Stereotaxic methods appear to offer the best available means of producing localized lesions in subcortical sites. This technique has the advantage of minimal surgical trauma and incidental tissue destruction. Since the stereotaxic instrument was devised and introduced by Horsley and Clarke, it has proved to be one of the most profitable experimental methods for studying the anatomy and physiology of the brain in animals. The method as used in animal investigation is based upon the principle of substitution of mechanical direction of electrodes, with respect to established planes, for visual direction and the premise that the skull bears a fairly constant relationship to the brain. The greatest experience with this method, to date, has been with experimental animals, particularly the cat and rhesus monkey. These experiences have shown that the method, as commonly employed with experimental animals without roentgenographic control, has a large element of trial and error. No study has been made of the combined use of radiographic techniques and the stereotaxic methods in laboratory animals, but it would seem that considerable increase in accuracy might be obtained.

The hope of Horsley and Clarke that the stereotaxic instrument would prove useful in human neurosurgery was not realized until 1947, when Spiegel et al. devised the first human instrument. Because of wide variations in the size and configuration of the human skull, these authors established coordinate systems with respect to structures within the brain, visible in plain roentgenograms (pineal) or identifiable in pneumoencephalogram (i.e., suprapineal recess, posterior commissure and anterior commissure). Narabayashi et al. have determined coordinates for the human brain with respect to three intersecting planes: 1) a horizontal plane determined by the inferior ridge of the orbit and both external auditory poles, 2) a vertical plane perpendicular to the horizontal plane and passing through the auditory poles, and 3) a mid-sagittal plane. The point of intersection of these three planes was taken as the zero reference point for calibrations, but final coordinates depended

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upon additional pneumoencephalographic information. This latter method is essentially the same as that used in animal investigation, except that roentgenographic assistance is rarely available.

The purpose of the current report was the determination of the spatial relationship between the globus pallidus and the anterior commissure. Since the latter structure often can be localized in a satisfactory pneumoencephalogram and bears an intimate and constant relationship to the globus pallidus, it would seem to be the most reliable reference point upon which to base coordinate systems for stereotaxic approaches to the globus pallidus. A graphic method of representation was devised for determining the general size, shape and disposition of structures within the brain which would appear to facilitate establishment of stereotaxic coordinate systems. By this method data concerning the size, shape and spatial disposition of the globus pallidus with respect to the anterior commissure were obtained.

**MATERIAL AND METHODS**

The material used in this study consisted of 15 brains obtained from general autopsies. Ages of the patients from whom brains were taken ranged from 32 to 84 years and averaged 60 years. Eight of the patients were males and 7 were females. Death resulted from non-neurologic pathology in all cases, but pre-existing cerebral pathology was found in 3 brains and cerebral arteriosclerosis was marked in 2 other brains. Brains were fixed in 20 per cent formalin for 9–12 days, according to the routine procedure followed in the Division of Neuropathology. One brain was further fixed in 90 per cent alcohol for 14 days. Measurements were taken from 1 additional fresh brain for comparative purposes only. Weights of the brains varied from 1000 to 1525 gm. following removal. None of the brains had generalized or localized edema, gross or localized atrophy, or distortion of midline structures.

The brain stems and cerebella were removed by a transverse cut across the upper mesencephalon. The cerebral hemispheres were cut in 1-cm. transverse sections in a brain-slicing apparatus; 0.5-cm. sections were made when needed. The frontal poles of the brain were placed against a horizontal board and the basal surfaces of the temporal and occipital lobes were pressed against a vertical board. The angle formed by the plane of the basal surfaces of the temporal and occipital lobes and a line projected along the orbital surface of the frontal lobe towards the frontal pole measured approximately 140 degrees (Fig. 1). This angle corresponds closely to the angle formed by lines projected from the lowest point of the middle fossa to the anterior limit of the anterior fossa and to the internal occipital protuberance, forming an angle which can be measured in lateral films of the skull (Fig. 2). Brain slices were thus cut perpendicular to a plane corresponding to that established by the lowest points of the temporal fossae and the internal occipital protuberance.

The center of the anterior commissure was considered the zero reference point. A line passing through the midpoint of the anterior commissure perpendicular to the plane of the brain sections constituted the Z axis. Measurements in millimeters of the rostral and caudal extent of the globus pallidus with respect to the zero point were made along this axis. The X axis was considered as passing from side to side