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Respiration Movement in Normal, Neurotic and Psychotic Subjects.

1. Thoracic and abdominal respiratory movements have been recorded separately on five subsequent days utilizing the pneumographic recording technique on groups of normal, neurotic and psychotic subjects of both sexes. Among the normal subjects was a sub-group which had systematic physical training.

2. Some of the measures were subjected to quantitative treatment, namely breathing rate, inspiration-expiration ratio for thorax and abdomen, and variation coefficients for thoracic and abdominal breathing rate, and also for the two inspiration-expiration ratios. A number of breathing features which did not lend themselves to quantitative treatment were qualitatively evaluated by comparing the percentage distribution of the different subject groups on characteristic categories for each of these features.

3. The quantitative data show :

(a) With a time-sample of one minute for each recording day the author obtains stable data by three recordings for respiration rate and the two inspiration-expiration ratios in the normal subjects, while at least four days seem necessary in the neurotic group. The variation coefficients are highly unstable in the normal groups, but considerably more stable among the neurotics.

(b) The inspiration-expiration ratio has a higher numerical value for thorax than for abdomen.

(c) Among the normals no difference is found between the subjects with and without physical training.

(d) Among the normals men have a slower breathing rate and larger inspiration-expiration ratios than have the women.

(e) Neurotic males have a significantly faster breathing rate than normal men, and comparison between normal and neurotic females shows the same trend.

(f) Comparison of breathing rate between normal and psychotic subjects reveals the same result as the comparison between normals and neurotics. In addition, psychotic females have a significantly higher abdominal inspiration-expiration ratio than have normal females and the thoracic inspiration-expiration shows a strong tendency in the same direction.

(g) The respiration measures do not seem to be causally related to pulse rate, body temperature, or anthropometric measures like height, weight, circumference of thorax and abdomen, or Rohrer's Index.

(h) When the patients were grouped according to emotional status no difference was revealed in breathing measure between the various groups.

(i) None of the variation coefficients proved to be a useful measure in the author's group comparisons.

4. The qualitative evaluation of the curves indicated :

(a) The abdominal type of breathing is characteristic for men, and the thoracic type characteristic for women, except for psychotic women, where the abdominal type is not uncommon.

(b) In general the patients have a sharper inspiration-expiration transition in the abdominal curve than have the normals.

(c) The following features seem to differentiate between normal and neurotic subjects: regularity within one recording, expiration pauses, and similarity between the five recordings.

5. Neurosis Points have been introduced for all features differentiating between neurotic and normal subjects. Group averages for these Neurosis Points were substantially smaller in the normal groups than in the patient groups.

6. The number of Neurosis Points in an individual patient seems only in a moderate degree to reflect the severeness of the illness.

7. The results are discussed with reference to various theories where anatomical or physiological sex differences, physical exercise, mental (or emotional) status, and social norms are considered. (Author's abstr.)

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Selective Cortical Undercutting. Results in New Method of Fractional Lobotomy.

1. Complete lobotomy causes too much blunting of the personality to warrant its further use except in severely deteriorated psychotic patients.

2. Selective cortical undercutting is presented as a new method of fractional lobotomy and offers certain technical advantages over other methods, in precision, preservation of adjacent blood supply, facility and accessibility.

3. A sufficient number of undercuttings have now been done to permit specific recommendations for its therapeutic use.

4. The results of undercutting indicate that there is little specificity of the frontal lobes in their effect on psychoses but definite specificity in their effect on personality. The psychoses are favorably affected by quantitative isolation of any area of the frontal lobes. The personality is unaffected and shows little if any blunting following isolating of the orbital surface and a definite blunting upon isolation of the superior surface, similar but to a less degree to that found in a standard lobotomy.

5. There is more apparent personality deficit in non-psychotic than in psychotic patients following any type of lobotomy. Hence only fractional lobotomies should be used in patients suffering from mood disorders, neuroses or pain.

6. Undercutting of the orbital surface appears the ideal operation for psychoneuroses and milder mood disturbances because of the almost complete absence of personality change.

7. Undercutting of the superior surface or the orbital surface is recommended for the schizophrenic and severe affective psychoses, the results being roughly equal to those obtained in standard lobotomy with significantly less personality deficit.

8. Pain, if accompanied by addiction, psychalgia, or excessive anxiety, responds well to undercutting of the superior surface.

9. Undercutting of the medial, cingulate gyrus surface is technically more difficult and dangerous with inferior early and possibly equal late, results making final evaluation difficult.

10. Certain cases showing an inadequate response to selective undercutting can be converted to a more complete lobotomy as a second-stage procedure.

(Authors' abstr.)

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Some Experiences with Transorbital Leucotomy. A Review of Results in 110 Cases.

1. A series of 110 patients on whom transorbital leucotomy was performed is reported.
2. These consisted of schizophrenia 74 cases, psychoneuroses 19 cases, affective psychoses 14 cases, paranoid psychosis 2 cases, mental deficiency with paranoia 1 case.
3. The schizophrenic group had received the present-day accepted forms of treatment without relief and were considered non-salvageable, but shown a 53 per cent. improvement rate following transorbital leucotomy.
4. Catatonic and paranoid types of schizophrenia responded most favorably in this category with a 74 per cent. and 63 per cent. improvement rate respectively, whereas the deteriorating forms showed a low improvement rate of 17 per cent. If agitation was a significant feature of the deteriorated type, improvement was obtained after transorbital leucotomy.
5. Among the obsessive-compulsive patients previously subjected to psychotherapeutic techniques, E.C.T., etc., transorbital leucotomy effected an improvement in 84 per cent. Improvement was slow initially but showed increasing momentum with the passage of time.
6. Psychoneurotics with pronounced hypochondriacal preoccupations are not favorably influenced by transorbital leucotomy.
7. The affective psychoses, wherein repeated courses of shock therapy have failed to prevent frequent recurrences, particularly agitated depressions, respond very favorably to transorbital leucotomy, an improvement rate of 83 per cent. appearing in the manic-depressives, and 63 per cent. in the involuntional depressions.
8. In view of the relative ease of performance, short hospitalization, minimal nursing care, insignificant morbidity, low mortality compared with other psychosurgical procedures, and the favorable results, the authors suggest that this procedure be utilized more widely in suitable cases before relegating them to custodial institutions for life, or permitting them to lead a burdensome existence.

(Authors' abstr.)

Impaired Cerebral Functions in Essential Hypertension.

1. The cerebral course of essential hypertension is reviewed.
2. The psychiatric syndrome, characterized by changes in personality patterns, especially in relation to the expression of hostility, the willingness to yield to dependent needs, and reduction in perfectionistic drives, associated with mild judgmental and memory defects, insomnia, loss of energy and anxiety symptoms that are not explainable by changes in the cardiovascular status, has been isolated by the combined techniques of the internist, psychiatrist, neurologist and experimental psychologist. The appearance of this syndrome signifies the onset of

organic involvement of the brain. The duration of the syndrome depends not so much upon the quantitative aspects of the cerebral damage as upon the integrative ability of the premorbid personality.

3. Impairment of cerebral functions equivalent to that seen in patients with surgical removal of both frontal lobes may occur early in the course of essential hypertension without neurological signs. Although the critical experimental psychological tests used in the authors' study measure functions of the prefrontal lobes, the authors do not presume that brain damage is confined to this area. On the contrary, neuropathological evidence points to diffuse involvement of the nervous system.

4. The syndrome described that accompanies the onset of brain disease provides further information regarding the clinical course of hypertension. The authors' study does not provide information relative to its incidence nor the factors that promote or retard its appearance.

5. The mechanism by which cerebral damage herein described occurs requires further elaboration. The discrepancy frequently encountered between disturbances and adaptive capacities and the absence of neurological signs invokes a concept of neuropathology that considers alterations in vasomotricity and subtle biochemical changes.
(Authors' abstr.)

Decamethonium Bromide (C-10) in Electric Convulsive Therapy.

Twenty-one mental patients were given decamethonium bromide to modify electric convulsive response. A dose of 4 mg. or above was necessary to prevent aggravation of pre-existing traumatic injury. Respiratory paralysis is regularly present when doses of 4 mg. or above are given. Pentothal sodium is useful to allay fear occasioned by muscle paralysis, but in sensitive persons pentothal may produce laryngeal spasm. Training in pentothal anesthesia and oxygen administration to unconscious patients is needed by the therapist wishing to use decamethonium bromide for the more serious physical contraindications to E.C.T. The therapeutic effect of E.C.T. is not interfered with by decamethonium bromide modification of the seizure. Decamethonium bromide is a powerful and potentially dangerous drug, but it is of great value when skilfully used in trained hands.

(Authors' abstr.)

Phenurone in the Treatment of Psychomotor Attacks.

During the past 2 years phenurone (phenacetylurea) has been administered to 59 patients whose presenting complaint was psychomotor epilepsy. In 17 of these patients (29 per cent.) the psychomotor attacks occurred without other manifestations of epilepsy; in 42 (71 per cent.) there were associated *grand mal* and/or *petit mal* seizures. The medication was discontinued because of the development of toxic symptoms in 15 patients (25.3 per cent.); it failed to help in 4 patients (6.7 per cent.); it was discontinued for other reasons in 12 patients (20.2 per cent.). In the remaining 28 patients (47.8 per cent.) phenurone, with or without other anticonvulsants, brought about the most complete control of attacks that the patients had experienced to date, and every patient had been tried on almost every known drug used for the treatment of epilepsy before the institution of phenurone therapy. In 74 per cent. of these patients the attacks are under complete control, and in the remaining 25 per cent. they are 75 per cent. to 90 per cent. controlled.

Phenurone should be considered an important addition to the drugs used for the treatment of epilepsy, especially psychomotor seizures, which respond poorly to other medication. Its use is not without danger, but serious toxic results are infrequent. The most common untoward symptoms associated with its use appear in the first few days of treatment, and indicate immediate withdrawal of the drug. Patients receiving phenurone should be watched carefully for the possible development of damage to the hematopoietic system and to the liver; withdrawal of the medication is indicated as soon as these appear. An acute toxic hepatitis occurred in one instance in the author's series. The psychological changes reported in patients with psychomotor epilepsy who are receiving phenurone were encountered in only one instance (the same patient), and he may have had what should be diagnosed as a toxic psychosis superimposed upon a schizoid psychopathy. It is

possible that the reported psychologic symptoms are associated with psychiatric changes secondary to discharging temporal lobe lesions. The majority of the author's subjects, who are ambulatory patients of the neurologic clinic of the University Hospital, failed to show significant personality abnormality before the institution of therapy and showed no changes thereafter.

Although phenurone must always be administered with caution and discretion, and patients who receive it must be followed carefully, it is considered to be no more toxic than many other therapeutic agents. It is capable of relieving certain patients of seizures that are not affected by other anti-epileptic drugs. It is of such definite value in the treatment of psychomotor epilepsy that it is hoped that it will soon be available for general use. It is believed that the warnings of the manufacturer should at all times be borne in mind, however, and that treatment with phenurone should be instituted only by a physician experienced in the therapy of epilepsy. It should be employed with caution in patients who have previously shown personality disorders, and it may be advisable to hospitalize such patients during the first weeks of treatment. The patient and his family should be instructed to watch for changes in behavior, evidences of gastrointestinal disturbance or jaundice, rash and fatigue and report these to the physician immediately. The most serious complications, which should be kept in mind, include aggravation of pre-existing personality abnormality, hepatic damage and bone marrow depression. (Author's abstr.)

A Preliminary Report on the Use of D-Desoxyephedrine Hydrochloride in the Study of Psychopathology and Psychotherapy.

1. D-desoxyephedrine hydrochloride was employed intravenously in an intensive study of 22 patients with psychoneurotic illness.
2. It was found invaluable as a working tool for :
 - (a) The delineation of defenses available to the patient, and the role of this delineation in diagnosis and research.
 - (b) A Nosological differentiation in so-called "borderline" syndromes.
 - (c) The vivid clarification of transference reactions.
 - (d) The unexpected confrontation of the alert patient with a dramatic change in his chronic symptoms, and its consequent impetus toward recovery.
 - (e) The marked reduction in time consumed in obtaining valuable conscious and preconscious material.
3. A repeated phenomenon, which the authors have labelled "reawakening of focal memory" has been frequently observed, and represents a challenge to the study of recall and psychic representation.
4. It allows for clearly observable phenomena even in the presence of a group, and thus affords an excellent medium for teaching purposes.

(Authors' abstr.)

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Permanency of Glutamic Acid Treatment.

The authors' results show a considerable degree of permanency after glutamic acid treatment has been discontinued over a period of years, with many patients holding their gains on the intelligence test remarkably well. Their data indicate that amount of gain on the verbal intelligence test is of greater importance in determining the permanency of effect than is length of treatment. Performance test findings, however, favor length of treatment as a positive factor determining the degree of permanency.

The results of investigators who have obtained negative results with the administration of glutamic acid can be explained by the lack of technical precision,

both in the proper administration of the drug and in experimental accuracy. When these factors have been handled adequately, results similar to the authors' have been obtained, both in the human and in the animal fields. The latter is well demonstrated by Albert and Warden in a study in which a problem box much more elaborate than the authors' maze was used. This particular experiment has never been challenged, or even repeated. Among psychologists, of course, it is well known that problem box work is much more laborious and time-consuming than are the relatively rapid maze experiments. (Authors' abstr.)

Prognosis in Topectomies and Lobotomies Relative to Body Type.

If the patient subjected to either a topectomy or a lobotomy is not a mesomorph, the prognosis for a favorable outcome is less than 1 in 10. Of the 13 nonmesomorphs operated on in the authors' series, only one was discharged. On the other hand, four of the five mesomorphs in their series who had either lobotomy or topectomy have been discharged, and the remaining patient (with lobotomy) was on trial visit but has been at least temporarily returned to the hospital. The use of psychosurgical procedures on nonmesomorphs should be undertaken with caution. (Authors' abstr.)

Studies on the Iron Content of Cerebrospinal Fluid in Different Psychotic Conditions.

1. The iron content of the cerebrospinal fluid of 98 patients committed to a hospital for mental disease is examined.

2. The relation of the iron content of the brain to that of the spinal fluid is discussed.

3. When the patients were divided into various diagnostic groups, a statistically significant difference between the spinal fluid iron of the acute and that of the deteriorated schizophrenic patients appeared. The difference between the spinal fluid iron of the group with organic psychoses and that of the group with acute schizophrenia was very significant.

4. It is assumed that a low iron content of the spinal fluid is indicative of increased brain metabolism and that high iron values of the spinal fluid may reflect reduced cellular activity of the brain tissue. (Authors' abstr.)

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Intellectual and Emotional Make-up of the Epileptic.

The authors' findings indicate that a relationship exists between the degree of disturbance in conscious awareness and the adequacy of mental functioning in groups of epileptic patients.

An etiological classification based on commonly-accepted clinical seizure types reveals differences in intelligence and personality in these groups of epileptic patients.

Petit mal epilepsy, with its transitory lapses of consciousness and relatively mild clinical manifestations, shows the highest intelligence quotient and the least amount of personality deviation among children and adults, whereas in the severer types of seizures the intelligence quotient is lowered and productiveness is more curtailed.

The intelligence quotient is higher among children if the onset of the *grand mal* seizure appears late than if it appears early in the child's life.

The authors' Rorschach records seem to demonstrate some degree of "organicness," even among the idiopathic types, interference with mental functioning being most pronounced in the authors' groups with symptomatic and traumatic epilepsy.

All these conclusions are made possible by a method of classification which utilizes finer degrees of differentiation than the older dichotomy of "organic-non-organic" epilepsy. (Authors' abstr.)

Psychological Effects of Chronic Barbiturate Intoxication.

1. Five former morphine addicts, who volunteered for the experiment, were given sufficiently large doses of secobarbital, pentobarbital or amobarbital to induce continuous mild to severe intoxication for periods varying from 92 to 144 days. Six tests were used in an attempt to measure psychological changes during intoxication with abrupt withdrawal from the barbiturates. Three of the tests were administered routinely, the Digit-Symbol, the Bender Gestalt and the Draw-a-Man test. Three of the tests, the Rorschach, Stanford-Binet and Kohs Block tests, were administered only during specified periods of the study.

2. During the chronic intoxication period there was a quick decline in ability, followed by an increase in efficiency, which became maximal 30 to 70 days after the start of continuous medication. In only one instance was a score attained which was higher than control scores obtained after recovery from chronic intoxication. One of the subjects showed gradually increased efficiency on the Digit-Symbol tests from the very onset of chronic drug administration.

3. Oral administration of secobarbital, pentobarbital and amobarbital produced greatest impairment in performance of tasks involving speed, less impairment in tasks involving copying and least in tasks requiring production of behavior that had been stabilized in the past experience of the subject.

4. There were quantitative and qualitative differences in the effects of barbiturates on different subjects, and the same dose of a barbiturate affected the same subject differently on different days.

5. During chronic barbiturate intoxication, there was a partial loss of ego control, which was manifested by a greater magnitude of pathological personality projection in the projective techniques used. This trend became more pronounced as intoxication continued.

6. When the administration of barbiturates was discontinued, the performance of the subjects quickly reverted to the preaddiction level. No evidence of residual physical damage could be detected.

7. The results of Rorschach examinations obtained during the withdrawal from barbiturates, while the patients were psychotic, were very different from those obtained during the other periods of the experiment. The form level was comparatively low; bizarre responses were present; stereotypy (A per cent.) increased, and the number of popular responses decreased.

8. It was observed that the preaddiction Rorschach patterns of the three subjects in whom major psychoses developed after abrupt withdrawal of barbiturates were characterized by high percentage of F + responses and deficiency in affect and fantasy. In the other two patients, the percentage of F + responses was low, and percepts related to affect or fantasy were present. The possible relations of these findings is discussed with reference to the susceptibility of certain personality types to the development of psychoses in reaction to the stress of barbiturate withdrawal. (Author's abstr.)

Experimental Physiological Studies with Lysergic Acid Diethylamide (L.S.D.-25).

Studies with lysergic acid diethylamide (L.S.D.-25) have been carried out in an effort to clarify the physiological and psychic responses attendant on administration of this drug in schizophrenic patients. The drug produced slight increase in blood pressure, slight increase in pulse rate, no essential change in respiration, increase in salivation and lacrimation, dilatation of the pupils, increase in deep reflexes and slight ataxia. Oral administration produced pupillary dilation of marked degree, whereas topical administration produced very slight dilation. The total white blood cell count was increased during the time of action of the drug. Euphoria occurring in outbursts, was prominent. Increased accessibility and amiability, with increased release of libido and greater accessibility of delusional material, was observed. Visual hallucinations of the so-called primary type were not noted in two blind patients treated with the drug but were seen in all of the six patients on whom complete studies were carried out. Urinary constituents, the non-protein nitrogen level, the electroencephalogram, cephalin-cholesterol flocculation, weight and temperature were not affected by the administration of this drug in doses up to 6 micrograms per kilogram. Lysergic acid diethylamide appears to be a suitable substance for further therapeutic investigation in the psychoses. (Authors' abstr.)

The Phenomenon of Sensory Displacement.

Observations on patients with the method of simultaneous stimulation of the face and hand disclosed two types of abnormal responses: (a) imperception of the hand stimulus and (b) mislocalization of the hand stimulus.

The mislocalization showed direction and predictability. For this reason this effect has been called the phenomenon of displacement.

The displacement occurred (a) in an ipsilateral direction, this being the most frequent type, (b) in a contralateral direction, or (c) outward into the extra-personal space, this being the least frequent type.

The direction of the ipsilateral displacement was usually toward the "dominant" sensory region. The direction of contra-lateral displacement was away from the "bad" or hypesthetic, side of the contralateral (normal) regions. In general the direction of the displacement was determined by the degree of dominance of the sensory areas tested. The order of dominance was established after numerous combinations of simultaneous stimulation of two different regions of the body. The face was most dominant, whereas the hand was least dominant.

The phenomenon of displacement was found not only in patients with disease of the brain but also in patients with disease of the spinal cord. Most significant is the observation that the phenomenon of displacement occurs in a small percentage of normal adults, in a high percentage of normal adults during the period of recovery from anesthesia and in a high percentage of normal young children.

The significance of the phenomenon of displacement is the same as that of extinction. The occurrence of the phenomenon of displacement or extinction suggests that a sensation evoked by one stimulus is constantly influenced by other stimuli. Perception is organized in characteristic patterns. The pattern found in patients with disease of the nervous system is the same as that which one may observe in the normal subject. (Author's abstr.)

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Fits of Laughter (Sham Mirth) in Organic Cerebral Disease.

Four cases are described in which attacks of laughter occurred in association with organic cerebral disease, and similar cases from the literature are quoted. The episodes of laughter are considered to be fits comparable with Jacksonian (motor or sensory) fits.

The patient's emotional state at the time of such an attack is not that appropriate to laughter—the apparent mirth is "sham."

In every case in which there were indications of the site of the lesion it was so placed that it might affect the hypothalamus, and these cases give practical support to the view that the motor centre for laughter is situated in or near the hypothalamus.

The observations on the patients' emotional states suggest that the centre which discharges is a motor centre and not one exciting emotion.

The attacks of laughter in most of the cases were of evil omen.

(Author's abstr.)

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Corticofugal Connexions of Posterior Orbital Surface in Rhesus Monkey.

Lesions were made in the posterior orbital surface of three monkeys (*Macaca mulatta*). The animals were sacrificed ten days after the operation and fine-fibre degeneration was investigated by a silver staining method. Direct projections were shown from the orbital surface to the ventromedial and the paraventricular nuclei of the hypothalamus and to the caudate nucleus. Physiological work on the significance of these projections is discussed.

(Authors' abstr.)

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Stimulation Studies of the Prefrontal Lobe and Uncus in Man.

1. Electric stimulation of the uncus, cingulate, orbital and superior surface areas of the prefrontal cortex has been carried out in conscious man with special reference to its effect on respiration, state of consciousness and seizures.
2. Studies were made on 24 patients while undergoing selective cortical undercutting in various areas of the frontal lobes for mental disease.
3. Meager changes were noted following stimulation with high voltage and long duration of the cingulate, orbital and superior surface areas of the prefrontal lobes. In one case, stimulation of the cingulate surface produced a marked quieting effect on an agitated patient.
4. Profound changes in respiration, state of consciousness and delayed appearance of seizures followed stimulation of the uncus with relatively low voltage and short duration.
5. The uncus effects appear to be cumulative and when once initiated may continue for variable periods of time. (Authors' abstr.)

Electroencephalographic Findings in 186 Cases of Chronic Post-traumatic Encephalopathy.

1. A significant shift toward abnormal diffuse and focal types of E.E.G. was found in comparing 186 head injuries with the 1,000 normal controls of Gibbs.
2. There was a pronounced change from the "normal" to the "focal" electroencephalogram as one moved from the "closed" through the "open, non-penetrating" to the "open, penetrating" group of head trauma.
3. E.E.G.s in cases of "open, penetrating" head wounds without localizing neurologic findings were as likely to be abnormal as those with such signs.
4. Of the "focal" tracings 24 or 77 per cent. (86 per cent. in the "open, penetrating" series) corresponded to the site of the wound. Of the remaining 8 cases, 6 satisfied most of the requirements for "contre-coup" injury.
5. In this series the electroencephalogram did not reveal, with any degree of accuracy, those patients who had had convulsions prior to the tracing. (Authors' abstr.)

The Incidence of Focal and Non-focal E.E.G. Abnormalities in Clinical Epilepsy.

1. A group of patients with clinical epilepsy have been studied in various centres across Canada.
2. In 428 civilian patients, 38 per cent. had focal E.E.G. abnormalities.
3. In 262 veterans and service patients who were carefully studied, 66.5 per cent. had focal E.E.G. abnormalities.

4. In another group of 175 veterans, 39.5 per cent. had focal E.E.G. abnormalities.
5. In the total series of 865 patients, 47 per cent. had focal E.E.G. abnormalities.
6. This figure was identical with the percentage of focal E.E.G. abnormalities found in 2 previous groups of patients studied at the Montreal Neurological Institute.
7. In a total of 2,648 patients with clinical epilepsy, focal E.E.G. abnormalities were the largest single group of E.E.G. disturbances.
8. The percentage of focal disturbances uncovered depends to a considerable extent on the technique and care used in doing localization studies.
9. Eighty-one per cent. of patients with clinically focal seizures had a focal E.E.G. abnormality.
10. Although 80 per cent. of patients with *petit mal* attacks had bilaterally synchronous E.E.G. disturbances, the latter also occurred in 53 per cent. of patients who had *grand mal* attacks only. This form of discharge therefore, although commonly seen in *petit mal*, is by no means pathognomonic. Nor is it only seen in idiopathic epilepsy, though they are very frequently associated.
11. Diffuse dysrhythmias were most frequently associated with patients who had only *grand mal* seizures.
12. Bilaterally synchronous disturbances were much more common in patients whose seizures began before the age of 25 years.
13. Focal E.E.G. abnormalities were much more common in patients over 25 years of age and particularly if the attacks began after the age of 25 years.
14. Diffuse dysrhythmias were evenly distributed in all age groups.
15. Borderline or normal E.E.G. records were seen more frequently in patients with *grand mal* attacks only and in older patients particularly after the age of 56 years.
16. The lowest percentage of normal and borderline records were seen in patients with *petit mal* and in infants and young children. (Authors' abstr.)

Drug Effects on the Results of Minimal Cortical Stimulation.

The effects were investigated of a number of anti-convulsants upon the spread of depression and "convulsoid activity" induced by minimal cortical stimulation. Pentobarbital decreased the wave frequency of the convulsoid activity, increased the threshold of stimulation for Leão's spreading depression and decreased the rate of propagation of this phenomenon. In small doses it "improved" the pattern in between stimulation (interim pattern). Phenobarbital had a similar, although less pronounced effect on the convulsoid activity and on the interim pattern as Pentobarbital. It did not influence the threshold or rate of spread of Leão's depression. Mebaral curtailed the convulsoid activity in small doses. Tridione had no effect on any of the results of cortical stimulation investigated. Mesantoin suppressed the convulsoid activity in rather small doses. Dilantin slowed down the wave frequency of the convulsoid activity, but did not suppress this phenomenon even in relatively large doses. It did not affect the threshold or rate of spread of Leão's depression. The interim pattern deteriorated after the administration of Dilantin. (Authors' abstr.)

Physiological Relationships between Hypothalamus and Cerebral Cortex.

1. After small bilateral hypothalamic lesions which produced affective behavior changes, the E.C.G. was usually of fast normal type. In some animals, affect-evoking stimuli produced alerting patterns with subsequent rhythmic slow waves, followed again by fast activity.
2. After lesions which were primarily restricted to the posterior hypothalamus, but which involved upper midbrain, the animals developed catalepsy, there were rhythmic bursts of high voltage slow waves, and alerting was difficult. After several days recovery, alerting was readily possible.
3. After massive bilateral hypothalamic destruction, the dominant frequencies shifted to the slow bands, and strong stimuli (often noxious) were required to produce alert E.C.G.s. With less extensive destruction, the pattern was identical during the early days, but as normal behavior and temperature control returned,

the E.C.G. returned toward preoperative levels ; alerting was more and more easily produced.

4. After massive unilateral lesions there was a change to slow frequencies in ipsilateral cortex, but with stimulation the cortical pattern tended to become bilaterally symmetrical as alerting occurred. When the remaining half of the hypothalamus was destroyed, greater symmetry appeared ; the effects resembled those following one-stage destruction.

5. It may be concluded that destruction of the hypothalamus produced a cortical potential pattern of the sleep type, which could, however, be blocked and changed to the alert type by stimuli of sufficient intensity. This supports the hypothesis that the hypothalamus normally exerts an alerting effect upon the cortex, which is involved in maintaining resting wakefulness. This is but one component, however, because strong alerting stimuli can break through the sleep of cats lacking a hypothalamus, indicating that accessory components may still serve to support wakefulness in the absence of the hypothalamo-cortical facilitatory mechanisms. (Authors' abstr.)

The Effect of Benzedrine on the Post-electroshock E.E.G.

1. In 44 Macacus rhesus monkeys and in 15 humans, the observations of other investigators on immediate and prolonged E.E.G. effects of electroshock convulsions have been repeated and confirmed.

2. E.E.G. alterations during and after electroshock convulsions can be divided into five phases : 1. High amplitude fast waves appear during the tonic phase of the convulsion. 2. Fast and slow waves are mixed during the clonic phase of the convulsion. 3. Marked low amplitude, or flattening, characterizes the electroencephalogram during the immediate post-convulsive period. 4. High amplitude 1-3 per second waves appear most prominently in the frontal leads and persist during the period of post-convulsive stupor.

5. Six per second and then normal frequencies are mixed with the 1-3 per second waves, and there is a gradual shift to normal.

3. The fourth phase, that of extreme post-convulsive slowing, was eliminated in 11 of 19 trials in monkeys when Benzedrine 1-3 mg./kilo was given subcutaneously 10-15 minutes before the shock, and the animals appeared more alert. In humans, Benzedrine was not adequately tested for its effect on immediate post-convulsive slowing but, as in the monkeys, it did not affect the fifth phase. It did not alter post-convulsive confusion.

4. The Benzedrine effect was not reproduced by any of the other drugs tested. These included the dextro- and laevorotatory forms of Benzedrine. Both the vasomotor and central nervous system stimulating, effects of racemic Benzedrine appeared to play a role in the mechanism of its action.

5. The persistence of post-convulsive slowing was also affected by the number of shocks and by the position of the shocking electrodes ; it was increased with increasing numbers of shocks and by transfrontal electroshock. Electroencephalographic slowing was less persistent after transoccipital than after transfrontal shocks, and the site of maximum slowing tended to be posterior with posteriorly delivered shocks. (Authors' abstr.)

Comparative Effectiveness of Sleep and Metrazol-activated Electroencephalography.

In 210 patients with various manifestations of epilepsy, 37 per cent. showed seizure discharges in the electroencephalograms recorded while awake. The use of sleep E.E.G. increased the incidence of such discharges to 47 per cent. In the group of 102 patients who had normal or borderline electroencephalograms while awake, 15 (14.7 per cent.) demonstrated seizure discharges during sleep.

Sleep recording contributed most information in the group with psychomotor seizures, and was especially valuable in demonstrating anterior temporal spike foci in these patients.

In 138 of the patients, the results of sleep and Metrazol-activated E.E.G. were compared. There was a 33 per cent. incidence of seizure discharges while awake. With sleep recording, the incidence was increased to 40 per cent. and with Metrazol to 62 per cent. In almost all cases, seizure discharges recorded during sleep were also observed during Metrazol activation.

Metrazol induced seizure discharges in the electroencephalograms of 35 (45 per cent.) of the 77 patients with normal or borderline records while awake. Sleep was successful in only 10 patients (13 per cent.) of this group.

Metrazol was more effective than sleep in all clinical groups except for the group with psychomotor epilepsy. The focal character of the seizure discharges in the patients with psychomotor epilepsy was best demonstrated during the sleeping state. (Authors' abstr.)

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Comparative Morphologic and Histometabolic Studies of Nerve Cells in Brain Biopsies and Topectomies.

From the foregoing studies it seems that :

1. A morphologic variability of the medium and large pyramidal cells in the brain of selected biopsies and topectomies is associated with marked variability in the activity of the indophenol oxidase (cytochrome-C oxidase), peroxidases and the acid phosphatases. Generally, the oxidase and peroxidase reactions follow very closely the microscopic features and the distribution of Nissl bodies. The acid phosphatases appear frequently more concentrated in the intracellular areas of more pronounced chromatolysis. Irregularity in reaction and distribution of acid phosphatases are common in various degenerative changes of the nerve cells. Decrease and rarefaction of the granular material of the reacting substrate are encountered in the pycnotic and ischemic type of neuronal changes.

2. There is an apparent close similarity between peroxidase activity of the protoplasmatic components of the studied neurons and some components of the fluid and corpusculated blood elements.

3. There are concomitant variations in the morphology and enzyme activity of the neurons, and in the glial elements involved in the process of pseudoneuronophagia and neuronophagia.

Whether these variations of the correlated morphologic and histometabolic findings of the investigated cortical nerve cells are due to changes in their functional activity or whether they are due to some other as yet undetermined conditions, is left open for further investigations. (Author's abstr.)

The Effect of Morphine on Cats with Hypothalamic Lesions.

A group of normal cats was given injections of morphine sulfate ranging from 5 mg. to 35 mg. per kg. of body weight, and in every case there was a marked rise in rectal temperature and an increased amount of body activity, which if permitted reached a convulsive level.

In order to locate possible sites of action of morphine in the central nervous system, electrolytic lesions were placed stereotactically in the caudal hypothalamus and upper tegmentum in ten cats. Four of the animals in which the lesions were presumably not in critical areas, showed a nearly normal postoperative behavior, and their reactions to morphine were those seen characteristically in normal animals. Six animals showed loss of temperature control and chronic somnolence post-operatively, and in these animals the response to morphine injection was greatly altered; hyperthermia and hyperactivity did not appear.

A cataleptoid state was present in some of the operated animals of both groups and appeared independent of other behavior patterns. This condition did not seem to affect the animal's reaction to morphine. (Authors' abstr.)

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Migraine as a Form of Neurasthenia.

Upon comparison of the characteristics of neurasthenia and migraine the following similarities can be found:

1. On the one hand, an increased excitability of the nervous system in respect to external and internal stimuli, and, on the other, an abnormally rapid onset of exhaustion. Associated in some degree are the following characteristics:
2. The autonomic system is not autonomous; and
3. There is a considerable fluctuation in the organic functions, particularly in the brain and digestive tract.

This is associated with two further characteristic group syndromes which are:

- (a) The typical psychic changes with tendency to states of depression; and
- (b) the neurasthenic gastro-intestinal disturbances.

4. The onset of the attack commences with a morning disorder.

5. *Cyclus diae inversus.*

6. Sleep as a cause of this cycle and these functional disturbances.

In migraine all these symptoms of neurasthenia are supplemented by one additional symptom, the headache.

Hence migraine should be regarded as being a special form of neurasthenia plus headache. (Author's abstr.)

Sexual Behavior after Lobotomy.

A series of 40 patients was interviewed at intervals of six months to four years after lobotomy for the purpose of determining changes in sexual behavior. They were specifically questioned in regard to sex drive, inhibition, phantasies, type of

sexual activity, subjective response and moral and religious attitudes. An attempt was made to correlate these features with the patient's clinical condition and work adjustment.

As might be expected, evaluation was difficult because of unknown effects of long hospitalization and long duration of illness.

In 4 patients, the sexual behavior after operation was such as to involve them in social difficulties. One of the patients had been a sexual psychopath before the onset of her psychosis with a return to promiscuous behavior after operation. Two patients who remained psychotic after operation were in constant difficulty because of their unbridled sexual verbalizations. Only one patient became a social problem after operation who had not been one before operation. This is the only instance in which it can be conjectured that the operation produced characteristics similar to those found in psychopathic personalities.

Homosexuality did not arise anew after lobotomy in *any* of the authors' series. Two patients with troubling homosexual phantasies preoperatively were completely relieved of those phantasies postoperatively. A third patient retained his homosexual phantasies after operation with minimal guilt and no anxiety. He did not act out his homosexual phantasies.

Although there were many variations in form of sexual expression, the predominant prelobotomy mode of sexual activity was maintained after lobotomy. Of 14 patients who were heterosexual before operation, 10 continued after operation, 1 became auto-erotic, and 3 denied sexual indulgence altogether. Of 6 patients who were predominantly auto-erotic before operation, 4 continued autoeroticism, 1 of whom added heterosexual activity. Two of the 6 gave up auto-eroticism and confessed no sexual activity. Of 6 patients who practiced both auto-eroticism and heterosexuality before operation, 1 continued as before, 1 practiced only auto-eroticism, 3 became solely heterosexual and 1 denied sexual activity.

A decrease in feelings of guilt, modesty and anxiety in connection with sexual activity was a striking phenomenon. This was more apparent in terms of personal restraints such as shame and abashment than in social restraints.

On the basis of the subjective report of the phantasy life of the patients, one must assume that phantasies are impoverished after lobotomy. In 15 patients, phantasies became less frequent and less vivid. Twenty-three denied phantasies; and only 2 patients described them as being more vivid. Several patients reported dreams after operation. Two patients reported dreams with manifest sexual content.

The degree of pleasure derived from sexual practices was reported by 20 patients; 1 felt there was no change in his enjoyment of sex, 12 had less pleasure and 7 had more.

Patients who were apathetic, and lacking in spontaneity usually had decreased sexual interest. However, no clear-cut correlations could be made between sexual functioning, and independent appraisal made by another group of workers, of the work adjustment, community adjustment and over-all clinical picture after lobotomy.

In general, patients and relatives reported that preoperative moral, social and religious attitudes continued to operate after lobotomy, even though there was a reduction in guilt, modesty and embarrassment in association with sexual activity. (Authors' abstr.)

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Self-Inflicted Prefrontal Lobotomy. Report of a Case.

The personality change noted in this patient is similar to that in those having surgical lobotomies in that there was an increase of self-indulgence and egoism,

restriction of activity due to inertia, and loss of drive and spontaneity with a decrease in apprehension, worry, insomnia and nervous tension. However, the anorexia with the return of depression and suicidal thoughts (although diminished), and the inappropriate affect are symptoms not encountered in successful surgical leukotomy. The expression aphasia, persistence of incontinence and her marked concern and awareness of thinking disturbance are suggestive of brain damage of greater extent than a lesion entirely confined to the prefrontal area. However, Watts and Freeman state that if sufficient white matter is not cut, the worry, nervous tension and depression are not permanently relieved; and in many cases, repeated leukotomies were done to alleviate these symptoms. It is felt that although extensive brain damage occurred in this case, an insufficient amount of white matter was destroyed to produce a satisfactory result in combating her psychosis. In one of the cases, similar to the present case, reported by Ardenghi, a supplementary surgical procedure was done to obtain a more satisfactory leukotomy. (Authors' abstr.)

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An Evaluation of the Technic and Results of the Radioactive Diiodo-fluorescein Test for the Localization of Intracranial Lesions. <i>Ashkenazy, M., et al.</i>	300

Focal Epilepsy of Psychomotor Type. A Preliminary Report of Observations on Effects of Surgical Therapy.

1. A preliminary report is made regarding focal epilepsy of psychomotor type with reference to the effects of extensive gyrectomies and anterior temporal lobectomies.
2. Clinical, electroencephalographic and electrocorticographic studies show close correlation, indicating localization in the anterior temporal areas.
3. Gross or microscopic pathology was found in association with the electrographic disturbances in the anterior portion of the affected temporal lobe in 14 of the 23 patients. Tissue was not removed in 1 case. In general, these patients were benefited more by surgery than those in whom no pathology was found.
4. In selected cases of psychomotor epilepsy, temporal lobectomy, anterior to the acoustic receptive cortex, appears to be more effective than lobotomy or gyrectomy.
5. The neurologic deficits following anterior temporal lobectomy in this series are described.
6. Of 23 patients, 12 have had no psychomotor seizures postoperatively.
7. The effects of anterior temporal lobectomy on seizures, E.E.G. and mental status are reported. Clinical elements that appear to be associated with favorable and unfavorable results are discussed.
8. Whereas many years must elapse prior to formulation of definite conclusions, it appears that radical excision offers hope for selected patients who have definite

clinical and electrographic localisation and whose attacks are not controlled by medications. (Authors' abstr.)

The Experimental Application of Ultrasonics to the Localization of Brain Tumors. Preliminary Report.

1. Pulsed ultrasonic vibrations have been sent through normal and neoplastic cerebral tissues.

2. The texture of the neoplastic cerebral tissues is such that the ultrasonic response is approximately twice that of normal cerebral tissue.

3. Subcortical cerebral neoplasms have been located in post-mortem material by this method of investigation.

4. Pulsed ultrasonic vibrations of this frequency did not produce demonstrable damage in the cerebral hemispheres of experimental animals.

(Authors' abstr.)

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An Investigation into the Effects of Glutamic Acid on Human Intelligence.

Two groups of mentally defective adults, one group of mentally defective children, and two groups of normal boys, were divided each into an experimental and a control section. Before and after treatment with glutamic acid or with an indifferent substance, each subject was given verbal, performance, and personality tests. After the second test administration each subject was transferred to the opposite section for a further period of treatment, at the end of which the tests were administered for a third time. The results of the cognitive tests provided no evidence in favour of the hypothesis that glutamic acid improves cognitive functioning, except in one group of normal boys, whose findings yielded slight but equivocal evidence in favour of the hypothesis. For the additional hypothesis; that scores on the personality tests would be improved, there was no evidence.

(Authors' abstr.)

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Strychnine Facilitation of Pressor Responses Evoked from Cerebral Cortex. <i>Hoff, E. C., et al.</i>	167

Changes in Excitability of Cerebral Cortex Following Single Electric Shock Applied to Cortical Surface.

The excitability of cortical neurons has been studied by means of local cortical potentials elicited either by a single electric shock applied to the cortical surface or by an afferent stimulation. Consequent to a single electric shock the cortical neurons underwent a period of refractoriness followed by a prolonged secondary depression. The degree and duration of the secondary depression varied with stimulus strength and the number of cortical neurons previously activated by the conditioning shock. The most severe depression was observed in the cortex locally treated with strychnine.

In the auditory cortex of the cat a single electric shock produced a periodic variation of cortical excitability with a frequency coincidental with that of the corticothalamic reverberating waves. The excitability was increased during the developing phase of the reverberating waves and decreased during the returning phase. The phase relations of the reverberating waves and the fluctuations of the excitability curve of cortex can be expressed mathematically.

It is suggested that the processes of the excitability change of cerebral cortex following a single shock are analogous in basic principles to the excitability change of spinal motoneurons or that of peripheral nerves. (Authors' abstr.)

Organization of the Diffuse Thalamic Projection System.

The diffuse thalamic projection system has been studied in the cat by evoking recruiting responses with thalamic stimulation and determining their distribution with recording electrodes moved systematically through the hemisphere.

The thalamic origins of this system include the centre median, intralaminar, anterior, ventralis anterior and anterior reticular nuclei. These components form a functionally interconnected unit, the excitation of any part of which sets the whole into activity. Radiations leave the thalamus principally from its rostral pole and to a lesser extent laterally, and project in a localized fashion to the caudate nucleus and to the associational cortex of the frontal, cingulate, orbital and suprasylvian portions of the hemisphere. The projection overlaps the motor region but avoids the sensory receiving areas.

The results suggest that the diffuse projection system is organized for mass thalamic influence upon associational cortex. (Authors' abstr.)

MAY.

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- *Location of Receptors for Tonic Neck Reflexes. *McCouch, G. P., et al.* 191
- Delayed Response Performance of Monkeys with Frontal Removals after Excitant and Sedative Drugs. *Blum, J. S., et al.* 197
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- *Characteristics of Responses from Electrogenic Tissue of *Electrophorus electricus*. *Albe-Fessard, D., et al.* 243

Origin of Cerebellar Waves.

A study is reported of the relationships between cerebellar waves and cerebellar neuron spikes as recorded with microelectrodes thrust into the substance of the cerebellar cortex.

Considered from the anatomical point of view, evidence is presented indicating that both waves and spikes originate from structures in the Purkinje cell and/or granule cell layers of the cerebellar cortex.

Functionally, the selective susceptibility of the spike-forming mechanism to cerebellar ischemia indicates that the waves and spikes originate as the result of operation of functionally different mechanisms.

Arguments are presented in favor of the hypothesis that cerebellar waves may

be due to fluctuations of membrane potential not directly associated with conducted nerve impulses. (Authors' abstr.)

Location of Receptors for Tonic Neck Reflexes.

The location of the receptive field for the tonic neck reflexes has been studied in a series of labyrinthectomized, decerebrate cats. Only the responses to rotation of the neck have been studied in the entire series. An inadequate number of observations on the response to tilting the head suggest that the conclusions are also applicable to this reflex.

The response is retained unimpaired after section of all muscles connecting neck or trunk with the head, after bilateral section of muscular and cutaneous branches of the first three cervical nerves, and after resection and denervation of the muscles.

On the other hand, the response is abolished ipsilaterally by unilateral circum-cision of the first three cervical roots at their exit from the ligaments and abolished in all four extremities by bilateral circum-cision, although muscular and cutaneous nerves are left intact. In some animals decerebrate rigidity is lost with the neck reflexes, in others it remains unimpaired.

It is concluded that the reflex is ipsilateral and that the receptive field lies in the region of the upper joints of the neck, especially the atlanto-axial and atlanto-occipital joints. (Authors' abstr.)

Cortical Projection of Vestibular and Facial Nerves in Cat.

1. The cortical receiving area of the vestibular portion of the 8th nerve has been outlined by single shock stimulation of the "isolated" vestibular nerve in the cat.

2. The center of this vestibular sensory area lies in the anterior descending limb of the suprasylvian gyrus. Anteriorly it overlaps the posterior margin of the arm and face tactile receiving areas, and posteriorly it appears to overlap with the anterior margin of the auditory receiving area.

3. The ipsilateral and contralateral cortical projections are symmetrical in extent and location.

4. No cortical projection of possible afferent fibers of the facial nerve could be demonstrated, although one cannot exclude a projection from the nervus intermedius to this cortical region. (Authors' abstr.)

Site and Extension of Bulbar Respiratory Centre.

By means of localized recording of action potentials in respiratory rhythm and of localized stimulation of respiratory structures in the bulbar part of the medulla oblongata, two separate areas were located, a ventro-medial inspiratory part and a dorsolateral expiratory part. The inspiratory area is situated mainly in the reticular substance at the level of the entrance of the vagi; the expiratory area seems connected with the spinal trigeminal root laterally and has medially a course parallel to the solitary tract. (Authors' abstr.)

Characteristics of Responses from Electrogenic Tissue in Electrophorus Electricus.

1. Oscillographic records of discharges of the electric eel *Electrophorus electricus* are described, particularly as regards their temporal characteristics. Each wave of the normal repetitive discharge lasts 2-3 m./sec.

2. Simultaneous recording in two adjacent segments of the electric organ has sometimes revealed a central or precentral origin of the discharge, the wave front of which progresses in two opposite directions.

3. The speed of this progression, although lower than was previously supposed, is still too great to be accounted for by conduction in spinal cord or nerves: 250 m./sec. is a minimum value.

4. Small pieces of electric tissue respond to direct stimulation at threshold by giving brief waves circa 1 m./sec. in duration, which may be considered as the ultimate components of the total wave of discharge.

5. The stimulating current has its maximal effect when it is directed from the anterior to the posterior part inside the organ, i.e., when it is antidromic relative to the discharge.

6. Data on latencies, conduction velocities, spread of components and various types of responses have been picked up in different cases of indirect electric stimulation applied to skin, brain, spinal cord and electric nerves. The thresholds in the nervous structures were always found strikingly high.

7. The organization of the discharge involves an accelerated recruitment of active units in the electric organ. This acceleration seems to be the result of nervous actions and peripheral electric influences according to mechanisms which will have to be rendered more explicit by further studies. (Authors' abstr.)

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Studies in the Physiology of Awareness : Oximetric Evidence of the Role of Anoxia in Certain Psychiatric States.

What would appear to emerge, from the use of oximetric techniques, is that a common factor runs like a thread through the constantly fluctuating patterns of awareness seen in normal life ; in the ever-present minor stresses which make up day-to-day existence ; in the prototypes of major stress demands and the response of our homeostatic mechanisms to those demands ; in the periodicities like sleep which impinge in phasic fashion on our individual pattern of consciousness. This common factor, or thread, is the organism's unique efforts to maintain a level of arterial blood oxygen saturation which represents for him an adequate balance of normal functioning potential and at the same time lies within the critical range of his brother's normal needs.

The author would also suggest that an individual's relative success in the maintenance of such a homeostatic equilibrium with respect to oxygen saturation levels is a function as much as anything of the emotional stability his personality represents—emotionally unstable individuals, such as those with psychoneurosis, being unable to maintain the same sort of relatively stable baseline in the face of life situational stress and responding with wide swings well outside the critical range of functional normality.

Finally the author has seen that schizophrenic individuals who, for one reason or another, have more or less permanently been unable to sustain blood-oxygen saturation levels consistent with the normal range of consciousness, represent a pattern of awareness very similar to that experienced during life at high altitudes or under any other condition of defective oxygen assimilation. Many such patients by voluntary empathic effort, can initially give the appearance of relatively normal awareness but the pall of anoxia soon falls on this, their arterial oxygen drops to the levels of sleep and their mental state conforms once more to Jung's remark about the schizophrenic—that he is a "dreamer in a world awake." The author has seen how the schizophrenic process may be reversed by insulin coma ; such apparent reversal only occurs, in the author's experience, when the delayed effect of this coma is to raise the oxygen saturation levels.

Consciousness at one level or another is a dimension of life for the human personality and to the deviations from its thresholds can be attributed much of the phenomenology seen in psychiatry. If emotional tension be created by a conflict of desires denied expression, awareness falls away and a reality potential tends to be replaced by one of phantasy. At the same time that consciousness is dimmed, anoxia appears ; conversely, when empathy and attention raise the thresholds of anoxia, conscious awareness increases and the oxygen saturation levels parallel its rise. Aside from all this is the significant fact that, with the induction of experimental anoxic anoxia and in step with the consequent fall in arterial oxygen saturation, there follows the sequence of diminishing awareness, uprising of emotional tension and instability, effective lability and that fragmented, chaotic, irresponsible, dream-like pattern of consciousness which is schizophreniform in quality when wakefulness is forced upon him who experiences it, yet whose *alter ego* is natural sleep. (Author's abstr.)

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Mechanism of the Action of Tetraethylthiuram Disulfide in Alcoholism. Iron as Antidote for the T.E.T.D.-Alcohol Reaction.

1. Manometric blood pressure studies in dogs confirmed the fact that an increased acetaldehyde level in blood produces effects similar to those of a sympathomimetic drug and parallels doses of l-epinephrine 1,000 times smaller. This sympathomimetic action of acetaldehyde was verified also by reversing it with an adrenergic blocking agent (C-7337) and by studies on Starling's heart-lung preparation in comparison with l-epinephrine.

2. The action of T.E.T.D. on acetaldehyde or l-epinephrine was to prolong the vasodilating phase, with a pronounced fall in blood pressure, an observation which explains the analogous clinical symptoms described in humans showing toxic reactions to T.E.T.D. and alcohol.

3. It is assumed that the action of T.E.T.D. is to alter the response of specific sympathomimetic receptor cells to the sympathomimetic mechanism of acetaldehyde or l-epinephrine.

4. Injection of iron salts intravenously tends immediately to reverse the phase of prolonged blood-pressure fall in spite of the fact that there is probably no change in the existing blood-acetaldehyde level. This may be explained by the fact that T.E.T.D. easily combines with heavy metals to form insoluble compounds, thus eliminating its action on the specific vasodilating receptor cells of the sympathetic system, without affecting the inhibitory action of T.E.T.D. on the oxidation of acetaldehyde. (Author's abstr.)

The Effect of Tetraethylthiuram Disulfide on the Metabolism of Ethyl Alcohol.

The authors believe that two facts regarding the effect of T.E.T.D. on the metabolism of ethyl alcohol have been demonstrated by this research. First, T.E.T.D. certainly does not accelerate the rate of metabolism of alcohol; indeed, in some cases it may retard it. Second, T.E.T.D. slows the rate of metabolism of acetaldehyde, whether formed in the intermediary metabolism of ethyl alcohol or introduced directly into the body. This slowing does not occur in all animals.

Whether the slowing of acetaldehyde metabolism, with the consequent increase in blood acetaldehyde concentration, is or is not responsible for the clinical effect of T.E.T.D. is neither proved nor disproved by this work. This question can be decided only by research with human subjects. (Authors' abstr.)

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1. Pharmacology and Treatment.

Electroencephalographic Changes in Experimental Convulsions Caused by Divided Injections of Metrazole. *Muller, Heinz W.* (Univ. Munster i W., Ger.). [*Z. ges. exper. Med.*, **116**, 318-26 (1950).]

In rabbits divided doses of 6 mg./kg. of metrazole (total dose 50 mg./kg.) caused a progressive increase of the amplitude of the basal rhythm. The frequency shifted to the upper limit of the normal range. After the crisis the waves returned to normal.
 J. H. WEISBURGER (Chem. Abstr.).

Narcotics and the Inorganic and Creatine Phosphates of Mammalian Brain. *Buchel, L., and McIlwain, H.* (Maudsley Hosp., London). [*Brit. J. Pharmacol.*, **5**, 465-73 (1950); cf. *C. A.*, **44**, 10912i.]

The brain of guinea pigs, narcotized by chloral (I), contains 6-10 mg. per cent. of (I) which is comparable to the concentration of (I) in the blood at the same time. (I) caused no changes in the inorganic phosphate (II) and creatine phosphates (III) *in vitro* in respiring slices of guinea pig brain when present in tissue concentrations of 10-20 mg. per cent. Tissue concentrations of (I) of 30-100 mg. per cent. which inhibited respiration, decreased (III) and increased (II). Concentrations of dial or neonal which inhibited respiration affected (II) and (III) similarly. The *in vitro* inhibition of respiration caused by narcotics had very different characteristics from that observed *in vivo* where (III) is raised and (II) is lowered. It is concluded that the biochemical changes found *in vivo* are a result of depressed functional activity caused by the narcotic.

RICHARD F. RILEY (Chem. Abstr.).

Effects of Various Drugs upon Cerebral Circulation and Metabolism in Man. *Shenkin, Henry A.* (Univ. of Pennsylvania, Philadelphia). [*J. Applied Physiol.*, **3**, 465-7 (1951).]

Caffeine (0.46 g. as the Na benzoate) increased the cerebrovascular resistance of patients recently operated upon for brain tumors, reduced the cerebral blood flow 15.6 per cent., but had little effect on the cerebral O consumption. Papaverine, 0.6 g. (as the HCl), given to patients prejudged to have slowed cerebral circulation, caused relaxation of the cerebral vasculature and reduced the mean arterial pressure and 0.7 mg. histamine base in 174 c.c. normal saline caused a decrease in the cerebrovascular resistance which correlated with the reduction of systemic blood pressure. Benzedrine given to 2 stuporous patients with slowed cerebral circulations caused no change in cerebral blood flow nor in cerebral O consumption.

THERESA McKEE (Chem. Abstr.).

Permeability of Dura Mater to Epidural Procaine in Dogs. Rudin, Donald, O., Fremont-Smith, Kenneth, and Beecher, Henry K. (Harvard Med. School, Boston). [*J. Applied Physiol.*, **3**, 388-98 (1951).]

Epidural procaine anesthesia for the production of reversible, peripheral deafferentation of the spinal cord of dogs was used to study a part of the central nervous system temporarily devoid of sensory inflow from the periphery. From 2 to 3 per cent. procaine-HCl injected into the epidural space was found in the subarachnoid space (I) in concentrations of 0.3-0.8 mg./c.c. This occurred as the result of direct penetration of the nontraumatized dura and was not secondary to procaine in the blood stream. With anesthetic concentrations of epidural procaine (2-3 per cent.) the resulting amounts in (I) exerted an effect on the spinal cord.

THERESA MCKEE (Chem. Abstr.).

Effect of Certain Analgesic Drugs and Adrenal Cortical Hormones on the Brain of Normal and Hypophysectomized Rats as Measured by the Thiobarbituric Acid Reagent. Zauder, Howard L. (Duke Univ., Durham, N.C.). [*J. Pharmacol. Exptl. Therap.*, **101**, 40-6 (1951).]

Morphine (I), meperidine (II), methadone (III), and adrenaline (IV) when injected into rats daily for several days increased the ascorbic acid-catalyzed oxidation of linolenic acid in the brain homogenate as measured by the thiobarbituric acid (V) test procedure of Bernheim, *et al.* (*C. A.*, **42**, 5060d). Codeine, dionine and apomorphine caused a lesser increase. Cocaine, Na salicylate and pentobarbital had no effect. In hypophysectomized rats (I), (II), (III) and (IV) caused no change in (V) test values although they still produced analgesia. Injection of adrenal cortical extract increased the brain (V) test values in intact and hypophysectomized rats. (I), (II), (III) and (IV) caused no change in (V) test values although they still produced analgesia. Injection of adrenal cortical extract increased the brain (V) test values in intact and hypophysectomized rats. (I), (II) and (III) thus apparently cause a release of adrenocorticotrophic hormone from the hypophysis. It is suggested that there may be some parallelism between certain central effects produced by the adrenal cortical hormones, and the drugs which cause their release, and the reaction measured by the (V) test.

L. E. GILSON (Chem. Abstr.).

Blood Adrenaline in Electroshock. Kinzius, Hansjorg, and Hann, Joseph (Max-Planck Inst. Arbeitsphysiol., Dortmund, Ger.). [*Deut. Z. Nervenheilk.*, **165**, 80-9 (1951); *cf. C. A.*, **44**, 4572e.]

Adrenaline (I) was determined in blood, taken by indwelling catheters from the vena cava, above and below the adrenal vein, before, during and after electric shock. In the first phase after the shock there was inhibition of (I) formation and increased consumption in the peripheral tissues. In the second phase there was excessive secretion of (I) by the adrenals and larger consumption. In the third phase the concentration of (I) returned toward normal, usually reached at 10-12 minutes after the shock.

WARREN M. SPERRY (Chem. Abstr.).

Alcohol-barbiturate Synergism. Ramsey, Helen J., Pinschmidt, N. W., and Haag, H. B. (Med. Coll. of Virginia, Richmond). [*Trans. Am. Therap. Soc.*, **46**, 54 (1946).]

In mice, 4 c.c. per kg. of EtOH increased the toxicity of seconal by almost 50 per cent. (on LD₅₀ values), and the toxicity of barbital and pentobarbital to about the same extent. In dogs, EtOH decreased the anesthetizing dose of pentothal, and anesthesia was markedly prolonged. In the rabbit, picrotoxin was very effective in counteracting pentobarbital but was less effective in the presence of EtOH. Applications to medical toxicology are discussed.

W. C. TOBIE (Chem. Abstr.).

Effects of Atropine on Brain Respiration. Cavanaugh, D. J. (Univ. of Chicago). [*Proc. Soc. Exptl. Biol. Med.*, **75**, 607-10 (1950).]

Atropine sulfate 0.001-0.01 M inhibited respiration of rat brain homogenates as much as 40 per cent. under optimal conditions. This effect was partially revers-

ible by acetylcholine under certain conditions. The degree of inhibition increased with the pH in the range pH 6–8. The ultraviolet absorption spectrum of atropine sulfate showed slight changes in the same pH range.

L. E. GILSON (Chem. Abstr.).

Sites and Mechanisms of Action of Morphine and Related Drugs in the Central Nervous System. Wikler, Abraham (U.S. Public Health Service Hosp., Lexington, Ky.). [*J. Pharmacol. Exptl. Therap.*, **100**, No. 4, Pt. 2; *Pharmacol. Revs.*, 435–506 (1950).]

L. E. GILSON (Chem. Abstr.).

2. Biochemistry, Physiology, etc.

Tannic Index of Serum Proteins for the Determination of Total Proteins in the Cerebrospinal Fluid. Ravier, H. (*Ann. biol. clin. (Paris)*, **8**, 604–6 (1950).)

To 0.5 c.c. of cerebrospinal fluid in a centrifuge tube, add 1.5 c.c. physiological saline and 0.5 c.c. of tannin in phenol (0.40 g. tannin and 0.10 g. phenol in 100 c.c. H₂O). Add a MgSO₄ crystal and stir the mixture. Heat until a precipitate begins to form. Centrifuge and decant the supernatant. Wash the precipitate with 4–5 c.c. saline, centrifuge, and combine the supernatant with the preceding one. Add to the pooled solutions 2 drops 10 per cent. NH₄ molybdate. Make up to 10–15 c.c. with H₂O. The resulting yellow color (representing excess tannin) is measured in a spectrophotometer using a blue filter. The results are referred to a standard curve, based on a mixture of serums of known protein concentration.

T. J. WINNICK (Chem. Abstr.).

Method for Application of the Abderhalden Reaction to the Cerebrospinal Fluid. Elsaesser, K. H. (*Univ. Halle, Ger.*). [*Allgem. Z. Psychiat.*, **124**, 228–35 (1949).]

The Abderhalden protective enzyme reaction is more easily applied to the cerebrospinal fluid (C.S.F.) than to urine: To 2 ml. portions of C.S.F. are added 0.5 ml. portions of suspensions of substrates prepared from different parts of the brain. The mixtures are incubated at 37° for 6 hours and filtered. To 0.5 ml. of the filtrate is added 0.1 ml. of 1 per cent. ninhydrin (I), the solution is heated at 82° for 6–9 minutes, and the color is read. The success of the method depends on the proper preparation of the substrate which must give no (I) reaction and be in a finely divided suspension.

WARREN M. SPERRY (Chem. Abstr.).

Results Obtained by Application of the Abderhalden Reaction to Cerebrospinal Fluid. Flügel, F. (*Univ. Halle, Ger.*). [*Allgem. Z. Psychiat.*, **124**, 266–78 (1949).]

The method of Elsaesser (*C. A.*, **45**, No. 3900f) was applied to over 2,000 samples of cerebrospinal fluid from patients with various diseases of the central nervous system. The reaction was positive in 41 per cent. of all cases and no correlation with any disease or with any part of the brain, used as substrate, was evident.

WARREN M. SPERRY (Chem. Abstr.).

The Electromotive Action of Acetylcholine at the Motor End-plate. Fatt, P. (*Univ. Coll., London*). [*J. Physiol. (London)*, **111**, 408–22 (1950).]

While testing the hypothesis that acetylcholine (AcCh) exerts a polarizing effect at the motor end-plates of muscle fibers by increasing the end-plate membrane selective permeability to Na ions, the effects of AcCh under decreased Na concentrations were studied in the skeletal muscle of the frog *Rana temporaria*. AcCh continued to produce a local depolarization at the end-plate of muscles bathed in Na-free solutions, despite loss in mechanical response. Na ions appear to augment the depolarizing effect of AcCh, even in concentrations below that needed for propagated impulses, but are not essential for this depolarizing effect. Increased AcCh concentration in Na-free solutions containing prostigmine bromine (as anticholinesterase), resulted in higher depolarizing effects during the first 10 seconds. The theoretical significance of AcCh and end-plate depolarization is discussed in terms of direct penetration of the end-plate membrane by AcCh cations.

MORRIS ROCKSTEIN (Chem. Abstr.).

- Factors Affecting the Synthesis of Acetylcholine by Brain Slices.* McLennan, Hugh, and Elliott, K. A. C. (McGill Univ., Montreal, Can.). [*Am. J. Physiol.*, **163**, 605-13 (1950).]

The acceleration of the synthesis of acetylcholine by rat brain slices by high K concentration was confirmed. Addition of acetylcholine to the medium does not depress, but sometimes increases the rate of synthesis. In the presence of high K⁺ concentration, lack of Ca⁺⁺ markedly inhibits acetylcholine synthesis. Maximum synthesis occurs at about 1.3 mM Ca⁺⁺, and further increase of Ca⁺⁺ concentration is inhibitory. Mg⁺⁺ has similar but much smaller effects. The CO₂-bicarbonate buffer system is required for maximal synthesis. Any deviation from normal plasma concentrations of CO₂, bicarbonate, or H⁺ depresses synthesis. Pyruvate, oxalacetate, and citrate strongly inhibit synthesis in a glucose-containing medium.

E. D. WALTER (Chem. Abstr.).

- The Mechanism of Synthesis of Acetylcholine. II. The Synthesis of Citrate by Brain Enzymes.* Persky, Harold, and Guzman Barron, E. S. (Univ. of Chicago). [*Biochem. et Biophys. Acta*, **5**, 66-73 (1950) (in English); cf. *C. A.* **41**, 2090f.]

Water soluble preparations from acetone-dried rabbit brain in the presence of citrate (I), yeast juice (II), choline, Mg, K, and adenosine triphosphate (A.T.P.) carry out the following two reactions: (1) (I) \rightleftharpoons oxalacetate (III) + "active" acetate; (2) "active" acetate + choline \rightleftharpoons acetylcholine (IV). (III) was identified and the reversibility of (1) was shown by (I) synthesis in the presence of enzyme (III), acetate (II), Mg, and A.T.P. Conclusion: citrogenase catalyzes (1); Mg is probably prosthetic group of the enzyme. NaF, necessary for (IV) synthesis, had no effect on (III) formation from (1). p-Chloromercuricbenzoic acid and methylbis (2-chloroethyl)amine inhibit (IV) but not (III) formation. Rabbit brain preparations contain aconitase and phosphatase. Dog brain preparations contain acetylphosphate phosphatase and adenosinetriphosphatase.

J. R. PORTER (Chem. Abstr.).

- Effect of Adrenocorticotrophic Hormone (A.C.T.H.), Cortisone and Desoxycorticosterone on Brain Excitability.* Woodbury, Dixon M., Sayers, George, Marti, L. A., and Wilhelmson, Paul C. (Univ. of Utah, Salt Lake City). [*Proc. Soc. Exptl. Biol. Med.*, **75**, 398-403 (1950); cf. *C. A.*, **43**, 7146a; **44**, 4989a.]

Desoxycorticosterone acetate (D.C.A.) decreases brain excitability in rats as shown by elevation of the electroshock seizure threshold. Cortisone has the opposite effect. A.C.T.H. alone, 1 mg. 3 times daily, first lowers then slightly raises the threshold. Both A.C.T.H. and cortisone antagonize the action of D.C.A.

L. E. GILSON (Chem. Abstr.).

- A Cytoplasmic Constituent of Brain.* Dixon, K. C., and Herbertson, B. M. (Univ. Cambridge, Engl.). [*J. Physiol. (London)*, **3**, 244-7 (1950).]

Cerebral, cerebellar and spinal cord tissue of freshly-killed rabbits fixed in 10 per cent. formol saline, and embedded in paraffin wax, revealed a substance in many neurone cell bodies which reacts vividly with periodic acid-leucofuchsin stain of McManus (*C. A.*, **42**, 6873i) without haemalum counterstaining. This chromogenic substance, removable by prolonged boiling in an ethanol-ether mixture, is possibly a glycolipide.

MORRIS ROCKSTEIN (Chem. Abstr.).

- Effect of Intravenous Injections of Casein Hydrolyzate on Electrocardiogram of the Rabbit.* King, R. B., Trufant, S. A., and Ross, C. A. (Washington Univ., St. Louis, Mo.). [*Proc. Soc. Exptl. Biol. Med.*, **75**, 565-7 (1950).]

An enzymic hydrolyzate of casein (intended for intravenous feeding) was found to contain an agent which produced significant changes in the electric activity of the rabbit brain. The agent appears to be a protein fragment which is adsorbed by Amberlite IR-4 and which yields large amounts of glutamic and aspartic acids when subjected to acid hydrolysis.

L. E. GILSON (Chem. Abstr.).

Modifications of the Electroencephalogram Caused by Tetraethylammonium Ion. Jimenez-Vargas, J., and Molins, M. (Facultad med., Barcelona, Spain). [*Rev. espan. fisiol.*, **6**, 125-30 (1950).]

Following intracisternal injections of 0.1 per cent. solutions, it appeared that the brain was affected directly. Lower concentrations caused only slight changes in the graphs.
J. H. WEISBURGER (Chem. Abstr.).

Phenylpyruvic Oligophrenia in the Dark-skinned Person. Fernandes, J. Ferreira (Univ. Minas Gerais, Brazil). [*Brasil-med. (Rio de Janeiro)*, **64**, 225- (1950).]

Urine from a negress gave a positive test for phenylpyruvic acid (dark-green color on addition of a few drops of 5 per cent. FeCl₃; the urine was at pH 4-6).
NELLIE M. PAYNE (Chem. Abstr.).

The Dehydrogenase Action in the Sliced Brain Tissue of the Rat. (1) Tadokora, Tetsutaro, and Saito, Tsuneyuki (Hokkaido Univ.). [*J. Agr. Chem. Soc., Japan*, **18**, 394-6 (1942).]

The nucleotide-type dehydrogenases acted similarly for mannose and glucosamine as the substrate, while the thiazole-type enzymes showed stronger action for mannose than for glucosamine (*C. A.*, **41**, 3139c). The dehydrogenase of the brain of albino rat acted similarly for mannose and glucosamine, and for acetate and glycine; thus it was inferred to be of the nucleotide type. The action of this enzyme was strongest for citrate, medium for mannose, and weakest for mannuronic acid. As the activator, MgCl₂ was most effective, CaCl₂ less effective and AlCl₃ least effective.

(II) Tadokoro, Tetsutaro and Hashimoto, Jizo. *Ibid.*, 1159-60.

Dehydrogenase action in the brain tissue of cod for citrate was accelerated by MgCl₂, and it was weaker for glucosamine than for mannose. The dehydrogenase action of the brain of the albino rats accustomed to lower temperature (-5 to -15°) was compared to that at room temperature (18-20°). The dehydrogenase action of the former for citrate was weaker than that of the latter. When mannose and glucosamine were the substrates, there was no difference in the dehydrogenase action of the brain at lower temperature, but the action of the brain treated at room temperature was greater for mannose than for glucosamine.

S. KAWAMURA (Chem. Abstr.).

Histochemical Studies of Phosphatases in the Nervous System of Thiamine-deficient Pigeons. Shimizu, Nobuo, Handa, Yoshitoshi, Handa, Jiro, and Kumamoto, Tetsuzo (Wakayama Med. Coll., Wakayama-shi, Japan). [*Proc. Soc. Exptl. Biol. Med.*, **75**, 696-9 (1950).]

In thiamine deficiency the nerve cells shrink and acquire increased amounts of alkaline phosphatase, whereas the neuropil shows very little such increase. Acid phosphatase of the axis cylinders and cytoplasm of the nerve cells is diminished. After administration of thiamine to the deficient pigeons a considerable return toward normal is observed. Accompanying restoration of the acid phosphatase, a network similar to the pattern of neurokeratin appears in the myelin sheaths.

L. E. GILSON (Chem. Abstr.).

Shifts in Ammonia Content of the Epileptogenic Zone of the Brain. Budanova, A. M. [*Doklady Akad. Nauk S.S.S.R.*, **75**, 875-6 (1950).]

Determination of NH₃ in frozen (liquid air) brain sections of rabbits and dogs shows an increase (200-300 per cent.) over unfrozen controls. Glutamine shows no significant rise. The sections frozen were those of cerebral cortex in the vicinity of the visual segment.
G. M. KOSOLAPOFF (Chem. Abstr.).

Acetal Phospholipides of Brain. I. Procedure for Isolation of Crystallized Acetal Phospholipide from Brain. Thannhauser, S. J., Boncoddò, Nicholas F., and Schmidt, Gerhard (Tufts Coll., Boston, Mass.). [*J. Biol. Chem.*, **188**, 417-21 (1951).]

Beef brain was dried with Me₂CO and extracted twice with EtOH, first at 37°, then at room temperature. The alcohol extracts were concentrated to dryness, the dried residue was extracted at room temperature with petroleum ether and the residue saponified with 5 volumes N NaOH at room temperature. The saponified emulsion was adjusted to pH 5 with AcOH, cooled and precipitated with 2 volumes Me₂CO. The precipitate was resaponified in the same way, the dried saponified material allowed to stand 2 days at room temperature in 10 volumes ether and centrifuged. The residue was washed with ether, the combined ether solutions were dried, and extracted, with 1:4 alcohol-ether 4 times for 16 hours at room temperature. The extracts were worked up by treatment with Pb subacetate, Amberline XE-58, and Amberlite XE-64. The crystal 1 no. I, 43 (α) $\frac{22}{D}$ 6.25° (c 4, 1:1 CHCl₃:MeOH).

II. *The α-structure of Acetal Phospholipide of Brain.* *Ibid.*, 423-30.

The fatty aldehydes in crystallized acetal α-phospholipide were converted into the corresponding fatty acids. Palmitic and stearic acids were identified by high-vacuum distillation of their Me esters. The compound does not contain unsaturated fatty aldehydes. There is more palmitic than stearic aldehyde.

FELIX SANUDERS (Chem. Abstr.).

Temperature and Convulsive Activity. Teschan, Paul, and Gellhorn, Ernst (Univ. of Minnesota, Minneapolis). *Arch. intern. pharmacodynamie*, **84**, 57-67 (1950).]

In experiments involving increased temperatures, convulsive potentials disappear before normal ones, and usually the spike potentials show progressive decrease in amplitude and frequency before they disappear. This is similar to the action of anoxia. More neurons are damaged by elevated temperature and topically induced convulsive activity than by heat on normal neurons. The frequency of convulsive discharges is much increased by repeated short periods of moderate heating.

M. L. C. BERNHEIM (Chem. Abstr.).

Life Situations, Emotions and the Excretion of Hippuric Acid in Anxiety States. Persky, Harold, Grinker, Roy R., Mirsky, I. Arthur, and Gamm, Stanford R. (Michael Reese Hosp., Chicago). [*Research Pubs., Assoc. Research Nervous Mental Disease*, **29**, 297-306 (1950); cf. *C. A.*, **44**, 7445h.]

Review and discussion of authors' finding of a relation between excretion of hippuric acid, after administration of a test dose of Na benzoate, and emotional status.

W. M. S. (Chem. Abstr.).

Effect of Desoxycorticosterone Glucoside Upon Cerebral Blood Flow and Metabolism in Human Subjects. Bentinck, R. C., Gordan, Gilbert S., Adams, John E., Arnstein, L. S., and Leake, T. B. (Univ. of California, School of Med., San Francisco). [*J. Clin. Invest.*, **30**, 200-5 (1951).]

The effects of desoxycorticosterone glucoside (D.C.G.) upon the cerebral utilization of O₂ in human subjects was studied by the N₂O technique of Kety and Schmidt (*G. A.*, **40**, 7274⁸). Administration of D.C.G. produced a rise in the cerebral venous sugar concentration above the arterial level, indicating that it causes liberation of sugar from the brain. A small but significant increase in arterial glucose concentration also occurred; this suggests liberation of glucose from other sources, possibly the liver. Preliminary data suggest a difference in response to D.C.G. between individuals with normal and with deficient steroidal status. The mean arterial blood pressure, cardiac rate and rate of cerebral blood flow were not altered by D.C.G.

JOHN T. MEYERS (Chem. Abstr.).

Concentration and Distribution of Enkephalin in Brain of Humans and Animals. Raab, W., and Gigg, W. (Univ. of Vermont, Burlington). [*Proc. Soc. Exptl. Biol. Med.*, **76**, 97-100 (1951).]

Colorimetric assay of a large number of human and animal brains for enkephalin (cf. *C. A.*, **42**, 5981c) revealed a rather uniform pattern of intracerebral distribution in various species. No difference was found in the enkephalin content and distribution in brains of normal and psychotic humans. In animals, no major changes were observed under the influence of various hormones, adrenalectomy, hypophysectomy, convulsive drugs, electric stimulation of the brain, narcotics, conditions of stress, acetylcholine and N-free diet. Injection of dihydroxyphenylalanine was followed by a very marked temporary increase of the colorimetric readings, which suggests either a selective absorption of this substance by the brain or its conversion into enkephalin. L. E. GILSON (Chem. Abstr.).

Distribution, Exchange and Migration of Phosphate Compounds in the Nervous System. Samuels, A. J., Boyarsky, L. L., Gerard, R. W., Libet, B., Brust, M., and Hearon, John Z. (Univ. of Chicago). [*Am. J. Physiol.*, **164**, 1-15 (1951).]

The total P of guinea-pig brain, cord and nerve was determined in the fractions: acid-soluble P, phospholipid P, nucleoprotein P and phosphoprotein P. Following intraperitoneal P^{32} injection in single or daily (up to 14) doses, the specific activities of these fractions were determined at intervals up to 36 days after the final injection. Both diffusion of P from plasma to cells and uptake of inorganic P into organic combination are slow, even diffusion equilibrium requiring over 10 days. Malonitrile produced no change in amount or exchange rate of nucleoprotein or other fraction. Nerve section led to halving of phospholipid and doubling of nucleoprotein in nerve and to a sharp increase in exchange rates. Activities of cord were also increased. An anticipated peripheral flow of nucleoprotein along nerve fibers was not revealed by these experiments. Phosphoprotein, however, flowed at a rate of about 3 mm. a day. E. D. WALTER (Chem. Abstr.).

Effect of Generalized Convulsions on the Blood Histamine in Man. Gabraoui, B., and Abdel-Nabi, S. (Kasr-el-Aini Faculty Med., Cairo). [*J. Roy. Egypt. Med. Assoc.*, **33**, 683-7 (1950).]

The plasma histamine level of patients undergoing electrically-induced convulsions was elevated for about 10 minutes after shock therapy.

ERICH HEFTMANN (Chem. Abstr.).

Mental Achievement of Congenitally Hypothyroid Children. Topper, Anne (Mt. Sinai Hosp., New York, N.Y.). [*Am. J. Diseases Children*, **81**, 233-49 (1951).]

In hypothyroidism there is an elevation of blood lipides, especially cholesterol. In young untreated cretins the total cholesterol was occasionally within normal limits. In treated children with hypothyroidism, after withdrawal of thyroid therapy, there was an increased serum cholesterol, which dropped after resumption of treatment with thyroid. FELIX SAUNDERS (Chem. Abstr.).

Action of Malonitrile on the Nervous System. Reale, G. (Univ. Siena, Italy) and D'Argento, L. [*Riv. patol. nervosa e mentale*, **71**, 171-2 (1950).]

The findings of Hyden and Hartelius (*C. A.*, **43**, 2330e) are not confirmed, especially with regard to the increase of nucleic acids. Malonitrile causes a toxic degenerative process in the nervous cells. C. SCANDURA (Chem. Abstr.).

Decarboxylation of L-glutamic Acid by Brain. Wingo, Wm. J., and Awapara, Jorge (Univ. of Texas, Austin). [*J. Biol. Chem.*, **187**, 267-71 (1950).]

Aqueous homogenates of rat brain contain a glutamic acid decarboxylase (I) as indicated manometrically by the production of CO_2 under anaerobic conditions, and the parallel increase in γ -amino-butyric acid shown by paper chromatography (I) is active in homogenates for 2 hours and has a pH optimum of 6.8. It is inhibited by 10^{-4} M HCN hydroxylamine and semicarbazide, but not by octyl alcohol. Aspartic acid is not decarboxylated by (I). LEONARD J. COLE (Chem. Abstr.).

Hemolytic Acid Present in Horse Brain. I. Purification and Identification as cis-11-octadecenoic Acid. Morton, I. D., and Todd, A. R. (Univ. Cambridge, Engl.). [Biochem. J., 47, 327-30 (1950).]

Free fatty acids of brain were isolated by EtOH extraction, the unsaturated fraction was obtained by precipitation with Pb salts, and was further fractionated by molecule distillation. The earlier fractions revealed most of the hemolytic activity. By further fractional crystallization at low temperature it was determined that the activity is practically entirely in the monoethylenic fraction. The hemolytic acid is identified as *cis*-11-octadecenoic acid not previously found in nature. The *cis*-11-octadecenoic acid was prepared synthetically and this also had the hemolytic properties of the natural acid.

II. Examination by the Insoluble Monolayer Technique. Goddard, E. D., and Alexander, A. E. *Ibid.*, 331-4.

The *cis*-configuration has been determined from the monolayer properties of the hemolytic fatty acid which, it is thought is a mixture of oleic and *cis*-11-octadecenoic acid.

Appendix. X-ray Examination of the Hemolytic Fatty Acid. Goddard, E. D., and Perutz, M. F. *Ibid.*, 334-5.

The x-ray photographs of built-up multilayers of hemolytic acid show the same layer spacing as those obtained with *cis*-11-octadecenoic acid.

S. MORGULIS (Chem. Abstr.).

Respiration and Phosphorylation in Preparations from Mammalian Brain. Case, E. M., and McIlwain, H. (Maudsley Hosp., London). [Biochem. J., 48, 1-11 (1951).]

The main end products of *in vivo* (also of *in vitro*) metabolism of glucose in the brain are lactic acid and CO₂. In the brain, as elsewhere, oxidative phosphorylation forms a link between functional activity and the metabolism which supports such activity. These experiments aim at a determination of the balance between lactic acid and CO₂. By using dialyzed brain homogenates, conditions were determined for securing maximum P/O ratios (atoms inorganic P esterified/atoms O absorbed). Chloral lowered both with little change in the P/O ratio, but 2, 4-dinitrophenol (with little lowering, and even occasionally raising the respiration) greatly decreases the P/O ratio. Ethyl red is somewhat intermediate in its effect, and phenosafranine lowers P/O with variable action on the respiration. A system was also devised with diluted but undialyzed homogenates, and adenosine-5-phosphate as P acceptor (P/O ratios 0.6 to 1.8) in which 2, 4-dinitrophenol (also NaN₃) inhibited phosphorylation but had little action on respiration. (More or less similar effects were obtained also with phenosafranine, diazine green, neutral green and nicotine.)

S. MORGULIS (Chem. Abstr.).

The Aldehydes of the Acetal Phosphatides of the Brain. Leupold, Friedrich (Univ. Cologne, Ger.). [Z. Physiol. Chem., 285, 182-200 (1950).]

The aldehydes of the acetal phospholipides of the brain were isolated as the dimethyl acetals in almost quantitative yield. The aldehydes were identified as *cis*-11-octadecenal and *cis*-9-octadecenal. Palmitaldehyde, stearaldehyde and myristaldehyde also occur in small amounts. FELIX SAUNDERS (Chem. Abstr.).

Identification of γ -aminobutyric Acid in Brain by the Isotope Derivative Method. Udenfriend, Sydney (Washington Univ., St. Louis, Mo.). [J. Biol. Chem., 187, 65-9 (1950).]

The S³⁵-labelled pipsyl derivative of γ -aminobutyric acid (I) was prepared by treating 25 mg. of (I) with S³⁵-labelled p-iodophenylsulfonyl chloride (pipsyl chloride). An alcohol extract of mouse brain was treated with 10 mg. of iodine¹³¹-labelled pipsyl chloride. Paper chromatograms of each of the radioactive derivatives were developed with BuOH saturated with N NH₄ OH. The bands were located by radioautography, and each band was cut into several transverse segments. Each segment was eluted with water, transferred to a planchette, and dried. The

elutions need not be quantitative since calculations are based on the ratio of one isotope to the other. The samples are counted with and without a 0.003 inch Al absorber, which passes 40.2 per cent. of iodine¹³¹ radiation (F_s), and 0.08 per cent. of S³⁵ radiation (F_s). The proportion of each isotope in any sample is calculated from the simultaneous equations: $I^{131} + S^{35} = \text{counts without Al absorber}$ and $(F_1)I^{131} + (F_2)S^{35} = \text{counts with Al absorber}$, where I^{131} and S^{35} represents the number of counts due to the respective isotopes. A constant ratio throughout the band indicates homogeneity, and therefore identifies the iodine¹³¹-labelled compound. The brain extract yielded 3 bands on the chromatogram. The major band coincided with the synthetic sample of pipsyl- γ -aminobutyric acid, and the proportion of the 2 isotopes was constant throughout.

LEONARD J. COLE (Chem. Abstr.).

Nitrogen Metabolism in the Brain in Tetanus. Promyslov, M. Sh., and Pletsityi, D. F. (Inst. Gen. and Exptl. Pathol., Acad. Med. Sci. U.S.S.R., Moscow). [Doklady Akad. Nauk S.S.S.R., 70, 271-3 (1950); cf. C. A., 43, 7122b.]

Injection of a fatal dose of tetanus toxin subcutaneously into a rabbit leg leads to no significant deviation from normal protein and lipide metabolism in the first 3-4 days, i.e., during symptoms of localized tetanus. In later stages, when tetanus is general, some increase of the rate of degradation of proteins and lipide substances is noticed (about 7-9 per cent. increase), which never reaches the levels shown in diphtheria intoxication. The increase of residual N in the brain is the result of the decline of phosphatides, cerebrosides and related N-containing lipide substances, with consequent decline of the ratio of lipide substances, with consequent decline of the ratio of lipide N to total N (to 10-10.7 per cent. compared to normal 12.2-12.6 per cent.). The essentially normal metabolism of brain protein may be due to the absence of an attack on the nerve cells, while the high rate of lipide degradation may be caused by enhanced activity of these cells.

Ibid., 74, 1117-18 (1950).

Subcutaneous injection of tetanus toxin (between the ears) into rabbit in toxic dosage leads to lowering of protein and lipide in the brain, increase of rate of breakdown of proteins and lipides, lowering of lipide N (as a fraction of total N), especially noted at the height of the disease (5-7 days). On the whole, N-containing lipide breakdown increases more intensively than the same phenomenon occurring in general tetanus. No changes in the spinal cord are noted.

G. M. K. (Chem. Abstr.).

Silver Impregnation of Degenerating Axon Terminals in the Central Nervous System. Nauta, W. J. H., and Gyax, P. A. (Fed. Inst. Technol., Zurich, Switz.). [Stain Technol., 26, 5-11 (1951).]

A new Ag technique especially suitable for demonstrating terminal degeneration within the central nervous system is described. Some of the chemical principles underlying the process of reductive liberation of metallic Ag from ammoniacal AgNO₃ solutions are discussed.

W. B. ESSELEN, JR. (Chem. Abstr.).

Synthesis of Silver Proteinates for Neurological Staining. Porter, Robert W., and Davenport, H. A. (Northwestern Univ. Med. School, Chicago). [Stain Technol., 26, 1-4 (1951).]

Soluble derivatives of the AgNO₃ precipitates of various split protein products were prepared by dissolving the precipitate in a 30-40 per cent. aqueous solution of pharmaceutical peptone (Cudahy). The split proteins used included pepsin, trypsin and papain digests of albumin, globulin, gelatin, casein, protamine; tissue proteins from heart, liver and brain; an *Escherichia coli* digest of casein; and com. products, Amigen (Mead), casein hydrolyzate (Squibb) and pharmaceutical peptone (Cudahy). Only redissolved Ag precipitates of pharmaceutical peptone and bacterially digested casein stained axis cylinders selectively. The manner of degrading a protein prior to combining it with Ag was the most important factor in determining the subsequent staining reaction.

W. B. ESSELEN, JR. (Chem. Abstr.).

The Effect of Ammonium Chloride upon the Electroencephalographic Changes in Toxemia of Late Pregnancy. Preliminary Report. Parviainen, S., Temmes, Y., and Soiva, K. (Univ. Helsinki, Finland). [*J. Obstet. Gynaecol. Brit. Empire*, **57**, 780-5 (1950).]

In 6 toxemic patients the hyperventilation test, causing respiratory alkalosis, aggravated the electroencephalographic changes. In 2 cases with a severe sub-convulsive state the changes nearly disappeared during a treatment of a few days with NH_4Cl .
RACHEL BROWN (Chem. Abstr.).

Chemical Studies on Peripheral Nerve During Wallerian Degeneration. (II) Lipides After Nerve Crush (Axonotmesis). Burt, N. S., McNabb, A. R., and Rossiter, R. J. (Univ. Western Ontario, London, Can.). [*Biochem. J.*, **47**, 318-23 (1950); *cf. C. A.*, **44**, 3130a.]

Studies on the sciatic nerves of cats were made at intervals of 16-144 days following axonotmesis. The wet weight of the nerves increased following the operation reaching a maximum in 32 days. By the end of 144 days the weight returned to normal. The total lipide content decreased during the first 16 days then, after a stationary period, it increased gradually from the 48th day on but remained below that of the control even after 144 days. Neutral fat also decreased during the first 16 days but became normal again by the end of 48 days. The myelin lipides, including cerebrosides, free cholesterol, and sphingomyelin decreased for 32 days, then remained stationary for the next 64 days, when they began to rise gradually but even after 144 days were still only 44 per cent. of the concentration found in control nerves. The free cholesterol behaved like the myelin lipides except that the injured nerves contained cholesterol esters (not found in normal nerves) which, however, completely disappeared by the 144th day. The total phospholipide and sphingomyelin followed the same course as the myelin lipides, but cephalin was decreasing more rapidly and lecithin more slowly, and the latter was not restored beyond the concentration attained after 64 days.
S. MORGULIS (Chem. Abstr.).

Brain Metabolism In Vivo. (II) The Distribution of Lesions Caused by Azide, Malononitrile, Plasmocid and Dinitrophenol Poisoning in Rats. Hicks, Samuel P. (New England Deaconess Hosp., Boston, Mass.). [*Arch. Path.*, **50**, 545-61 (1950); *cf. C. A.*, **44**, 7430h.]

In white rats, acute azide poisoning caused lesions mainly in the corpus callosum, corpus striatum and optic tracts. Malononitrile caused lesions in the corpus striatum. Plasmocid and 2, 4-dinitrophenol damaged skeletal and heart muscle, and the former, but not the latter, produced lesions in the trigeminal ganglion.
M. L. C. BERNHEIM (Chem. Abstr.).