

venous adrenalin produces effects similar to hypothalamic stimulation, while pilocarpine causes effects in the opposite direction.

The human hypothalamus lies on the clivus of the sphenoid bone, either above or behind the sphenoid air sinus. There is much individual variation. A simple drilled steel cylinder slightly curved at the top, insulated with dripped celluloid, except for a few millimeters at the sharp pointed silver-plated tip, is used as a unipolar electrode. The turbinates are shrunk with adrenalin and, using an endoscope in one nostril, the electrode is passed through the other to the posterior pharynx. It is inserted far back in the vault of the pharynx, and at the junction of the roof and posterior wall it is pressed deeply through the mucous tissue until a crunching noise is heard. The electrode can be firmly embedded in the bone. Only slight pain occurs at its insertion. The patient is able to walk about and swallow normally with the electrode in place. No untoward results appear after its removal.

Stimulation of the hypothalamic electrode causes the usual signs of hypothalamic excitation, pupils dilating and blood pressure rising as high as 80 mm of mercury. In the human, too, a characteristic electro-hypothalamogram can be elicited and the effects of hypothalamic stimulation on cortical brain waves studied. Pharmacological effects and other experimental situations may be studied by this method of comparing hypothalamic and cortical leads to an encephalograph as in the experimental animal. Larger currents sent through the hypothalamic electrode produce convulsive movements and marked changes in blood pressure, respiration and circulation. These cease gradually on cessation of stimulation. This method will be used to produce shock effects in schizophrenia as a substitute for insulin or metrazol, as it offers a safer, easier graded and quickly interrupted method of changing cerebral circulation. It seems more rational than the other methods because it directly influences the vegetative regulatory centers concerned with circulation and blood pressure, at the same time evoking the identical secondary effects by producing muscle twitchings. If the effect of "shock" in schizophrenia is psychological, the above method is equally adapted.

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THE CULTURE OF CHAOS CHAOS

PROFUSE cultures of *Chaos chaos*, Type A, Schaeffer strain, have been obtained by the following method:¹

Prepare each finger bowl in the manner suggested by Brandwein—namely, by covering the bottom with

¹ A modification of the method of Paul F. Brandwein, *American Naturalist*, 69: 628, 1935.

a thin (1–2 mm) sheet of 1 per cent. aqueous solution of agar and implanting the agar, while it is still soft, with five preheated rice grains, distributed evenly on the surface. After the agar has hardened, add 80 cc of the general culture solution,² a few drops of a rich culture of *Blepharisma lateritia*³ and several specimens of *Chaos chaos*. Maintain the culture at 17–19° C. Maximum growth is reached in about four weeks, and then sub-culturing is advisable.

Blepharisma lateritia, *Actinophrys sol.*, *Stentor coeruleus*, *Paramecium bursaria* and *Paramecium caudatum* also propagate rapidly in the foregoing solution, used in conjunction with the agar and rice. In such cultures, *Chilomonas* also appears in abundance and, apparently, this small ciliate serves advantageously as food for the larger organisms.

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² General Culture Solution: NaCl 1.20 gms, KCl .03 gm, CaCl₂ .04 gm, NaHCO₃ .02 gm, Phosphate Buffer Solution, pH 6.9–7.0, 50 cc; add distilled water to 1 liter. For use, dilute 1:10, with distilled water (see footnote 1).

³ *Chaos chaos* ingests *Blepharisma* in preference to *Paramecium*, *Stentor* and other ciliates which have been tried. In the cultures every specimen shows numerous food vacuoles containing the pinkish remnants of the digesting *Blepharisma*.

BOOKS RECEIVED

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