracic segment and also of the right triceps innervation, other arm movements being conserved, although much impaired, especially distally. Facial and neck movements were strong.

All *reflexes* were then absent, with the exception of a slight dorsiflexion of the left great toe. In his delirious state the *sensibility* could be examined only roughly; but it was clear that the right side was quite insensitive to pain and temperature as high as the second intercostal space, although no abnormality was then detected on the left side. Bed sores began to appear.

The Anomaly.—It was only five days later, after the deep reflexes had returned and the great toe had ceased to extend, that there was detected the curious anomaly of dissociated sensation which it is desired to record. On the left side as high as Th 2, a sensation of coolness was immediately reported when he was touched with an object at a temperature of 60° F., but when he was touched with a tube containing ice, no sensation of cold whatever was left, the patient immediately calling out with pain, crying "it sticks."

He could appreciate the painfulness as well as the temperature of a tube of boiling water; and felt no pain, although he distinguished the warmth of a tube a little over blood heat. There was marked hyperesthesia to pin prick and to deep pressure over this area. Light touches could be felt on both sides, although less easily on the right, especially distally. The sense of attitude was completely lost in both lower limbs, and appeared to be impaired in the upper limbs.

Without going into further detail, although the case presents many other points of interest which are reserved for a future communication, it was emphasized that the failure to appreciate cold as such still persists on the left side one month later; but the patient now declares that it *burns*. The hyperesthesia is less intense, and the sensibility has now returned on both sides as low as Th 6th.

As to etiology, the lesion was thought to be hematomyelia, but no blood was found in the cerebro-spinal fluid, in which it was reported that lymphocytes were abundant. Noguchi reaction negative. Dr. Carr, hearing of the cases of Murrey of Boston, and Victor Horsley of London, believed that a serous meningitis might be present and resolved to operate eight days after admission. He selected the fifth cervical vertebra on