IN THE LABORATORY

Stereotaxic Apparatus for Operations on the Human Brain[1]

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Exposure of subcortical areas usually necessitates rather extensive operations. It seemed desirable, therefore, to adapt the stereotaxic technic for use on the human brain. This technic, employed thus far for animal experimentation only (*1*), permits one to insert a wire or a cannula accurately into a desired subcortical area with minimal injury to the cerebral cortex or the white matter.

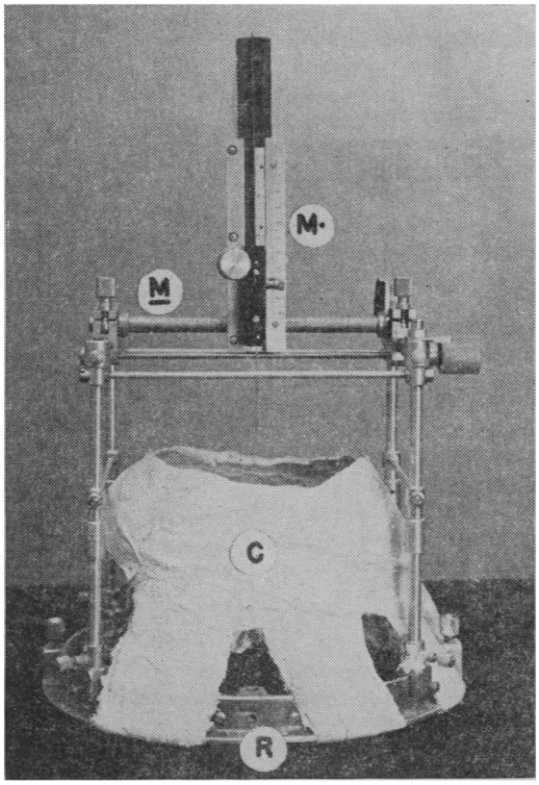

FIG. 1. Side view of stereotaxic apparatus: R = ring; C = cast of plaster of Paris; M· = millimeter scale on needle holder; M = millimeter scale for movement in sagittal direction.

Our apparatus (Figs. 1 and 2) consists of a ring (R) fixed to the skull by means of a cap of plaster of Paris (C) and a frame resting upon the ring and carrying the wire or cannula to be introduced into the brain.

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The needle holder can be moved in sagittal as well as lateral directions and lowered toward the base of the skull in a direction perpendicular to the horizontal plane of the skull or, with the needle holder tilted in the frontal or sagittal plane, at other angles to the horizontal plane. The exact position of the needle in relation to the coordinates of the skull is easily determined by the millimeter scales (M·, M, M′), and the angle between needle and horizontal plane by the scales on the protractors (P′, P″).

The preoperative preparation and operative procedure consist of the following steps:

(1) A plaster cast is prepared which fastens the ring rigidly to the shaved head in the proper position, *i.e.* parallel to the horizontal plane (determined by the inferior margin of the orbit and the upper border of the external auditory meatus on either side). After the cast has hardened, large windows are cut in its top (field of operation) and in the frontal and temporoparietal regions (for X-ray photography of the pineal body and of the region of the thalamus). It is important that the ring with the cast can be easily removed from the skull and reapplied during operation in exactly the same position as before operation.

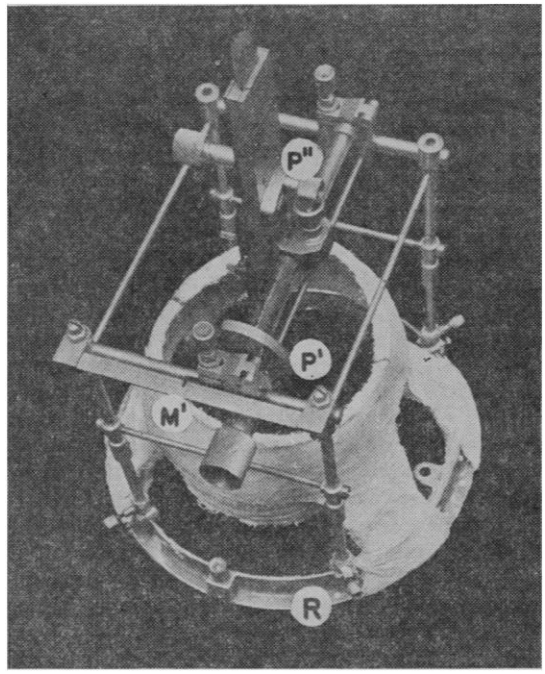

FIG. 2. Apparatus seen from above: M′ = millimeter scale for movement in lateral direction; P′ = protractor for tilting needle holder in frontal plane; P″ = protractor (on back of needle holder) for tilting needle in sagittal plane; R = ring.

(2) An X-ray picture is taken with the apparatus in situ

and the needle in the zero position (crossing of the interaural and midsagittal planes) before and after filling of the ventricles with air. From these photographs the coordinates of the lesion are calculated and the place of trepanation is determined.

(3) After trepanation a wire or cannula is introduced through the intact dura, a lesion is produced by thermocoagulation, fluids are aspirated or injected, etc.

This apparatus is being used for psychosurgery. In a series of patients studied in collaboration with H. Freed, lesions have been placed in the region of the medial nucleus of the thalamus (medial thalamotomy) in order to reduce the emotional reactivity by a procedure much less drastic than frontal lobotomy (*2*). The results so far obtained are promising. Further applications of the stereotaxic technic are under study, e.g. interruption of the spinothalamic tract in certain types of pain or phantom limb; production of pallidal lesions in involuntary movements; electrocoagulation of the Gasserian ganglion in trigeminal neuralgia; and withdrawal of fluid from pathological cavities, cystic tumors.

References

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2. SPIEGEL, E. Preliminary report, American Neurological Association, June 18, 1947.

A Solution for Plasticizing Kymograph Records

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In the past, many solutions such as shellac in ethanol, resin in ethanol or isopropanol, etc. have been used to fix kymograph records. Satisfactory results were not always obtained because, as the solutions became more concentrated due to evaporation, the records were extremely sticky, did not dry rapidly, and had a glossy finish which would not photograph readily.

The solution to be described has been used for 8 months and has always given excellent results in that the records dried within 10 minutes, were never sticky, and always had a dull finish. One further advantage was the ease with which the fixing pan was cleaned. A 10 per cent aqueous solution of sodium carbonate readily removes all traces of the dried fixative from the pan.

The plasticizing solution is composed of cellulose acetate phthalate (Eastman Kodak Co.), 10 grams; ethyl lactate, 150 cc.; ethyl acetate, 150 cc.; and ethanol or isopropanol, 700 cc. To prevent precipitation of the plastic, the solution must be mixed in the following manner: dissolve the cellulose acetate phthalate in 25 cc. of ethyl lactate and then add an equal quantity of ethyl acetate. This solution is added to half of the ethanol or isopropanol with rapid stirring. Some precipitation of the plastic may occur at this point, but the addition of another 25 cc. each of ethyl lactate and acetate will redissolve the precipitate. Add the remainder of the alcohol, ethyl lactate, and ethyl acetate in that order. Filter the solution by gravity through glass wool and bottle. Kymograph records are fixed in the usual manner with this finished solution.

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Yeast Autolysate: A Culture Medium for *Hemophilus influenzae*

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It is generally agreed that *H. influenzae* requires for its growth two distinct factors, the heat-labile V factor and the heat-stabile X factor. Lwoff and Lwoff (*5*) have shown that the V factor is a coenzyme, and their observation has been confirmed by other investigators. Gingrich and Schlenk (*3*) reported that codehydrogenase I replaces the V factor and, in this respect, is superior to codehydrogenase II. The X factor can be replaced by crystalline beef-liver catalase according to Bass, Berkman, Saunders, and Koser (*1*). From the investigations of Hoagland and associates (*4*) as well as of Bass and co-workers (*1*) it is evident that in addition to these two growth factors other compounds may be required for maximal growth. Yeast is known to be rich in V factor; however, it is generally regarded to be lacking in X factor. The experiments reported below revealed that yeast autolysate supplies both growth factors required by *H. influenzae* and suggest that this substrate may be used to advantage as a culture medium and may be useful in studies on the streptomycin sensitivity of this microorganism.

The yeast autolysate (Supplement B) used in these studies was procured from Difco Laboratories. It is a filtrate of autolyzed fresh yeast and, according to Schoenlein (*6*), is rich in coenzyme, glutamine, cocarboxylase, and other B-vitamin factors. Difco Supplement is recommended for use in the cultivation of *Neisseria gonorrhoeae* and has been employed by Buck (*2*). In the present study, two lots (№ 388386 and № 388624) proved to be equally satisfactory. For as yet unexplained reasons another lot (№ 386207) failed to support the growth of *H. influenzae*. The vast majority of experiments were carried out with lot № 388386.

Nineteen strains of *H. influenzae* were used. Six strains were freshly isolated from the spinal fluid of patients with meningitis; the remainder were stock culture strains available in this laboratory or kindly supplied by H. E. Alexander and the Division of Laboratories and Research, New York State Department of Health. Seventeen strains belong to type b and one strain each to types a and c, respectively.

The first series of experiments was undertaken to determine the growth-promoting properties of yeast autolysate. The 19 strains of *H. influenzae* were seeded into 10 per cent yeast autolysate-brain heart infusion. All grew profusely within 24 hours in this culture medium and failed to grow entirely in brain heart infusion used as control. In view of the fact that the inoculum, which was harvested from hemoglobin-proteose peptone № 3 agar, may have contained an adequate amount of X factor, serial transfers were made daily from yeast autolysate-brain heart infusion to yeast autolysate-brain heart

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