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The Horn-Hellersberg Test and Adjustment to Reality.

A performance test is presented which uses a set of given lines and squares for drawing pictures. The individual must adapt his subjective images to objectively given material. This process of using inner impulses in adapting to outer necessities is a fundamental function of our life process. It changes with the inner conditions of the individual, and develops gradually from childhood to adulthood in a fashion typical for the civilization. The test particularly activates perception, motor activity as drawing, and verbalization. The evaluation may utilize various levels of human functioning, and the validity of the obtained results is believed to derive from the fact that these various levels check and control each other. The test has been devised particularly for the practical working psychologist, as a means to control various environmental and therapeutic influences on the client. The obtained material has various implications for the study of personality. Its analysis has proved specifically helpful for screening out individuals who are at the moment unable to cope with their environment or their given job, and this holds true, independent of the type of disturbance shown by their psychiatric diagnosis. The test can be repeated, and, so far as we have been able to follow it up, always registers changes in the individual's relation to reality.

(Author's abstr.)

An Alternative Short Form of the Wechsler-Bellevue Test.

A statistical survey was made to determine which subtests of the Wechsler-Bellevue could best predict the total score. These tests were found to be the Digit Repeating Test and the Picture Arrangement Test. This short form was found to be superior to the Rabin Short Form, providing particularly for discrimination in the IQ range from 40 to 70, and had a correlation of ·90 with the full scale in 523 cases from a heterogeneous population.

To use the short form: (1) administer the Digit Repeating Test and obtain a weighted score; (2) administer the Picture Arrangement Test and obtain a weighted score; (3) add the two weighted scores and multiply by *five*; (4) use the product obtained above to find the IQ in Wechsler's tables. (Author's abstr.)

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Prolonged Post-traumatic Syndromes following Head Injury.

1. A series of 125 late post-traumatic syndromes have been compared to 70 cases with acute head injuries, 30 cases with brain disease, and 40 psychoneuroses.

2. The common features of late post-traumatic syndromes were the abnormal high score on the neurotic scales of the Minnesota multiphasic personality inventory and the large number of diffuse complaints. Related to the presence of brain damage in chronic head cases were increase in metabolism and muscular tension, decrease of intelligence, delayed return of sugar values to the base line in insulin and glucose tolerance tests, increase in white blood count, insufficient increase of the pulse rate during stress and after injection of epinephrine. Related to the presence of neurotic tendencies were higher intelligence, greater ventilation volume, irregularity of breathing and decrease of endurance to stress.

3. Comparison of late post-traumatic syndromes with acute head injuries and cases with brain disease on the one hand, and psychoneuroses on the other, revealed that chronic head cases without signs of brain damage resemble the psychoneuroses, and often cannot be distinguished from these. Chronic head cases with neurological signs are in many respects closer to the acute cases, and resemble the psychoneuroses less.

4. In late post-traumatic conditions the importance of organic damage to the brain has been widely over-rated. While cases with severe brain lesions improve as time goes on, post-traumatic conditions without signs of cerebral damage tend to become worse. The longer a post-traumatic syndrome lasts, the less likely it is to be an expression of brain damage, and after one year following the accident most post-traumatic conditions constitute personality problems, convulsive disorders excepted.

5. The post-traumatic personality is a determining factor for delayed or definitely postponed recovery following head injury. While overt and social maladjustment is related to accident-proneness, covert maladjustment, conflicts

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and dissatisfaction seem to be associated with prolonged convalescence and post-traumatic physical symptom formation.

6. Abnormal states of mind associated with intoxication, excitement, hatred, fear, guilt or other emotions predispose to accidents. While in some cases the injury may act as a release and solution for an unbearable situation, the environmental conditions and the subject's state of mind after the injury are in many instances the same as before the accident. The same circumstances which may lead to accidents seem therefore to predispose to delayed recovery.

7. While the therapy of convulsive disorders, subdural hematomas, brain abscess, paralysis of cranial nerves and extremities follows traditional lines, the psychiatric treatment of late post-traumatic conditions has to start with the prevention of these syndromes in the acute stage. Attention should be directed at investigation of the state of mind prior to the accident. Pre-traumatic difficulties of adjustment, or immediate post-traumatic signs of anxiety, hysteria, or hypochondriasis should be approached with psychotherapeutic measures. The patient's realization of the presence of pre-traumatic personality difficulties and awareness of the responsibility in the causation of the accident seems to favor recovery. Less successful, but quite amenable to psychotherapy, are cases with post-traumatic syndrome of longer standing, seen weeks or months following the injury.

(Authors' abstr.)

The Memory Function. (1) *A Factorial Study of Fifteen Clinical Types.*

Fifteen individual memory tests and one intelligence test were given to 60 male neurotic army patients at Mill Hill and Sutton Emergency Hospitals. The scores on these 16 tests were intercorrelated, and the resulting table-factor analyzed. The following results were found:

1. All the memory tests correlated positively with the intelligence test, the correlations varying from +0·63 to +0·96.

2. One general factor accounted for all the correlations in the table within the limits of the probable error; this general factor accounted for 74 per cent. of the variance.

3. It was shown by two separate methods that the general factor found could be equated with general intelligence, or " g," and that all the correlations in the table could be accounted for without the necessity of postulating a " memory " factor.

4. The conclusion was drawn that the ability involved in the clinical tests of " memory " studied in this research was identical with that involved in the intelligence test used, and that therefore it was misleading to accept scores on these various tests as estimates of a person's " memory " ability. (Authors' abstr.)

Bilateral Internal Jugular Blood. Comparison of A-V Differences, Oxygen-Dextrose Ratios and Respiratory Quotients.

Blood was drawn simultaneously from an artery and the two internal jugular veins in 25 subjects.

The oxygen A-V difference was approximately the same on the two sides, except in four patients with psychosis, and in four epileptics with left-sided cerebral pathology. In the latter the oxygen A-V difference on the affected side was relatively great, suggesting a diminished blood-flow.

In all but three of the 25 cases the respiratory quotient approached unity, the average in these 22 being ·995 on the right side and ·994 on the left side. Variations in the A-V differences in oxygen, as between both individuals and the two sides, did not cause a shift in the value of the respiratory quotient. The average ratio of the A-V difference of oxygen (in volumes per cent.) to the A-V difference of glucose (in milligrams per cent.) was equal, 1·63 on the right side and 1·62 on the left.

In seven cases hyperpnoea produced the usual increase in the oxygen A-V difference, without consistent differences on the two sides, even in the presence of unilateral brain pathology.

Simultaneous puncture of the jugulars and artery is not necessary if A-V differences in the oxygen content of the blood are being measured, but it is necessary if the carbon dioxide content, the respiratory quotient, or the oxygen-glucose ratios are being measured. (Authors' abstr.)

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Electroencephalographic Study of Criminals.

Electroencephalographic study of 452 criminals and 1,432 control subjects reveals that when age factors and sampling errors are controlled there are no significant differences between the two groups. Since the EEG is a fairly reliable indicator of epilepsy and organic brain disease, it seems reasonable to conclude that subclinical forms of these disorders are not contributing factors in a significant fraction of the "sane" criminal population.

No significant correlation could be found between the EEG and the type of criminal behavior. (Authors' abstr.)

The Correlation of Pre-Electroshock Electroencephalogram and Therapeutic Result in Schizophrenia.

A table is presented showing the relationship of EEG before treatment to outcome of electric shock therapy, in 187 schizophrenics, of whom 95 per cent. were young men. One-fourth of those with a normal pattern left the hospital much improved or "quiescent." None of these with abnormal records was able to leave the hospital. Of 19 patients who had previously had insulin therapy, three left the hospital much improved. (Authors' abstr.)

An Electroencephalographic Study of Cases with Syncope and Related Disorders.

In a study of the EEGs (between attacks) of a selected group of 229 patients subject to "fainting spells" and "dizzy spells" the following observations were made:

1. In patients subject to typical "fainting spells" the incidence of EEG abnormality (11 per cent.) was as low as one finds in normal controls.

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Patients subject to " dizzy spells " had an even lower incidence of EEG abnormality (4 per cent.).

Patients subject to " fainting spells accompanied by rigidity " had a considerably higher incidence of EEG abnormality (45 per cent.), suggesting that of the three groups this was the only one in which a significant number of the group might belong to the epileptic category.

2. There was no correlation between EEG abnormality and frequency, duration and number of spells. It appears that repeated syncopal attacks do not produce EEG abnormality.

3. Within the total group of 229 cases there were only two patients whose EEGs showed typical 3 per second spike and wave discharges (*petit mal* waves).

(Authors' abstr.)

The Electroencephalogram in Some Military and Selective Service Convulsive and Non-convulsive Problems.

Electroencephalography was performed in 92 military and selective service convulsive and non-convulsive problems.

Of 20 subjects with a history of convulsion during military service observed by other than medical personnel, the EEG was abnormal in 10 (50 per cent.), doubtful in 2 (10 per cent.), and normal in 8 (40 per cent.).

Of 41 subjects with a self-claimed history of rare convulsions months to years ago, the EEG was abnormal in 18 (43·9 per cent.), doubtful in 1 (2·4 per cent.) and normal in 22 (53·4 per cent.).

Of nine subjects with a history of " fainting attack " in the military service, the EEG was abnormal in five (55·6 per cent.) and normal in four (44·4 per cent.).

Of 12 subjects with episodes of faintness with retention of consciousness, the EEG was abnormal in one (8·3 per cent.), doubtful in one (8·3 per cent.), and normal in ten (83·4 per cent.).

Of ten subjects considered malingerers with vague " nervousness " or vague fainting spells, the EEG was abnormal in none, doubtful in one (10 per cent.), and normal in nine (90 per cent.).

From this study it was concluded that the electroencephalogram was of assisting value in the neuropsychiatric diagnosis of non-convulsive and convulsive problems.

(Author's abstr.)

Ageing and Detoxication. Studies in Hippuric Acid Synthesis during Psychoses of the Involutional and Old Age Group.

The detoxifying capacity of the organism during psychoses of the involutional and old age period was investigated by Quick's intravenous hippuric acid test. Seventy-one patients were studied, 48 of whom were 45 years and older; 30 of these were 60 years and older.

Evidence of faulty detoxication was present in more than three times the number of patients of 60 years and older than had been found by previous investigators in mentally normal people of the same age-group. Moreover, a small group (5) of cases of senile dementia had conspicuously low values, even when compared with patients of the same age suffering from affective disorders or from hypertensive encephalopathy.

A comparison of these cases among themselves shows that gross differences in diet and nutrition, differences in body weight, in blood pressure and in urinary excretion can be neglected as sources of error.

The significance of these findings is discussed. (Authors' abstr.)

The Central Nervous System in Morphinism.

1. A brief review of the literature concerning the central nervous system involvement in morphinism is presented. Although there are scattered clinical and pathological reports which indicate that acute and chronic residuals may result, no consistent picture of the neurological involvement can be formulated.

2. Histopathological studies are reported in three cases of morphinism in which the illness varied in duration from the very acute to the chronic stage.

3. Definite histological alterations were present within the brains of all cases, and consisted of acute or chronic neuronal alteration and destruction and irregular

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perivascular demyelinization. The damage was similar in all cases, but was more apparent in the chronic ones. The most severe nerve cell changes were observed in the medulla.

4. There is good experimental evidence to suggest that morphine at certain doses may be a cortical stimulant, and is probably contraindicated in toxic conditions resulting in convulsive phenomena. (Author's abstr.)

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Cincinnati Society of Neurology and Psychiatry.

Studies on Flying Personnel with Operational Fatigue. *Balser, B. H.* . 229

Tremors of Combat Neuroses.

Electromyographic studies were made on the tremors of 23 men of combat personnel. Of these patients, 3 had symptoms of lesions of the extrapyramidal tract, and 20 had a condition diagnosed as combat neurosis.

In addition, studies were made on 10 civilians with paralysis agitans and 10 civilians with tremors associated with psychoneurosis.

Electromyographic data are given on tremor in a case of delirium tremens.

The following electromyographic differences were found between the tremor of paralysis agitans and tremors of psychoneurotic origin.

1. The rate of tremors associated with psychoneurosis is usually faster than that of tremors of paralysis agitans, and is often so fast as to give a completely diffuse electromyogram, with no discernible rhythm.

2. The tremor of psychoneurosis does not have the clearly patterned discharge of smooth increase in the voltage to a maximum followed by a smooth decrease that is typical of tremor of paralysis agitans.

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3. Clear interspaces between the individual tremor bursts are rarely found in cases of psychoneurosis.

4. Tremor bursts associated with psychoneurosis do not alternate from agonist to antagonist as in paralysis agitans, but usually appear simultaneously in opposing muscles, and sometimes are even exactly synchronous in the timing of the individual discharge. (Author's abstr.)

Incidence of Advanced Maternal Age in Mothers of One Thousand State Hospital Patients.

1. Of 1,000 patients at a State hospital, 94 (9·4 per cent.) had mothers who were over 40 years of age at the time of the patient's birth.

2. In the same series of patients, 174 (17·4 per cent.) had mothers who died before the patients were 20 years old.

3. Paradoxically there was a high death-rate among the younger mothers, with a relatively low mortality-rate among the mothers over 40 years of age.

4. In a preliminary series of psychoneurotic patients, the percentage of older mothers (3·6) was within normal limits. (Author's abstr.)

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Disturbances in Sleep Mechanism.

In 25 cases of pathologic sleep there was involvement of the corticodiencephalic structures. The hypothalamus was compressed in 16 cases, and its nerve cells showed pathologic changes in all of these cases. In 4 other cases there was actual invasion of the hypothalamus, while in 1 case there was partial destruction of the hypothalamus. In 2 cases the hypothalamus was compressed without changes in its nerve cells. In 2 other cases there was no compression of the hypothalamus or changes in its nerve cells. In 16 cases, in addition to compression or invasion of the hypothalamus, there was compression or invasion of the basal ganglia with implication of the striohypothalamic pathways. Three cases in which tumors occurred in the suprasellar region were placed in this group because the hypothalamus or its pathways and part of the orbital convolutions and cingular gyri were implicated.

Increased intracranial pressure was present in 18 cases and absent in 7 cases. A high incidence of increased intracranial pressure in this group should be expected, as in most of these cases the neoplasm encroached on the ventricular system.

Ocular manifestations, in the form of diplopia, ptosis, weakness of ocular movements and impairment in conjugate deviation, were present in 4 cases. Slight

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endocrine disturbances were present in 3 cases, and in these the tumor was situated either within or in the vicinity of the sella turcica. Slight deviations in temperature in the form of hypothermia were present in 4 cases.

From this series of cases of corticodiencephalic lesions, it may be assumed that some fibers for the control of sleep originate in the cortex, and reach the hypothalamus *via* (1) the median forebrain bundle, (2) the fornix, and (3) the inferior thalamic peduncle. (Authors' abstr.)

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Abnormal Suppression of Cortical Frequencies.

When abnormally slow rhythms appear in the EEG as a result of cerebral damage, whatever the cause, the normal rhythms are suppressed; the degree of damage, abnormal electrical activity and suppression are usually directly related to each other. This abnormal suppression is quite distinct from the rapidly reversible suppression of the normal " alpha " rhythm which is induced by attention.

In some circumstances normal or abnormal rhythms may be suppressed without slow activity, alone or together, and this suppression may be localized. The phenomenon has been investigated in man, and the factors determining it have been studied.

A large number of abnormal subjects with diverse lesions and an adequate number of normal controls were used. The suppression resulting from focal damage or destruction of brain tissue, caused by penetrating gunshot wounds, was studied, and the results were applied to the interpretation of similar suppression associated with other cerebral lesions.

The following conclusions were reached:

(1) Focal suppression of the " alpha " rhythm is always abnormal, as it was not seen in a large group of normals.

(2) Suppression occurs around penetrating gunshot wounds of the brain, and also in the cortex underlying non-penetrating gunshot wounds, and depressed fractures, and also in other circumstances in which brain is violently percussed.

(3) It is caused by complete destruction of brain tissue, but it also results from temporary suspension of activity as a result of percussion. In the first case it is irreversible, in the second full resolution can occur.

(4) This focal suppression is indistinguishable from the generalized suppression of " alpha " activity which is associated with concussion of the brain.

(5) The suppression results directly from physiological or anatomical interference with the area of cortex initiating or propagating the " alpha " rhythm. Because of this the extent, position, and intensity of the suppression are mainly determined by the proximity of the lesion to that cortex, and they do not necessarily reflect the extent, position or severity of the causal lesion. Thus a small lesion of the parieto-occipital cortex will suppress all " alpha " activity in the affected hemisphere, whereas a frontal, temporal or occipital lesion may have no such effect.

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(6) Suppression of the " alpha " rhythm is independent of interruption of visual pathways. There is consequently no support for the view that the optic radiations are a link in a neuronal circuit which sustains the rhythm.

(7) Interruption of physiological continuity of the cortex causes interruption of propagation of the " alpha " rhythm. This supports the view that spread of the potential changes is by neuronal and not simple electrical conduction.

(8) Focal or general suppression of the normal rhythms may occur independently of the appearance of abnormal slow activity.

(9) Suppression of abnormal slow waves, which are the direct effect of cerebral damage, is markedly different from the suppression of normal rhythms. Its position, extent and severity are a direct reflection of the position, extent and severity of the injury. It is usually irreversible.

(10) A " silent area " caused by suppression of normal and/or abnormal waves is determined by these conditions whatever the nature, size or position of the cerebral lesion.

(11) A " silent area " is very common in penetrating head injuries, but uncommon in closed. It is only seen in a closed head injury when there has been severe focal percussion of brain; then the local condition mimics that of a penetrating injury. Removal of damaged brain may abolish abnormal activity and leave an area of suppression.

(12) A " silent area " is not characteristic of subdural or extradural haematomas. It is only found when the haematoma covers the posterior parts of the hemisphere, and short-circuiting through the overlying haematoma is not the main cause.

(13) Cerebral angiomas often cause " silent areas," probably because they commonly lie over the parietal lobe.

(14) " Silent areas " are not commonly associated with other cerebral lesions.

(15) Because factors other than the lesion determine the presence and character of a " silent area," application of the phenomenon to clinical diagnosis is difficult, and requires the integration of all other evidences of the lesion with those recorded in the EEG. (Authors' abstr.)

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Personality: A Symposium. I. The Assessment of Personality.

1. The study of an individual's personality should follow a systematic but elastic scheme, based upon an eclectic interpretation of the current doctrines of academic psychology. The view of personality as a dynamic, integrated, purposive whole, generally accepted in this country since the days of Ward and McDougall, lends itself admirably to practical work. The adoption of such a scheme of study, involving a well-chosen and carefully defined set of scientific terms and headings, and comprising both an analytic and a synthetic approach, may nearly double the accuracy of the investigators' judgments.

2. The final summary of each case should include (*a*) quantitative ratings for the chief key-qualities or " factors," thus providing an analytic description of the child in terms of a standardized scale or set of diagrammatic profiles, and (*b*) a qualitative character-sketch, giving a synthetic picture of his total personality in words. The accuracy of the quantitative assessments can be measured by the ordinary product moment correlation; that of the character sketches by a correlation coefficient based on a matching procedure.

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3. Both the reliability and the validity of personality judgments are appreciably increased if more than one investigator studied each case. The investigators should work independently, and report their findings before consultation, but join in a case-conference at the close. The dominant partners in the team should be an educational psychologist (the same for all cases) and the child's own teacher.

4. The general procedure should consist in a combination of different methods of approach, and not rely on a single method only. Four main sources of information should be available for all cases, and be given their due and different weights: viz., (i) tests (of a picture, paper, and pencil type rather than instrumental); (ii) interviews (personal examinations, informal but systematic, with at least two sessions for every case); (iii) observations of the child's behaviour in a series of standardized real-life situations (in my view by far the most important feature of the plan); (iv) reports on past behaviour, home circumstances, mental development, etc., from teachers, social workers, parents, etc., including reports of medical inspections. If the psychologist has been adequately trained, reference to an outside specialist—e.g., a psychiatrist—should be necessary only in a comparatively small number of cases, i.e., those in which some pathological disorder is suspected.

5. Assessments based on the combined approach have a far higher validity than those based on one type of procedure only. The current notions that a child's personality can be summed up in a half-hour interview in school, or an hour's session in a psychiatrist's consulting room, or even a couple of hours' formal testing, is quite erroneous. To judge temperament and character it is desirable that he should be watched in natural but controlled situations, and for part of the time in the company of other children.

6. In general the interview is at once more informative and more trustworthy than the tests, the reports (when sent in by competent and interested observers) than the interview, and the observations under standardized real-life conditions better still. The final synthetic character sketch gains greatly in accuracy and value when based on a prior analytic study.

7. The value of quantitative assessments derived from formal temperamental tests has been much over-estimated, largely owing to the practice of not publishing adequate validation-data. Broadly speaking, their reliability coefficients are barely two-thirds, and their validity coefficients less than one-half, those usually obtained with standardized tests of cognitive abilities and attainments. Their chief service is to assist (*a*) in the preliminary screening, (*b*) in standardizing ratings by different investigators, and (*c*) above all in eliciting useful starting-points to be followed up in the interview. On the whole, the Questionnaire appears to be the most effective of the written tests, Ranking Pictures of the individual tests. Some of the newer techniques (e.g., those involving free or self-imposed assignments) throw special light on classroom problems, but require further research before they can be recommended for practical use.

8. Interviewing and observing require a knowledge of techniques quite as much as mental testing. The success of the observer depends partly on personal aptitude, partly on practical experience, but most of all on adequate training. The technical points for which training is more especially needed include a knowledge of the chief traits, tendencies, and types to be noted, their technical names and definitions, their symptoms and syndromes, the use of rating-scales, the construction of scientific reports (including character-sketches), in short, a knowledge of what to look for and how to elicit and describe it, and, last but not least, the validation of the different procedures used and of the observer's own judgments.

(Author's abstr.)

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Personality Structure and Measurement. I. The Operational Determination of Trait Unities.

1. Trait unities are established by co-variation of parts, and can be classified first into *common* and *unique* traits and secondly into *surface* traits (correlation clusters) and *source* traits (factors).

2. In studying co-variation by factor analysis the factors corresponding to psychologically meaningful functional unities can be distinguished from others by the method of parallel proportional profiles.

3. There are basically six and secondarily twelve sources of co-variation data, expressible in a *co-variation chart*, which can be used to provide independent correlation matrices for the above method.

4. It is meaningless to say that some factors represent *real* unities and that others are merely imaginary. All are real, but they may be arranged in a hierarchy according to " degrees of efficacy." The task of psychological comprehension and prediction demands the discovery of trait unities of a high degree of efficacy.

(Author's abstr.)

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The Clinical Use of the Thematic Apperception Test with Soldiers.

It has been the purpose of the present paper to indicate the usefulness of the Thematic Apperception Test in a military hospital where speed and efficiency were of the utmost importance, since it was not possible to keep the patients in hospital for any great length of time. The case-histories which have been presented are

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intended to indicate the manner in which the strivings underlying behavior are projected into the stories. It is felt that even the few examples given will serve to illustrate the wide variety of thematic material obtainable from different subjects in response to the same picture. These differences are dictated, not by the picture, but by the personality make-up of the subject himself. A rapid method of analyzing the stories has been outlined and illustrated, and it is felt that the consistent manner in which inner strivings and conflicts revealed by the TAT were verified by subsequent analysis and therapy justifies the conclusion that this test is a useful aid in the study of psychopathology in neurotic patients.

In summary, the following uses of the Thematic Apperception Test to the clinical psychiatrist are suggested :

1. Eliciting further biographical material.
2. Uncovering unconscious needs, sentiments and conflicts not easily obtainable in interview.
3. Elaboration of parental, sibling, and general social relationships.
4. Economy of time in arriving at a picture of psychodynamics at a relatively deep level of personality.
5. As a psychotherapeutic agent, both in the uncovering of dynamics and in the direct use of the stories in helping the development of the patient's insight into his problems. (Author's abstr.)

Comprehension-Defects in the Psychoses.

The present report describes four types of comprehension-defect, made manifest by a tachistoscopic experimental procedure, which were found in a group of 84 psychotic patients. The types of defect did not follow particular diagnostic groupings; rather, they indicate that the process of comprehending undergoes impairment which becomes evident in the change or destruction of the patients' ability to communicate, irrespective of clinical diagnosis. Comprehension and communication, in turn, seem to depend upon association, disturbances of which are reflected in ways typified by the particular comprehension-defects. (Authors' abstr.)

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Boutons terminaux *in the Cerebral Cortex.*

An attempt has been made to investigate the problem of terminals within the cerebral cortex in pathological conditions and in biopsy specimens. Structures have been described which are morphologically similar to *boutons terminaux*, recognized to occur in the spinal cord, brain stem and cerebellar cortex. Their identification is difficult, owing to the well-known pathological alterations of nerve fibres, described by Cajal, which lead to similar histological pictures. It is possible, however, that Cajal's phenomena were not wholly degenerative, but represented a reaction of pre-existing, very delicate terminal structures to pathological damage. Likewise, it cannot be excluded that the "artefacts" encountered in biopsy material may have some physiological significance.

While *bouton*-like structures around cortical nerve cells can be demonstrated by our present methods under favourable circumstances, it is obvious that they constitute merely a small portion of terminals. Further investigations, both pathological and experimental, are necessary to ascertain their significance and relation to other forms of terminals.

In the light of our results caution is indicated as regards the qualitative and quantitative assessment of *boutons terminaux* in pathological conditions, particularly as far as the cerebral cortex is concerned. (Authors' abstr.)

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Rorschach Studies on Patients with Paranoid Features.

The case-histories and Rorschach findings of 35 patients with paranoid trends were studied. Most cases (30) show a low threshold for color and shading qualities. The latter are usually perceived as texture. The patients tend to have difficulty in integrating color and texture with form outline.

This feature is easily " lost " within the total possible constellation of factors. Hence cases of schizophrenia with paranoid features show no reliable specific element to distinguish them from schizophrenia as a whole. If, however, one separates from this group cases resembling " true paranoia " an essential difference can be seen. The latter show random abnormalities in their records, especially the tendency described above, but no definitely psychotic features. Therefore, a " normal " Rorschach record does not exclude the presence of true paranoia. The patient's particular pre-occupation is, as a whole, not revealed in the content of the responses; an exception to this was a case with very marked reactive features. The psychopathology and nosology of paranoid reactions is discussed on the basis of the present findings. (Author's abstr.)

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The Nuclear Configuration and Cortical Connections of the Human Thalamus.

In general the human thalamus shows the same differentiation of nuclei as those of higher primates. The differences are: the increase in relative size of the dorsomedial nucleus; the pulvinar and nucleus ventralis lateralis. The anterior group of nuclei, nuclei ventralis posterior and centrum medianum retain their relative proportions. The midline group of nuclei are present, but continuing their gradual diminution in the ascending phylogenetic scale, they are small and may be insignificant in man.

The dorsomedial nucleus possesses a magnocellular part which seems to be intimately connected with nucleus paracentralis and nuclear centralis lateralis. This would appear to evidence a greater richness of intranuclear connections, furthering thalamic integration. That the relative increase in size of the dorsomedial nucleus is related to the increase of the frontal granular cortex in man is indicated by the fact that most of its connections are with this frontal area.

The increase in size of nucleus ventralis lateralis, the recipient of the dentothalamic and dento-rubro-thalamic fibers, is in accord with the increased development of the cerebellar hemispheres in man, and the growth of the pulvinar appears to be correlated with the inferior parietal and occipital association areas (area O.C. of von Economo).

After degeneration of the cortex or severance of cortical connections the following changes in the thalamus occurred:

1. There was complete degeneration of—
   - (*a*) The nuclei anteroventralis and anteromedialis;
   - (*b*) the internal, small-celled portion of the dorsomedial nucleus;
   - (*c*) nucleus ventralis anterior;
   - (*d*) the pulvinar;
   - (*e*) the nuclei lateralis dorsalis and lateralis posterior.

2. Centrum medianum and the reticular nucleus did not show an appreciable reduction of neurons, but there was a gliosis secondary to the degeneration of the fibers of passage.

3. Nuclei ventralis lateralis and ventralis posterior showed a falling out of the small neurons. The large neurons were preserved. Nucleus submedius showed some reduction of neurons.

The cortical connections of nuclei anteroventralis, anteromedialis, dorsomedialis and the medial portion of nucleus ventralis lateralis run in the anterior limb of the internal capsule.

The preserved large cells in the nuclei ventralis lateralis and ventralis posterior medialis and lateralis may be the anatomical site of " protopathic sensation," and, along with centrum medianum, probably form the thalamo-striate connections.

(Author's abstr.)

Bilateral Neural Integration in Visual Perception after Section of the Corpus Callosum.

A general analysis of visual perception in patients with partial and complete section of the corpus callosum disclosed that the following perceptual functions, depending on some degree of bilateral central interaction, were not materially altered by the operations: (*a*) binocular depth perception which involved in part fusion and integration of activity set up by stimulation of the heteronymous hemiretinae; (*b*) ability to maintain and recover fusion in response to diplopia-producing stimuli; and (*c*) monocular apparent movement vision involving stimulation of points lying on opposite sides of the vertical midline of the eye. However, the data indicate the possibility that the operations produce some deficit in divergence and convergence necessary to maintain and recover single binocular vision. This effect is of questionable significance, and it is clear that these functions are not seriously altered.

It is believed that the present experiments offer suggestive evidence toward the view that the subcortical levels of the central visual system serve a prime *role* in binocular perception and visual fusion independently of bilateral cortical integration. The exact functions of the subcortical optic system in visual depth perception, binocular fusion and movement vision are not directly disclosed by the

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present data. However, it may be suggested tentatively that the subcortical system, which is known to define primary ocular adjustments, may also provide the means for fusion of binocular images and consequent depth effects in seeing, the pattern and detail of which are refined at the level of the geniculo-striate system.

The above point of view is not proposed as a necessary interpretation of the data obtained. It may be that the anterior commissure, either originally or vicariously, provides a bilateral pathway for interhemispheral integration in these patients. The anatomical disposition of the fibers of this pathway and its evolutionary development, however, make this description of the functions of the anterior commissure improbable. Finally, one may not yet dismiss the possibility that a few residual fibers in the splenium, which may have remained intact even in cases with alleged " complete " lesions, provided a sufficient neural connection between the occipital lobes for the observed integrations. Evidence for or against this interpretation depends upon ultimate histological study of the lesions.

(Authors' abstr.)

The Functional Significance of the Inferior Olive in the Cat.

Cats in which one or both inferior olives were removed through a parapharyngeal approach were observed into the chronic state. Terminally the midbrain tegmentum or bulbar reticular formation were electrically stimulated or the animal was decerebrated.

Following loss of one olive (with inevitable partial retrograde degeneration of the other), the animals exhibited abnormal movements of the vocal cord, predominantly on the side of the lesion. An intention tremor of the neck muscles was present, and some head and body sway occurred on standing. Decomposition of movement, together with hypermetria in the use of the contralateral legs, contributed to ataxia in gait. When tested free, the contralateral legs exhibited an extensor hypertonus, occasionally associated with an overactive patellar reflex. As a result of these symptoms, the animals frequently fell to the side of the lesion when standing or walking. With bilateral lesions, laryngeal myoclonus and hypermetria and extensor hypertonus of the extremities were bilaterally present.

The characteristic tegmental response to midbrain stimulation was not altered by loss of one or both olives, nor were inhibitory effects from stimulating the bulbar reticular formation impaired by olivectomy. The absence of one or both olives did not prevent the development of marked decerebrate rigidity.

The results emphasize the apparently exclusive relation of the olive to cerebellar function—its loss is followed by cerebellar signs, and in its absence the function of other brain stem motor mechanisms is not impaired. (Authors' abstr.)

Pallidal Isolation in the Monkey : Chronic Physiological and Anatomical Results.

There would no longer seem to be any good reason for speaking of a commissure of Gudden ; at least there is, in the monkey, no bundle of such a nature which is clearly separable from that of Meynert. This has already been pointed out by Magoun and Ranson and others, and it is difficult to perceive that the adoption of a simple terminology (i.e., dorsal supraoptic decussation for Ganser's and ventral supraoptic for Meynert's) and abandoning the older connotations of the non-eponymic designations could have any but a clarifying effect upon the terminology of cognate systems.

Riley states the composition of the transverse peduncular tract to be of opticoectomammillary fibers, pallio-pontile elements and fibers of the tecto-pontine tract. From present circumstances it is apparent that the bundle must also contain elements which either begin or end in the substantia nigra, and pass dorsally into the lateral part of the more caudal, mesencephalic tegmentum.

It may be concluded, further, that permanent changes do not necessarily occur in brain stem nuclei which are quite deprived of either their afferent or efferent routes of conduction, and that neither large nor small, myelinated nor unmyelinated fibers of the pyramids proper arise from an infrapallial locus.

(Author's abstr.)

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Primary and Secondary Suggestibility.

Sixty neurotic male army patients at Mill Hill Emergency Hospital, all with I.Q.'s between 90 and 110, were given 10 tests of suggestibility, and an attempt was made to hypnotize them, and to make them carry out post-hypnotic suggestions.

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Also investigated in two subsidiary experiments were (1) the correlation between autosuggestion and hetero-suggestion, and (2) the effect of the length of time during which suggestion was given on the success of the suggestion. A factorial analysis was carried out on the inter-correlations between the suggestibility tests and the hypnotic and post-hypnotic scores. The following conclusions were arrived at:

(1) There are two independent types of "suggestibility," which may be called "primary suggestibility" and "secondary suggestibility."

(2) Primary suggestibility is of the *ideo-motor* kind, and correlates highly with hypnotizability. The best single test of this type of suggestibility is the Body-Sway test.

(3) Secondary suggestibility is of the *indirection* kind, and does not correlate with hypnotizability. It can best be measured by the Odour Suggestion and the Ink-blot Suggestion tests.

(4) A weighted point scale was constructed for the trial "hypnotizability," which showed this trait to be distributed continuously, and not dichotomously.

(5) This trait of hypnotizability could be forecast with considerable accuracy from knowledge of a person's scores on two or more of the suggestibility tests; a multiple correlation of ·96 indicated that the tests of suggestibility involved account for 92 per cent. of the factors active in hypnotizability.

(6) It was shown that post-hypnotic amnesia is a natural consequence of hypnosis, and is not dependent on suggestion, either direct or indirect, to that effect.

(7) The distribution of the raw scores on tests of primary suggestibility (and to some extent on tests of secondary suggestibility also) was usually of the U-shaped type found also by earlier investigators. By application of two psycho-physical laws it was possible to convert these distributions into more nearly normal ones, and to show that the U-shaped distribution of raw scores was due to statistical and experimental artefacts.

(8) Hetero-suggestion on the Body-Sway test was shown to be so highly correlated with autosuggestion that the two could not be differentiated experimentally.

(9) It was shown that the length of time during which suggestion was continued affected profoundly the effect of the suggestion.

(10) Results of the Press and Release tests of primary suggestibility suggested a subdivision of this type of suggestibility into "active" and "passive." This finding was only suggestive, however. (Authors' abstr.)

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The Behavioral Sequelae of Neurosurgical Therapy (Bilateral Prefrontal Lobotomy).

The author has attempted to present some of the more important behavioral modifications which follow the neurosurgical transection of the prefrontal tracts in the intact psychotic brain. The case-material has been drawn largely from a series of 20 patients who underwent bilateral prefrontal lobotomy at the Columbus State Hospital, between September, 1941, and September, 1942. Pre-operative and post-operative observations were made at daily intervals for periods ranging up to one year. The program of incidental observation was supplemented through the use of motion pictures, sound recordings, and standardized psychological testing procedures. The examination of the protocols seems to

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indicate that the psychological and behavioral picture in the post-operative period is a function of the following six factors: (*a*) emotional re-patternization; (*b*) attitudinal modifications; (*c*) dysfunction of the orientative mechanisms; (*d*) reorganization of the dynamic equilibrium of the organic substrate; (*e*) essential lack of neuro-motorial and psychoneurological symptomatology; (*f*) lack of intellectual change. These six factors, the first four of which are positive, and the last two of which are negative, constitute a core around which the post-lobotomy picture arranges itself. Whenever post-operative changes are present, the probabilities are very great that one of the most notable features will be a shift in emphasis in the emotional sphere. The critical point here is that it is relatively unimportant whether there is an increase or decrease in emotional responsiveness. The essential thing is that there is a rechanneling of emotion, permitting the patient to see his problems in a different light than was possible in the pre-operative period. Related to this shift in emotional emphasis are the modifications in the attitude of the post-lobotomy patient toward himself and toward others. The author prefers to speak of attitudinal modifications, rather than the concept of the consciousness of self which Freeman and Watts have emphasized, for the reason that the level of abstraction of the former is less involved than that of the latter. Attitudinal changes are closer to reality—to the physical nature of the individual—than is the concept of the consciousness of self. We are concerned, however, with the same general aspects of behavior, namely, the more subtle adjustments by means of which the individual is able to maintain his interpersonal and intra-personal balance. Changes of behavior in this area are frequently observed following lobotomy, although it has been impossible, thus far, to find a common thread which binds these changes together. Indeed, such changes in the attitudinal complex of the individuals are characterized by a lack of consistency that is most disturbing. It is here that the pre-operative and the pre-psychotic personality picture is reflected most clearly. Less complex, though equally pronounced, is the dysfunction of the orientative mechanisms. Following lobotomy, one observes a more or less transitory disturbance in the time-schema, the space-schema, and, less frequently, in personal orientation and the body-image. The disturbance of the time-schema appears to be, at once, the most frequent and persistent, although the manner in which the dysfunction is brought about is not clear.

From a therapeutic point of view, the most significant factor in giving an identifying tone to the post-operative picture is the reorganization of the dynamic equilibrium of the organic substrate. This factor, which in one sense includes the three preceding positive factors, is here limited to mean the loss of organic tension and agitation which is reflected, at the psychological level, in the diminution or disappearance of worry, apprehension and anxiety. Basically it is this loss which gives value to lobotomy as an instrument of therapy. If lobotomy did no more than to lower the threshold of resistance to other forms of therapy, and, in so doing, gave the patient a greater hope for recovery, it would thereby be justified. But lobotomy meets more than this minimal essential—it goes farther, in that it allows a spontaneous reorganization of processes which, in itself, appears to aid in the adjustment of the organism. This reorganization, fundamentally organic, alters, in some manner, the complex structuro-functional relationships which together constitute the human organism. These four factors—emotional repatterning, modification of attitudes, disorientation, and the reorganization of the organic substrate—constitute the major positive factors in the post-lobotomy picture. We must not overlook, however, the negative factors which serve to high-light that picture. The first of these negative factors is the lack of significant intellectual change. While it is true that, upon occasion, pre-operative delusional systems have dissolved, or have become attenuated, following the operation, and that we frequently find minor disturbances of the memory-function and of categorical and abstract behavior, it is also true that the over-all intellectual picture remains substantially unaffected. Similarly, there is an essential lack of post-operative neurological symptomatology. Other than the rather common findings of somnolence, restlessness, automatic acts, and increased appetite, there is a noticeable absence of neurological signs. In scattered cases a large number of central, peripheral and autonomic phenomena have been reported, but the analysis of this material indicates that lobotomy does not interfere, in an important way, with the explicit patterns of neurological organization. (Author's abstr.)

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A Study of Types of Word-association in Dementia Praecox and Manic-depressives.

1. The present study of 63 dementia praecox and 37 manic-depressive cases, which repeated the Gardner Murphy method of classifying associations according to logical relationship between stimulus and response, reveals no startling, outstanding, or reliably significant differences in central tendencies except possibly in responses of Type 8, in which there seems to be a strong tendency on the part of manic-depressives to " link " nouns to adjectives.

2. The tendency to give responses of more than one word, which violated the directions given to the subject, viz.: to respond with only one word, was found to be more prevalent in manic-depressive cases. This consisted largely in using definitions, or in explaining the usefulness of noun stimuli.

3. The personality of the investigator is likely a factor influencing the whole procedure.

4. There may be geographical difference.

5. The use of " worth predicates " appears to be characteristic of neither group, but is characteristic of individuals.

6. The tendency to give responses in the form of proper names was more noticeable in the Murphy study than in the present study.

7. The tendency to give purely sound associations was not confined to either psychosis but to individuals.

8. There was a slightly greater tendency on the part of dementia praecox to repeat the stimulus word.

9. The tendency to change the word-form of the stimulus word was peculiar to dementia praecox. This is contrary to the findings of the Murphy study.

10. Responses which consisted of neologisms were not found to be associated with dementia praecox in this study.

11. Stereotypy is not characteristic of either psychotic group, but is characteristic of individuals.

12. Responses containing a personal reference are associated with individuals and not with groups.

13. The use of rhymes was more characteristic of the manic-depressive group than of the dementia praecox group.

14. This study further confirms the conclusions of Kent and Rosanoff that there is a " gradual and not an abrupt transition from the normal state to the pathological state." (Author's abstr.)

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Electroconvulsive Therapy.

The findings of this study indicate the desirability of utilizing a time factor in the evaluation of the results of electro-convulsive therapy. Analyzing the results in 100 unselected cases, a social recovery was obtained in 87 per cent. When, however, successful application of the therapy was made dependent upon the patient's ability to attain social recovery within 30 days' post-treatment, the therapeutic efficacy was reduced to 51 per cent. S. M. COLEMAN.

Electroshock Therapy.

In a series of 300 consecutive cases treated with electric shock it was found that 50 per cent. of the recovered patients relapsed. The writer stresses the value of extramural maintenance shock therapy. S. M. COLEMAN.

Chronic Delirium.

Patients with organic dementia who become delirious fall into two groups—toxic or senile delirium. The former has an acute onset and clears up after the patient has got rid of the toxaemia, for instance bromide. Senile delirium is unrelated to toxaemia, and comes on gradually after the dementia has reached a certain degree of severity. In both the psychiatric picture is the same.
S. M. COLEMAN.

Cultural Influences in Alcoholism.

Considering drinking as a social neurosis it is shown that society has made the practice so attractive and even insidious that the total resistance has been lessened. To combat or counteract this it is necessary to minimize the cultural aspects, avoiding, however, total repression. The appeal of drinking as a glorified function can only be nullified by scientific truth. S. M. COLEMAN.

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Hallucinations and Mental Imagery.

An investigation was carried out to see whether there was any quantitative or qualitative relationship between mental imagery and hallucinatory experience in 20 schizophrenic patients. It was found that these patients separate the experiences of imagery from those of hallucination. Evidence from different methods of analysis used indicated that the two processes are psychologically distinct. The hypothesis that auditory hallucinations are exaggerations of mental imagery was not confirmed. S. M. COLEMAN.

Some Aspects of Shock Therapy.

This paper presents observations collected as a result of the psycho-analytical approach to patients treated by shock therapy. It is concluded that the hypoglycemia eliminates the pathological ego and its counter-cathexis. Therefore, the repressed ego and its repressed reality can enter their rights. They were latent, but by no means annihilated by the pathological process. However, neither are the pathological formations destroyed by the shock, since they reappear with automatic certitude and can be observed at work, even during a lucid interval.
S. M. COLEMAN.

Comparative Value of Electroencephalogram.

A heterogeneous group of cases, with and without clinical brain damage, received both abstraction tests and electroencephalograms. It is found that there was a definite but not a pronounced correlation between impairment of abstract ability and abnormality of the electroencephalogram. Abstraction tests are more reliable in diagnosis of brain damage than are the encephalograms. This does not apply to cases of epilepsy in which the EEG is more reliable. In cases with chronic non-progressive or slowly progressive brain lesions the EEG is often negative, despite well-marked lesion pathology. S. M. COLEMAN.

Mental Examination in State Hospitals.

It is computed that over 300,000 hours annually are devoted to the mental reports of new admissions in State Hospitals. This " rut of verbiage " is of little value to anybody and does not reflect a *living* picture of the patient's personality, though it may tell something of the physician's free associations. Only in conversation where the patient gives his own story in his own words can anything of real value be learnt. Stereotyped methods of case-taking, preconceived theories, which inhibit the free flow of conversation, and the fear that " all has not been told," are alike condemned. S. M. COLEMAN.

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Character and the Psychopath.

It is concluded that the psychopathic personality is found among a mixed group of individuals whose problems are complex and who often fail to adjust in their normal strata of society. They present a heterogeneous group of symptoms, but they have in common what is popularly known as a " bad character." This personality type is regarded as a reaction which certain individuals demonstrate because they have failed, or have been unable to take full advantage of the potential mechanism for character development incidental to normal life and growth.

S. M. COLEMAN.

Acute Disseminate Lupus Erythematosus.

Disseminate lupus erythematosus is a systemic disease which may produce diffuse damage to the C.N.S. Clinical manifestations include toxic delirium, frank psychosis, coma and convulsions. Neurological examinations show scattered findings which may shift rapidly on successive examinations. The pathological picture is one of diffuse non-specific encephalitis with extensive vascular changes and thrombosis. The nervous parenchyma shows acute and chronic degenerative changes secondary to disturbances in the vascular supply. S. M. COLEMAN.

Studies Regarding Glutamine and Ammonia.

A group of 50 patients with nervous and mental diseases were investigated as to the level of free ammonia and glutamine in the spinal fluid.

S. M. COLEMAN.

Electroconvulsive Therapy in Acute Hysteria.

Two cases of hysteria, one displaying paralysis and the other amnesia, were treated by means of electric shock as one phase of therapy with relief of presenting symptoms. S. M. COLEMAN.

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The Diagnosis and Classification of Neurotic States.

The identification of the neuroticism factors with those in the normal personality confirmed by a longer history of psychological research does not immediately provide a key to their inner nature. Much research remains to be done before the deeper, intrinsic character of these source traits becomes known. And since the main purpose of this article is to advance techniques at the descriptive level, we shall not digress into the considerable speculation which is already possible concerning what these factors basically are.

The main conclusion must be that the factors in neuroticism are recognizably the same as those in the normal personality—the same tendencies carried to greater extremes. There are, however, interesting differences, as follows.

(1) The correlations between the factors themselves do not seem to be the same as in the normal population. Of the six possible correlations only two are tolerably similar and three are decidedly different—opposite in sign and of appreciable magnitude. These are all relationships of one factor, III, or (B+K), which, among normals correlates positively with the emotional stability factor (C+G), negatively with the hypochondria factor (D+I), and negatively with surgency, F, but here behaves oppositely. There are adequate reasons for these correlations in the normal population; they express social trends which tend to throw certain "good" qualities—notably intelligence B and emotional stability C—together. The neurotic is evidently a misfit in regard to these social and biologic trends.

(2) The relative magnitude (variance: contribution toward making individuals differ) of the factors appears to be different. (The absolute magnitude is not considered; for Eysenck's correlation device would make the neurotic factors systematically bigger). If we consider two of the neuroticism factors to be compounded, co-operative factors (e.g. III equals (B+K)), the "normal" order would be I, III, II, IV. If III were B alone it would still retain this position, and if it were K alone it would fall to last place. In short, though the range of intelligence may be greater among neurotics than among normals, it is less important in accounting for personality differences. It is noteworthy that the above order agrees better with the "normals" than does the order from the unrotated neuroticism factors.

However, the most noteworthy difference is that some of the "normal" factors do not appear in the neuroticism data at all. Probably this is still a matter of magnitude—the missing factors might well have appeared as fainter factors if the analysis had been carried further. If we suppose that K, G and D are involved as co-operative factors in the above, the still unrepresented normal factors are (1) the cyclothyme schizothyme-factors A, H and L, which either as A or as a compound factor (A+H+L) are the *largest* factor differentiating normal personalities, and (2) the dominance-submission factor E, which is of middling magnitude. Unless the variables chosen were unsuitable for these factors to show themselves, their absence is a mystery. At least variables 15 and 16 might be expected to show big opposite loadings in some factor! A possible explanation lies in the fact that psychotics were excluded from the population. If we assume that when individuals with rather extreme cycloid or schizoid endowment become as extreme also in other factors as were these neurotics they become psychotic rather than neurotics, then no appreciable schizoid-cycloid variation would remain in the group studied here.

The psychiatrist may raise the objection to the present factorial analysis that half a dozen distinct factors are not enough to account for the full variety of neurotic syndromes. Yet the fact is that a few factors can account for a relatively large number of clusters. For example, if we suppose that what we recognize as a truly neurotic syndrome occurs only when some factor is present in extreme amount, then *two* factors could theoretically produce at least *eight* syndromes (four "pure" and four mixed); three factors, sixteen, four, thirty-two and so on. An extreme high or an extreme low endowment in either factor will stand out as a syndrome. Then a cluster can be produced also by each instance of combined action, where two factors are each present in extreme degree (both extreme high or one extreme high and one extreme low), and so on, producing eight major possibilities of cluster origin.

Actually not all of these possibilities would necessarily be realized. There might not exist any manifest, observable symptoms corresponding to some factor combinations, i.e., no variables can be observed in that potential "area of behavior."

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The manifestations might, for instance, be purely somatic or purely introspectible, only, i.e., non-behavioral. Consequently, for all that we know at present, fully half a dozen distinct *factors* might be required to account for the observed gamut of psychoneurotic *syndromes*, i.e., the manifest clusters. To sum up the whole situation systematically, the smallest number of factors required by mathematical theory (of combinations and permutations) might not in fact suffice because: (1) Probably in most factors only the extreme endowment in one direction is "neurotic," while the opposite extreme endowment describes superior powers with regard to manifestations of stability, integration, etc. (2) Variables (behavior manifestations) may not actually occur in the quadrant concerned. This is a subtle but real issue, best described briefly as above, by saying that certain combinations of factors may be unproductive of overt symptoms. (3) When a factor has small variance and no variables which it loads very highly, even an extreme endowment in that factor will not suffice to produce high correlation among variables, i.e., a visible syndrome. The more factors there are at work in a given realm of behavior, the less is a correlation cluster from a single factor likely to appear (compared with the incidence of the combined factor cluster).

Illustrations of the relations of clusters (syndromes) to factors are not so easy to give at this early stage of factor research. Among other things we do not know what degree of average correlation within a cluster corresponds to the commonly accepted overt syndrome. (The writer estimates that it is a minimum of about 0·5.) If we examine Eysenck's original correlations for clusters of about this closeness of texture, we find the following clear instances—variables (2, 3, 4, 14), (8, 9, 14), (5, 6, 16), (9, 13, 14), (11, 12, 13), (12, 13, 14), (5, 6, 36), (18, 26, 31, 32), (2, 9, 38), (19, 25, 28, 34)—and many clusters in which the internal intercorrelations are rather less consistently maintained. Unfortunately, only a few of these are the equivalents of common psychiatric syndromes, because some of the individual variables used are themselves syndromes, while in other instances the clusters prove to be clusters of environmental conditions.

However, we may take three of these as illustrative of the three chief possibilities. Cluster 2, 9, 38—unskilled work, narrow interests and low intelligence—is roughly the syndrome of mental defect. The intercorrelations between these variables are due only to one factor (III), in which they all have positive loadings. This is the factor we have interpreted as general intelligence (in reverse). Cluster 18, 26, 31, 32—obsessional, meticulous, irritable, anxious, depressed—is a cluster which seems to belie the clinical separation of neurasthenia and obsessional neurosis. Whichever label is given to it, it provides an instance of a cluster due to two factors. Inspection will show that these variables all have high negative loadings in III, moderate positive loadings in I, and nothing giving a significant correlation in any other. It is a product, therefore, simply of marked "desurgency" and moderate "dynamic disintegration." Cluster 19, 25, 28, 34—hysterical symptoms and attitude, freedom from overt anxiety, sexual anomalies—seems the nearest approximation among these clusters to the syndrome of conversion hysteria. It is an instance of a cluster in the formation of which all four factors have some role. The writer has already pointed out in more normal personality data how a cluster of similar variables, constituting what might be called a mild conversion hysteria syndrome, can be accounted for in part by two factors—low intelligence and dynamic disintegration. The same two factors, III and I, are found to have a role in the present cluster, the former slightly, the latter more markedly. But, in addition, these variables are found to have consistent loadings in II and, especially, IV. (The loadings on II and III are supplementary, affecting different pairs of variables.) The analysis suggests that low intelligence and unintegrated character form the background conditions of conversion hysteria, but that in addition a subaverage (negative) endowment is required in the I Factor of Sensitive, Anxious Emotionality with its *real* somatic upsets, and a decidedly high endowment in the temperamental factor of Surgency.

Although the roughness of the exploratory factorizations, and our present ignorance of the true, underlying nature of the factors discovered, prevent immediate clinical usefulness, the present paper may suffice to show that the consideration of symptoms in terms of correlation clusters and factors—surface traits and source traits—can clarify diagnosis, and in time lead to a psychometric calculus which may revolutionize clinical practice. (Author's abstr.)

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Aminoacetic Acid (Glycine) in the Treatment of Depression.

Nineteen cases of depression of various kinds and degree have been treated with oral administration of amino-acetic acid in the past two years. Most of the cases of mild depression recovered, some showed improvement, whereas the two cases of involutional melancholia did not benefit by the treatment.

In the opinion of the author, these results justify an extensive trial with this treatment in cases of depression, especially in milder cases which can be cared for in their own homes. Should this treatment prove to be as beneficial in other cases, it would obviate the necessity of placing such patients in institutions, and avoid the use of shock treatment—a very strenuous form of therapy.

(Author's abstr.)

Is the Epileptic a Safe Motor Vehicle Driver?

(1) Epilepsy is a definite motor vehicle danger, and patients so afflicted should not be permitted to drive, unless seizure-free for three years.

(2) Lapses of unconsciousness from secondary epilepsy or other syndromes should be treated in a similar manner, except that the licence can be restored at an earlier period when the spells are under medical control.

(3) State Legislation should be passed to deny these patients so afflicted the right to receive a motor vehicle-driving licence.

(4) In order to render the enforcement of the laws, epilepsy or other conditions causing a lapse of consciousness with loss of motor or sensory control should be made reportable. The passage of such a law should be publicized so that both physicians and patients are aware of its existence.

(5) Nocturnal seizures or an aura are not safety factors.

(6) The diagnosis of epilepsy should be made on clinical grounds; the EEG should only be used to supplement the clinical diagnosis.

(7) In California an epileptic is reinstated on a highly selective basis.

(Authors' abstr.)

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Degeneration of the Basal Ganglia from Carbon Disulphide Poisoning in Monkeys.

1. Four monkeys (*Macaca mulatta*) were chronically poisoned with carbon disulphide by exposing them to inhalation of the vapor for periods of from 12 to 21 months, when marked symptoms of intoxication appeared.

2. In all of the animals the essential and constant pathological changes consisted in extensive, bilateral and symmetrical necrosis of the globus pallidus and the zona reticulata of the substantia nigra.

3. The monkeys presented in common profound motor disturbances characterized by reduction and slowness of all types of movement without paralysis, inco-ordination of locomotion and climbing, plastic cog-wheel rigidity of the skeletal muscles, flexor postural attitudes of the trunk and extremities and severe action and tension tremor.

4. It is believed that the data justifies the conclusion that the motor syndrome observed in the animals is attributable to the destruction of the globus pallidus and substantia nigra, and that there are close similarities pathologically and physiologically to the Parkinsonian syndrome of man. (Author's abstr.)

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Cerebellar Atrophy. I. An Analysis of the Various Forms and an Analytical Scheme for their Study.

Cerebellar atrophy may be the anatomical expression of a number of clinical disease entities and histopathologic states.

One variety of chronic progressive cortical cerebellar degeneration which is termed " Marie's late cerebellar ataxia " is clinically indistinguishable from olivo-ponto-cerebellar atrophy, and one should be cognizant of the fact that an exact anatomical diagnosis cannot be made during life.

The terms " familial cerebellar ataxia " and " hereditary cerebellar ataxia " are not the designations of specific disease entities or histopathologic states. Under such a designation one may place the pure cases of olivo-ponto-cerebellar atrophy with familial and hereditary features of Hassin and Harris; the pure cases of chronic progressive cortical cerebellar degeneration as described by Richter and by Holmes; the cases of primary parenchymatous atrophy of the cerebellar cortex complicated by mental deterioration as described by Akelaitis; the cases of cortical cerebellar degeneration complicated by epilepsy as described by Thorpe; the cases of primary degeneration of the granular layer of the cerebellum as described by Norman; the cases of cerebello-olivary degeneration described by Parkes Weber and Greenfield; as well as many others.

Any of these disease entities may occur sporadically and/or be complicated by the co-existence of Friedreich's ataxia, Charcot-Marie-Tooth peroneal nerve atrophy, primary optic atrophy, so-called primary lateral sclerosis, spinal muscular atrophy and nuclear atrophy of some of the motor cranial nerves, particularly the facial and the hypoglossal.

For the detailed study of any brain showing evidence of cerebellar atrophy an analytical form has been proposed. This form may be modified or elaborated upon as need for changes arise. In a sense it forces the neuropathologist to declare which histopathologic changes in a given case of cerebellar atrophy are primary, which are secondary, and which are of a complicating nature.

The formulation of disease entities and the development of worth while classifications of the cerebellar atrophies can only follow the detailed analysis of many cases. (Author's abstr.)

Hemosiderin and Tissue Iron in the Brain: Its Relationship, Occurrence and Importance.

Formation of hemosiderin after traumatic and spontaneous cerebral hemorrhages was studied, and its microscopic appearance was compared with that of increased content of tissue iron in selected areas of the brain in which no signs of a preceding hemorrhage or thrombosis were present.

It was found that in many instances the hemosiderin and the tissue iron gives the same staining reactions and a similar microscopic appearance. One of the differences is the presence of histiocytes containing fine hemosiderin granules in areas of old hemorrhages and thrombosis, normally not seen.

Incrustations of blood vessel walls with iron salts occur in globus pallidus very frequently without a hemorrhage. They were observed in other areas after an effusion of red cells into the brain substance, or after a general increase of tissue iron in the brain.

Large amounts of tissue iron were often seen in globus pallidus in patients over 40 years of age suffering from various types of psychosis.

This increased iron content is considered a manifestation of an involutional process, irrespective of the age of the patient or the duration and type of the illness.. (Author's abstr.)

Occurrence and Distribution of Acid-fast Pigment in the Central Nervous System.

Although the series of cases studied is too small to be representative, the relation of the pigment to the lesions encountered, deserves brief comment.

In a case of senile psychosis, pigment in the nerve cells was intensely red and extremely abundant, and it was also present in glial cells and blood vessels. The pigment was almost as abundant in a 68-year arterio-sclerotic male with cerebral cortical atrophy.

In two cases of encephalomalacia the large mononuclear phagocytes of microglial origin were loaded with acid-fast pigment, in addition to ordinary fat droplets.

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In two glioblastomata no pigment was present even in necrotic areas. This was rather surprising in view of its occurrence in encephalomalacic areas, due to vascular obstruction. It was absent also in cerebral metastases from mammary and lung carcinomata.

We have purposely refrained from identifying the pigment with " ceroid " until the chemical identity of the " ceroid " pigment shall have been more completely worked out. Until more precise methods for its histochemical identification become available, discussion of the point is rather meaningless. The most specific feature of the " ceroid " pigment is probably its resistance to acid decolorization after staining with carbol fuchsin. The fluorescence of the pigment in the central nervous system has not been studied and this may prove to be a differential feature should it be absent. The " ceroid " pigment retains a certain affinity for Sudan 4, even after paraffin embedding. This has not been striking in the few brain sections which we have examined by this method. The pigment takes a bluish-green color with the Giemsa stain as does the " ceroid." To sum up, one cannot at this time make any positive statement as to the identity of this acid-fast pigment with the " ceroid " found in experimental cirrhosis. Its acid-fastness does, however suggest a chemical relationship.

The conditions under which " ceroid " pigment is deposited in the tissues are still under experimental investigation. An observation that suggests a possible relationship to vitamin E deficiency is the regular occurrence of acid-fast pigment in the ganglion cells of rats that have been for a long time on vitamin E deficient diets, and its absence in the ganglion cells of rats which have received protective doses of wheat germ oil or tocopherol (8). We do not wish, however, to imply that this is the only, or perhaps the most important factor, controlling its deposition. The familiar " lipochrome " pigment is commonly believed to increase progressively with age. This seems not necessarily to be associated with a change in acid-fastness, since ganglion cells containing yellowish-brown pigment which is non-acid fast may be found in abundance even at an advanced age. It seems probable that other factors are concerned in this transformation. (Authors' abstr.)

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The Influence of Hypothalamic Stimulation on Cortically Induced Movements and on Action Potentials of the Cortex.

1. Simultaneous stimulation of the hypothalamus (sub-threshold for somatic reactions) and of the motor cortices (cat, monkey) results in intensification of motor discharge in the peripheral musculature. This intensification is expressed as decrease in the period of latency of response, increase in magnitude of movements through the same joints activated during cortical stimulation alone, spread of motor discharge, contralaterally and ipsilaterally, and the evocation of muscular

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contractions when a sub-threshold stimulus is applied to the cortex. Those areas in the hypothalamus which are productive of a facilitatory effect are likewise productive of a sympathetic autonomic effect. Facilitation, however, is independent of sympathetic discharge; indeed, elimination of sympathetic pathways to the brain intensifies the facilitatory effect. Both cortices (ipsilateral and contralateral) are under the influence of the hypothalamus of one side of the brain. Generally speaking, wherever a motor response is obtainable from the cortex, facilitation can be found as well. The optimal area in the basal forebrain concerned with this function is the posterior hypothalamus, but such potentiality is not restricted here. Since hypothalamic facilitation of the cortically induced motor response persists after a small cortical area has been isolated from adjacent parts of the cortex, the intensification of the response is not due to functional spread to other parts of the motor cortex.

2. Stimulation of the hypothalamus results in a distinctive, enduring excitatory effect on the cerebral cortex, as manifested by increased rate and amplitude of discharge in the spontaneous electrocorticogram, and in suppression of "Dial" potentials during and following hypothalamic stimulation. Firing of cortical neurons initiated by local application of strychnine is likewise increased in frequency as a result of hypothalamic excitation. This facilitatory influence, resultant from stimulation of the hypothalamus, is found in motor and in primary sensory receptive and association areas as well. It is bilateral in nature, but most marked ipsilateral with the site of hypothalamic stimulation. The nuclear areas in the basal forebrain responsive with such an effect are likewise productive of sympathetic autonomic phenomena. The changes are independent of sympathetic autonomic phenomena as such and persist after elimination of the adrenals. The alteration in the electrocorticogram is thought to be due to increased frequency of discharge of cortical ganglion cells, as a consequence of a lesser degree of synchrony of discharge, and firing of a greater number of neurons than those responsible for the normal electrocorticogram. The fact that hypothalamic potentials following stimulation recorded from the stimulated area are unchanged, while increased cortical potentials persist, indicates that the changes in the E.E.G. are only initiated by hypothalamic impulses, but are self-sustained at the cortical level.

The complete parallelism between the two sets of experiments summarized in 1 and 2 suggests as one important site of hypothalamic facilitation of the pyramidal system the sensorimotor cortex. It is thought that hypothalamic cortical facilitation may be responsible for the overcoming of paralysis under conditions of emotional stress, and possibly for the initiation of epileptic seizures as well.

The experimental finding that cortical activity in sensory projection and association areas is likewise altered as a result of hypothalamic stimulation indicates that hypothalamic cortical facilitation is not restricted to the motor system. The functional evaluation of these studies, however, will depend on further experiments.

(Authors' abstr.)

Transsynaptic and Direct Stimulation of Post-fibres in the Artificial Synapse Formed by Severed Mammalian Nerve.

The excitatory properties of the artificial synapse (stimuli at motor, leads at sensory root) formed by a severed mammalian nerve have been studied. The aim of this work has been to compare direct and transsynaptic stimulation of the post-fibres.

1. In Section 1 measurements are given, correlating the size of the prefibre potential with the size of the volley transmitted in the post-fibres, as well as measurements of the transsynaptic effect in per cent. of maximum alpha activity in post-fibres, directly stimulated at the cut end. Transmission in the isolated nerve-root preparation has been compared with transmission of circulated nerve *in situ*.

2. Recovery curves for transsynaptic and direct stimulation of the post-fibres have been compared, and in the main found to be identical; some discrepancies have been taken up for discussion.

3. Increase of stimulus frequency causes accumulative depression with transsynaptic stimulation, evident even at such low rates of repetition as to give no effects upon the volleys elicited by direct stimulation. Higher frequencies are

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needed to cause the same amount of depression with direct stimulation of the postfibres. Experiments are presented showing that the greater depression caused by transsynaptic stimulation can be imitated by increasing the duration of the electrical shock in direct stimulation. The amount of the depression is shown to be dependent on the accommodative properties of the postfibres engaged.
(Author's abstr.)

Modification by Electrotonus of the Transmission in the Artificial Synapse Formed by Severed Mammalian Nerve.

Transmission in the artificial synapse formed by the severed region of the sciatic nerve of cats has been studied under the influence of a polarizing constant current.

1. Depending upon the polarity of the constant current traversing the artificial synapse the transmitted volley may be facilitated or depressed. Quantitative measurements are presented in which the degree of facilitation or depression is related to the strength of the polarizing current in rheobase multiples.

2. Under the influence of polarization the recovery curve for synaptic transmission may change from a type indicating mere subnormality after a conditioning volley to one also showing supernormality, in which this volley is followed by periodic variations of subnormality and supernormality.

3. During polarization an early secondary volley may arise in the synapse. Evidence is presented in favour of the view that it is elicited by the falling phase of the prefibre potential. (Author's abstr.)

The Localization of the Premotor Interneurons Discharging through the Peroneal Nerve.

Needle electrodes, isolated down to the tip, have been placed in the segments L_4–S_1 of the spinal cord and the effects elicited from various regions recorded in the peroneal nerve. The waves, relayed over one synapse, have histologically been localized to needle positions in the lateral part of the zona intermedia.
(Authors' abstr.)

Distribution of Internuncial Activity in a Multineuron Reflex Chain.

Stimulation of the popliteal nerve in cats elicits in the peroneal nerve a complex multineuron flexor reflex discharge, studied in this paper.

The form of this reflex response is determined by the afferents excited and by the distribution of internuncial activity in the spinal cord, both factors influenced by stimulus strength. Moderately strong stimuli engaging coarse, muscular and cutaneous afferents elicit a reflex response characterized by rhythmic grouping of volleys. An initial wave with a central reflex time of about 2·5 msec. is succeeded by two secondary volleys differing 2–3 msec. in latency.

The periodic properties of the reflex response are shown not to depend upon afferents with different conduction velocities. Nor do they depend upon a periodic variation of excitability at a single synaptic structure. The experiments support the view that the volleys with different latencies arise in interneuron chains of different lengths, and that some of these chains are " closed circuits " in which reverberation takes pace.

An increase of stimulus strength shortens the rhythmic reflex response from its tail end until only the first volley remains (" inhibition by subnormality ").

Even when the popliteal stimulus is subliminal from the point of view of reflex excitation, it leaves a fluctuating state of excitability which has be entested with the aid of a peroneal volley, elicited over one synapse from stimulating electrodes placed in the lateral intermediary region of the spinal cord. The conditioning popliteal stimulus then causes an early inhibition followed by prolonged facilitation and interrupted by periodic inhibitory deficits, corresponding temporarily to the rhythmic volleys of the flexor reflex, mentioned above, therefore interpreted as refractory periods left by these volleys.

The early inhibitory effect is discussed, and a schematic diagram given which describes the organization of the multineuron flexor reflex arc in the light of the evidence obtained. (Author's abstr.)

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The Relations Between Multiple Innervation and " Segmental " Response of Skeletal Muscle of the Dog.

By a combination of photographic procedures the movement of exposed muscles, " segmented " transversely by markers, were recorded in experiments on 46 dogs. Direct and indirect tetanizing faradic stimuli were employed.

Isometric and isotonic contraction and stretch occur simultaneously. The ratio of the number of the isometrically to the isotonically contracted " segments " is never constant, but varies as the distance between the points of attachment. Completely isotonic contractions are obtainable only by detaching one end of the muscle. The stretch lasts never longer than 60 msec. Afterward the stretched segments behave either isometrically or participate in the shortening. Thus, the initial stretch acts as a " shock absorber " during the initial contraction ; the subsequent " locking " prevents further loss of effective shortening. These results are obtained by a minimal tetanizing current applied to the entire trunk of the nerve supplying the muscle.

When but one main branch of the nerve supplying the muscle is stimulated, the other branches having been cut, the part of the muscle stimulated shortens and the parts unexcited by the stimulus show considerable stretch.

When curarized muscle is stimulated directly, shortening is confined to an area around the point of stimulation. The extent of the responding area depends on the strength of the stimulus. The other portions of the muscles stretch. This stretch may last 74 msec. (Authors' abstr.)

Anatomic and Physiologic Properties of Cutaneovisceral Vasomotor Reflex Arcs.

In unanesthetized white rats with the spinal cord transected in the lower cervical region and in rats with the cerebrospinal axis intact, under nembutal anesthesia, localized warming of the skin in the caudal half of the thoracic region to approximately 45° C. consistently elicited reflex vasodilatation in the small intestine. Localized cooling of the skin in the same area consistently elicited reflex vasoconstriction in the small intestine. These reactions are carried out through segmental and intersegmental reflex arcs, and neither require suprasegmental reflex centers nor involve parasympathetic nerves.

The sympathetic innervation of the gastro-intestinal blood vessels includes both vasoconstrictor and vasodilator nerve fibers. The former appear to be adrenergic, the latter cholinergic.

Thermal stimulation in a cutaneous area which has been rendered hyperemic by repeated warming and cooling elicits no appreciable reflex vasomotor reaction in the corresponding portion of the intestine. In the absence of disturbing stimuli the vascular bed in this portion of the intestine is dilated while the cutaneous hyperemia persists. Somatic pain producing stimulation during this interval elicits prompt vasoconstriction throughout the gastro-intestinal tract.

The receptors through which thermal sensations and reflex vasomotor reactions in viscera, elicited by thermal stimulation of the skin, are mediated, appear to be closely associated with cutaneous blood vessels. Tissue deformations incident to tonic changes in the musculature of these vessels probably play an essential role in the activation of the receptors in question and, consequently, in sensory adaptation. (Author's abstr.)

Further Investigations on Diencephalic-cortical Relations and Their Significance for the Problem of Emotion.

The relation between the various areas of the cortex of the brain and diencephalic nuclei was investigated by local application of strychnine to the cortex and exploration of the forebrain nuclei for strychnine spikes, as well as by injection of the latter with strychnine and exploration of other forebrain nuclei and the cortex for convulsive potentials. The results were as follows :

(i) Injection of strychnine into the hypothalamus causes first " firing " of the dorsomedial thalamic nucleus and later of the cortex. This may be followed by the appearance of spikes in the contralateral hypothalamus, the dorsomedial nucleus, and the cortex. The ventrolateral thalamic nucleus remains constantly negative under these conditions.

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(ii) Strychninization of the dorsomedial nucleus causes " firing " in the ipsilateral and then in the contralateral cortex. In addition, with repeated injection, or after a sufficient interval of time, the ipsi- and contralateral hypothalamus and the ventrolateral thalamic nuclei as well as the contralateral dorsomedial nucleus show strychnine spikes. A study of the cortical potentials and their comparison with the potentials in the nuclei which initiated the strychnine " firing " indicates that the discharge in the cortex is sustained, and may show a convulsive activity many times greater than that found in the forebrain nucleus.

(iii) Strychninization of the ventrolateral thalamic nucleus causes " firing " in the hypothalamus and dorsomedial thalamic nucleus on both sides, as well as in the contralateral ventrolateral thalamic nucleus. The " firing " of the cortex as described by Dusser de Barenne was confirmed.

(iv) Strychninization of various cortical areas (gyrus proreus of the pre-frontal lobe, the sensorimotor cortex, the primary acoustic area and the gyrus cinguli) causes the appearance of spikes in the anterior and posterior hypothalamus, the dorsomedial and the ventrolateral thalamic nuclei. In these, as well as in all other experiments, the ipsilateral discharges appeared earlier and showed greater intensity than contralateral spiking.

(v) Simultaneous recordings of the resting potentials from the cortex and forebrain nuclei show the appearance of " Dial " bursts not only in the dorsomedial thalamic nucleus as found by Morison, Findley and Lothrop, but also in the hypothalamus and ventrolateral thalamic nuclei. These observations suggest the hypothalamus as a site of origin of these grouped potentials.

The significance of these findings, particularly for the physiology of the emotional process, is discussed. (Authors' abstr.)

Relation of Electroencephalogram to Photometrically Observed Vasomotor Changes in the Brain.

Areas of cortex adjacent to ECG electrodes were photometrically matched with a standard, and physiologically induced changes were recorded along with ECG, EEG and EKG. A tendency for increase of frequency, increased potential of fast waves and decreased slow activity to be associated with vasodilatation, and for decrease of frequency, increased potential of slow waves and decreased fast activity to be associated with paling or cerebral vasoconstriction, was demonstrated. (Authors' abstr.)

The Acoustic Projection System : A Comparative Study.

The most significant finding of these experiments appears to be the difference in effect of partial section of the auditory pathway in the different species. In the monkey, boundaries between post-operatively active and inactive areas are generally sharp and characterized by presence or absence of response, whereas in the cat, there was always an intermediate zone of impaired, but not abolished, function. This is explicable on the assumption of corresponding difference of degree of dispersion and overlapping of bundles of fibers which are activated as a result of stimulation of different segments of the organ of Corti, and probably can be explained in no other way. This would imply that in the cat there is relatively less specificity of point-to-point projection than in the monkey, an implication supported for the geniculo-cortical segment of the pathway by the evidence of retrograde degeneration cited above. The latter gives the additional suggestion that there is still less precision in the rat's auditory projection.

If now a " place " theory of cochlear function is assumed on the basis of frequency of stimulation, which is certainly justifiable, there is an implicit correlation of functional (frequency) specificity with anatomical specificity of projection. This means, in turn, that in the cat there is a tendency toward frequency segregation on different fiber bundles, and in the monkey, a still greater degree of differential activation of fibers by different stimulus frequencies.

The foregoing conclusions are supported by the evidence of Licklider and Kryter, who demonstrated differential activation of auditory cortex in both cat and monkey, with the difference between the two that the resultant frequency map of the monkey's cortex is far more clearcut and regular than that of the cat. In the cat, while certain frequencies seemed to give the best response in a given region,

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a response might occasionally be elicited by other tones. This overlapping was far less noticeable in the monkey. Further confirmation comes from the experiments of Bailey *et al.* on monkey and chimpanzee. These authors call attention to the recent phyletic origin of tonotopic localization, but indicate no further advance in the process from monkey to chimpanzee. (Authors' abstr.)

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Favorable and Unfavorable Attitudes Toward Certain Enemy and Allied Countries. *Gilliland, A. R., and Blum, R. A.* 391

Personality Structure, Lactic Acid Production and Work Performance in Psychiatric Patients.

1. A fatigue experiment was carried out in 72 psychiatric patients in order to determine the relationship of work performance before exhaustion, production of blood lactic acid, and working efficiency to spontaneous complaints of fatigue, to psychiatric diagnoses, and measurements of personality.

2. While similar experiments on normals by other authors showed a significant positive correlation between lactic acid production and work, studies on patients did not reveal such a correlation. These findings warrant the conclusion that psychological factors determine the point of exhaustion in a fatigue experiment carried out with patients.

3. Except for cases with brain disease the personality disorders complain more about fatigue in general than do the psychoses. This finding contrasts with the index of efficiency (work : lactic acid), which is higher in the personality disorders than in the psychoses.

4. The experiments seem to indicate that general complaints of fatigue and inability to endure strain found in psychopathic personalities, psychoneuroses and cases of delayed recovery are due to psychological causes and are not a function of physical fitness. (Author's abstr.)

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L'ENCEPHALE.

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The Diary of a Schizoid.

Presentation of a case of mixed psychosis exhibiting three well-defined syndromes, schizoid, psychasthenic and paranoid. Extracts from the patient's journal emphasize the richness of his autistic life as contrasted with his apragmatic behaviour. There is some discussion as to the causal sequence of the three syndromes. S. M. COLEMAN.

The Body-Image.

A critical appreciation of Lhermitte's book of the same name.
S. M. COLEMAN.

(3) 1939/1940/1941.

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Anorexia Nervosa.

According to some, anorexia nervosa is closely allied to Simmond's disease, and is caused by a pituitary insufficiency. Others take the view that it has a psychological origin. In an attempt to elucidate this problem a detailed study of the physiological and psychological processes responsible for hunger and appetite is undertaken. It is concluded that fundamentally anorexia nervosa is an endocrine disorder, but that psychological factors are responsible for individual reactions.
S. M. COLEMAN.

(4) 1939/1940/1941.

*Psychasthenia and Schizophrenia. *Claude, H., and Micoud, R.* . . 421
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Psychasthenia and Schizophrenia.

An inquiry into the relationship between obsessions on the one hand and Janet's psychasthenia and Bleuler's schizophrenia on the other. It is concluded that obsessionals can be classified in a series of sub-groups in increasing malignancy: (1) Anxiety states with obsessions as a secondary feature. These are "borderline" cases. (2) The true anxiety-obsessional state with occasional paroxysms. (3) Pure obsessional states with fixed compulsions and anxiety as a less prominent feature. These patients are well adapted and pragmatic. (4) Obsessionals as for (3), but anxiety is still less marked and associated with Janet's psychasthenia.

In the rest of the series, true psychasthenia, the schizomanias, the schizophrenias and Claude's hysterias, there is progressively less anxiety and true obsessions are, to an increasing degree, replaced by stereotypy. S. M. COLEMAN.

(5) 1939/1940/1941.

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Pseudo-schizophrenic Forms of Psychasthenia.

Two cases of psychasthenia are presented in which the presence of certain symptoms is suggestive of schizophrenia. The authors incline to the view that there is common ground between these two disease entities. They are of the opinion that obsessional thoughts can progress to hallucinations, and that feelings of depersonalization can give rise to delusions of external influence.

S. M. COLEMAN.

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The Treatment of Psychoses with Methyl Guanidine Sulfate.

In a series of 12 Service men whose psychoses demonstrated schizophrenic or depressive characteristics, better results were obtained with electric convulsive therapy than with methyl guanidine sulfate. (Authors' abstr.)

The Clinical Measurement of Anxiety.

1. A simple and objective method and apparatus are described for the detection and the measurement of anxiety.
2. This method consists in a simplified form of mirror drawing and the consequent interpretation of the subject's motor performances.
3. The interpretation of the data is based on the disintegration concept of anxiety.
4. A number of cases are presented to illustrate the practical application of the method and its possibilities in diagnostic work. (Authors' abstr.)

Prevalence of Pulmonary Tuberculosis in New York State Institutions for the Mentally Ill.

1. Chest X-ray surveys of all the public mental institutions in New York State have been completed.
2. Clinically significant pulmonary tuberculosis was diagnosed in 5·6 per cent. of the patients in the State hospitals and in 2·4 per cent. of the patients in the State schools and Craig Colony.

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3. The prevalence rates increase with the length of time between first admission and the X-ray survey. They also increase with age, in the hospitals up to age 45, and in the schools at all ages.

4. Among patients with time periods up to five years between first admission and X-ray, the prevalence of tuberculosis among dementia praecox patients is in general lower than, or approximately equal to, the prevalence among patients with other types of mental disease.

5. Clinically significant pulmonary tuberculosis was diagnosed among 1·1 per cent. of the employees of the State hospitals and 0·7 per cent. of the employees of the State schools and Craig Colony.

6. Facilities for the segregation of patients with clinically significant pulmonary tuberculosis are inadequate at present, but plans are being made for the provision of well-equipped centers for the segregation and treatment of these patients.

(Authors' abstr.)

A Comparison of the Wechsler-Bellevue and the Revised Stanford-Binet Scales for Adult Defective Delinquents.

A group of 50 adult mental defectives in an institution for defective delinquents was tested with both the Wechsler-Bellevue and the Revised Stanford-Binet Scale—Form L in ABBA order. The following conclusions are justified by the test results:

1. The Wechsler-Bellevue Adult Intelligence Scale gives consistently higher I.Q. scores for mental defectives in 84 per cent. of the cases.

2. The mean I.Q. difference in favor of the Bellevue Full Scale over the Stanford-Binet is 10·92 I.Q. points; in favor of the Bellevue Verbal Scale 12·50 I.Q. points; and in favor of the Bellevue Performance Scale 13·78 I.Q. points.

3. The size of the difference in I.Q. score in favor of the Bellevue over the Binet varies directly with the increase in chronological age of the subjects. A large part of the discrepancy in I.Q. results between the two scales may be attributed to the differences in norms and principles of standardization. Thus, the Bellevue Scale allows for the normal deterioration due to age, whereas the Stanford-Binet does not; and, therefore, old subjects will score much higher on the Bellevue.

4. Significant differences in comparative performances on the two scales are found in the low grade mental defect group and the borderline group when the Bellevue Full Scale and Verbal Scale are involved. With respect to the Bellevue Performance Scale as compared with the Stanford-Binet, the significant differences in comparative performance are found in the moron and borderline groups.

5. A coefficient of correlation of ·765 ± ·04 is found between the Bellevue Full Scale and the Stanford-Binet, ·733 ± ·044 between the Verbal Scale and the Stanford-Binet, and ·506 ± ·071 between the Performance Scale and the Stanford-Binet.

6. Regression equations are provided for predicting probable Binet I.Q. from Bellevue Full Scale, Verbal Scale or Performance Scale I.Qs., and *vice versa*.

7. On the basis of this study, it is concluded that, particularly in the borderline groups, either test alone must be supplemented by social history data and psychiatric interview, in order to diagnose mental deficiency properly. Also, other tests should be used to supplement the data. (Author's abstr.)

The Anticonvulsant Action of Tridione.

Tridione (3,5,5-trimethyloxazolidine-2,4-dione) is a new compound showing marked anticonvulsant and slight sedative action in humans. A preliminary report is made concerning the effectiveness of tridione as compared with phenobarbital and dilantin. In a group of 11 mentally defective institutionalized epileptics, three were better controlled by tridione than with previous medications, six were essentially unchanged, and two had more seizures with tridione than with phenobarbital and dilantin. Nine of the 11 subjects showed a strong anticonvulsant action with tridione, which appears to be as effective as phenobarbital or dilantin in antagonizing convulsions. No major toxic effects were noted, although two patients died of extraneous causes during the experiment. The sedative action of tridione in large dosages is effective in decreasing the noisy overactivity of deteriorated epileptics. It is concluded that tridione is a strong anticonvulsant drug which deserves further intensive investigation. (Author's abstr.)

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Psychological Changes in Organic Brain Lesions and Ablations.

There are three fundamental questions which arise in relation to the clinical value of systematic investigations of the psychological alterations in organic disease of the cerebral cortex. These might be stated as follows:

1. Is there a group of psychological changes which occurs with sufficient frequency and consistency to be considered as an " organic psychological syndrome " ?

2. Can such mental symptoms be of any potential value in contributing toward the localization of the pathological process in the cortex ?

3. Can an investigation of the mental changes contribute toward a knowledge of the nature of the pathological process ?

A review of the descriptive or qualitative studies of the mental changes in organic brain disease enables one to hazard a reply to each of these questions.

With respect to the first question, it may be stated that there is a group of general and diverse mental symptoms which occurs with sufficient frequency and consistency to be considered, at least tentatively, as constituting a " frontal-lobe mental syndrome." Intellectual deterioration, memory defects, impaired abstract-thinking ability, loss of initiative, difficulties in sustaining attention, alterations in the general personality structure, and changes in psychomotor tempo and mood tone are particularly characteristic of tumors and other lesions of the frontal region of the cortex. These changes are less severe and less consistent in instances of ablation of frontal lobe tissue. These same psychological symptoms apparently occur frequently in temporal lobe involvement, especially in tumors and some types of progressive lesions in that area. However, it may be noted that mental symptoms in temporal lobe disease are apparently not as marked or consistent as in frontal lobe disease process than in the case of focal frontal-lobe involvement.

It is possible, therefore, that the mental changes cited above are related to frontal-lobe disease, and that their appearance in certain types of focal temporal region disease is a result of secondary involvement of the frontal cortex by virtue of either increased intra-cranial pressure of a generalized nature or some type of progressive degenerative lesion implicating the frontal region. Goldstein has stated that damage in any area of the cerebral cortex will eventually irradiate to the frontal region. However, qualitative studies of parietal and occipital disorders yield no mental changes similar to those observed in cases of fronto-temporal involvement. It appears, therefore, that the mental symptoms are of some value in the localization of the disease process within the cortex, being indicative of either primary or secondary involvement of the frontal cortex. This would seem to

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imply a positive answer to the second question posited above; the time of onset of the mental changes in the disease process has important implications for temporal-region localization in that a relatively late appearance of the mental syndrome would be suggestive of focal temporal-lobe disease. These conclusions are, of course, derived entirely empirically.

The third question asked is the most difficult, and any positive statements must be considered as highly tentative. However, it is felt that some indication of the nature of the disease process may emerge from a study of the severity, as well as the number, of the mental symptoms which are present. Frontal lobe tumors and other focal lesions along with temporal tumors appear to give rise to the most severe and consistent mental symptoms, and temporal lesions of a progressively degenerative type are next in importance. In the case of the latter, the psychological changes appear later in the disease process. Finally, it is found that the symptoms are consistently less severe and least frequent in cases of partial bilateral or unilateral frontal or temporal ablation.

The hypotheses of inter-lobular and intra-lobular transfer of functional ability have been suggested by various authors as possible bases for the absence of marked mental changes where cortical tissue has been excised. It is conceivable, as Brickner has pointed out, that psychological function is bilaterally represented within the prefrontal cortex. It is further possible that representation of functional ability is of a generalized nature within the entire association area of any one frontal lobe. The process of transfer of psychological function within the prefrontal cortex requires the integrity of the commissural fibres through the corpus callosum as well as the association fibres, and may be thought of in terms of a gestalt-like mechanism of interacting nerve fibres. This process of nerve fibre interactivity is presumably disturbed, and cannot be carried out adequately in the presence of pathological tissue in the frontal region, as evidenced in the severity and frequency of the mental symptoms in frontal tumors and other lesions of that area. It appears that only in the absence or excision of prefrontal tissue is it possible for such a transfer of function to take place with the resultant mild psychological changes which have been observed. Psychological studies, however, have demonstrated that such a transfer of functional ability is hardly of a complete nature, although it seems sufficient to escape general qualitative and clinical symptomatic detection. Specialized test methodologies suggest the presence of certain apparently irreversible mental deficits following excision of prefrontal tissue, which may well be missed unless a specific controlled situation is brought before the patient. Such a definitely controlled situation is that of psychological test procedure. Also, such test methods have served to break down certain of the broad and more general mental changes qualitatively observed into more specific and definite functional defects.

The approach to the problem of the mental changes in organic brain disease through the media of psychological test techniques has been described as being of two basic kinds. Both types of studies are primarily concerned with the relationship between the frontal cortex and mental function. One approach has employed conventional or *unspecialized* tests of formal intelligence, and general results indicate negative findings with reference to the presence of " general intellectual deterioration." Pre-operative and post-operative test comparisons upon patients undergoing excision of frontal tissue yield no gross lowering in the intelligence test scores following brain surgery. In fact, in some instances, a definite gain in the intellectual level has appeared following frontal ablation.

However, with the development and application of *specialized* psychological test procedures to this general problem, certain subtle but definite mental defects emerge. Such test development has consisted largely in an analysis of certain of the component elements of the so-called " general intellectual process " such as abstract thinking, memory ability, or judgment and comprehension. Other symptomatic and specialized tests have also yielded positive findings. Among these are the Rorschach, the Bender test of visuo-motor gestalt function, and tests of sustained attention. Such studies have been primarily applied in cases of partial unilateral frontal excision, in which the qualitative studies have noted either mild mental changes or complete absence of any mental defects after surgery.

The conclusion seems warranted that specialized test procedures can and do reveal definite impairment in mental functioning in cases in which prefrontal lobe

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tissue has been removed surgically, whereas clinical observation of a qualitative kind finds no psychological deficits in such cases. The presence of certain subtle irreversible mental defects points to the fact that the existence of any mechanism for the lobular transfer of psychological function within the frontal cortex cannot be visualized as a complete "regenerative" process. Certain mental functions suffer irreparable damage when frontal tissue is removed, but such defects can be studied or detected only by means of a highly specialized and controlled type of situation. The principal contribution of psychological test procedures in this problem must lie in the subsequent development of specialized situations, which would call forth and reveal impairment in mental functioning which escapes qualitative clinical detection.

At present, superficial study of the investigations utilizing test procedures reveals a somewhat confused picture. One must not minimize, however, the emergence of some consistent positive trends. The difficulties in obtaining adequate quantitative sampling at the human level in such cases along with the problems inherent in clinical diagnosis and localization must be recognized. However, despite the use of a great variety of tests upon all manner of organic clinical entities in an unsystematic manner, it has been shown that certain definite conclusions are possible from an organized survey of the field. The mental changes in organic brain disease appear clearly to embrace more than any single psychological functional sphere. Experimental investigation must proceed from numerous and different directions if the parts of the puzzle are to be joined together.

It is felt that experimental progress demands the satisfaction of two basic methodological considerations. First, it would seem that the primary and fundamental situation must involve comparisons between the test performances of patients with organic brain disorders and normal persons. Logically, one would expect to see the more obvious differences emerge in such a comparison. Then one could proceed to a study of patients with respect to the problems of different types of brain disease and differential localization of brain damage with chances of attaining greater understanding and accuracy. Second, it is felt that specialized test development should be directed toward the various spheres of possible psychological impairment. The diverse nature of the mental defects qualitatively seen in organic cases must be totally explored with the use of specialized test techniques. The problem of mental alteration in organic disease of the brain cannot attain certainty and generalization in terms of a single test procedure. A battery of test techniques which will attack psychological functioning in the organic patient at every potential vulnerable point appears to be most advantageous. It is felt that one of the principal justifications for a review of this kind lies in its demonstration of the type and multiplicity of such vulnerable points of attack.

(Author's abstr.)

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QUART. J. STUD. ALC.

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Case Histories of Compulsive Drinkers. *Wortis, H., et al.* 300
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Treatment of Experimental Liver Cirrhosis.

Rats were maintained on a cirrhosis-producing diet for 63 to 84 days, and the status of the liver of each rat was determined at that time by means of a biopsy. The rats were then treated by the daily administration of large amounts of choline chloride, or by using a diet containing larger amounts of casein. The gross and histological appearance of the liver after treatment was compared with the biopsy findings. During the period of treatment a striking improvement in the gross and microscopic appearance of the liver occurred. Although therapy had no recognizable effect on the fibrous tissue present, it apparently prevented further progression of the cirrhotic process and produced a marked improvement in the histological appearance of the parenchyma. (Authors' abstr.)

Alcohol as a Preventive of Experimental Neuroses.

Nine cats were trained in a feeding-response situation, and then on three to seven occasions were given 2 to 2·5 c.c. of alcohol per kgm. body-weight before being subjected to shock stimuli that induced severe conflicts in the feeding situation. Of the nine animals, only three developed relatively mild neuroses. When, however, the conflicts were repeated without antecedent intoxication, these three animals became more severely neurotic, and five of the six others also developed marked neuroses. These reactions, when graded according to an objective scale and analyzed statistically, were found to be stable and significant. It is concluded, therefore, that alcohol affords partial protection against the neurotogenic effects of conflictful experiences, probably by (*a*) diminishing the acuity of sensory experiences, (*b*) disorganizing perceptual-integrative response formations, and (*c*) impairing the retention of such reaction patterns as are temporarily formed. The correlation of these observations with parallel phenomena in human behavior is discussed briefly. (Authors' abstr.)

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The Rorschach Test and School Success Among Mental Defectives. *Abel, T. M.* 105
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1. Biochemistry, Physiology, Anatomy, Pathology, &c.

Acid Phosphatase in Growing Axons and Degenerated Nerve Tissue. Lassek, A. M., and Hard, Walter L. [*Science*, **102**, 123–4 (1945).]

Using a new method of determination to be described later, the authors have studied acid phosphatase in the central nervous system of cats and monkeys (*cf.* Wolf *et al.*, *C.A.*, **37**, 6334[1]). Studies of the growing neuron in the cat indicate that variations in the time of appearance of the enzyme in the axons are to be correlated with the phylogenetic background of the several nerve tracts as well as the ontogenetic age of the animal. The tracts which react positively at birth are known to be the first to become myelinated. Studies of the degenerating neuron in the monkey show a marked acid phosphatase reaction. Myelin sheath degeneration following axonal damage may be due to the liberation of an enzyme from the latter structure. Conclusion: Studies on acid phosphatase in the nervous system open up possibilities in the field of neuronal metabolism and function, and an additional method is offered for demonstrating both normal and degenerated nerve tissue. H. G. STEINMAN (Chem. Abstr.).

Relation Between Fiber Diameter and Action Potential of Single Nerve Fibers. Hertz, Helge. [*J. Physiol.*, **104**, 1–2P (1945).]

Solutions of NaCl or glucose up to 7 times hypertonic strength or ½ hypotonic had no effect on the diameter or action potential of single nerve fibers during 10 minutes' exposure. Irreversible changes occurred thereafter. Immersion of the nerves in isosmotic solutions with KCl content 6–10 times normal caused immediate and reversible reduction of the amplitude of the action potential without change in shape of the fiber. The effect could be only partially counteracted with a corresponding increase in $CaCl_2$ concentration. Removal of Ca++ was without effect for three-quarters of an hour; $MgCl_2$ (200 mgm. per cent.) and acetylcholine chloride (1 mgm. per cent.) were without effect in two hours.
H. L. WILLIAMS (Chem. Abstr.).

Experimental Technique and Electric Shock. Delmas-Marsalet, P., Servantie, L., and Faure, J. [*Compt. rend. soc. biol.*, **138**, 589–90 (1944). *Discussion.*]

Variations in total blood CO_2 in electric shock.
L. E. GILSON (Chem. Abstr.).

Role of Muscle Activity. Servantie, L., Delmas-Marsalet, P., Faure, J., and Blanc, M. [*Ibid.*, **138**, 591–2.]

In convulsions induced by electric shock there is a large decrease in the alkali reserve. This and the other chemical changes observed in the blood are the result of the intense muscular contractions. L. E. GILSON (Chem. Abstr.).

Experimental Study of the Hyperglucemia Following Electrically Provoked Epileptic Convulsions in the Rat. Delay, Jean, and Soulairac, Andre. [*Compt. rend. soc. biol.*, **138**, 490–1 (1944).]

Electric shock convulsions produce an important increase in blood sugar which is not entirely prevented by bilateral adrenalectomy or administration of insulin, or both. The hyperglucemic mechanism of the hypothalamic-hypophyseal region of the central nervous system appears to be involved.
L. E. GILSON (Chem. Abstr.).

Muscle-action Potentials During Electric and Chemical Stimulation of the Motor Area of the Cortical Cortex in the Waking Animal and Under Anesthesia. Juul, Aksel. [*Acta Physiol. Scand.*, **5**, 152–64 (1943).]

Muscle-action potentials show a frequency of 2–3 per second during electric stimulation of the cortex and about 80–90 per second during chemical stimulation. Under the influence of strychnine, frequencies up to 125 per second have been recorded. This is not influenced by Ca, but quinine does inhibit the muscle-action potentials provoked by the action of strychnine on the cortex. Picrotoxin affects the cortex motor area very much like strychnine, while cardiazole in 10 per cent. solution has a very slight central effect. S. MORGULIS (Chem. Abstr.).

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Excitability of the Respiratory Center During Sleep and During Evipan Anesthesia. Østergaard, Torsten. [*Acta Physiol. Scand.*, **8**, 1–15 (1944).]

The excitability of the respiratory center is lowered during sleep, and even more so in sleep induced by hypnotic doses of evipan. The depressive action of evipan increases with its concentration in the blood, and at a certain concentration the center is the first to be put out of commission, the respiration being paralyzed. The ventilation in sleep is decreased 20–38 per cent. and in evipan anesthesia 48–80 per cent., while the alveolar CO_2 tension is raised 3–6 mm. and 8–9 mm. respectively. In the former the effect was due to a reduction in frequency, in the latter to a reduction in both frequency and depth of breathing.

S. MORGULIS (Chem. Abstr.).

Action of Ergotamine on the Chemical and Mechanical Reflexes from the Carotid Sinus Region. Euler, U. S. v., and Schmiterlow, C. G. [*Acta Physiol. Scand.*, **8**, 122–33 (1944).]

Small doses of ergotamine inhibit the pressor reflex of the carotid sinus, which can be released by lowering the pressure, while leaving unaffected the response to chemical stimuli (cyanides, nicotine) and hypoxia.

S. MORGULIS (Chem. Abstr.).

A Sympathomimetic Pressor Substance in Animal Organ Extracts. Euler, U. S. v. [*Nature*, **156**, 18–19 (1945).]

The active substance was obtained by continuous fluid extraction with ether of extracts of liver, spleen, kidney, heart, lung, voluntary muscle, smooth muscle, brain, pancreas, and testis. No pressor activity was found in extract from human placenta. The biological reactions point to a sympathomimetic substance probably related to the "*sympathicusstoff*" of Loewi.

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

Functional and Organic Injuries of the Central Nervous System of Cats in Low-pressure Experiments. Altmann, Hans-Werner, and Schubothe, Helmut. [*Beitr. path. Anat.*, **107**, 3–116 (1942).]

Cats were exposed on successive days, after a short adaptation period, for 6–8 hours to a degree of air dilution which was just compatible with life, and corresponded on an average to a nominal altitude of 10,000–11,000 m. Some of the animals died spontaneously during or after the experiment; others were decapitated or otherwise killed by rapidly lowering the pressure. During the daily experiments, as well as in the intermediate periods, severe neurological symptoms were noted which were explained as consequences of the reduced oxidative metabolism in the central nervous system. Four phases were observed: Pre-asphyctic stimulation, asphyctic paralysis, post-asphyctic stimulation, and residual states of post-asphyctic paralysis. These stages are also evident in various states of cerebral asphyxia from different sources in man and animals described in the literature. In all animals with rather prolonged residual disturbances a pathologic-anatomical finding arises which can consist of elective parenchyma necrosis or complete softening according to the duration of the O deficiency. The various pathological types of ganglion cells were explained by the differences in intensity of the O deficiency. Chiefly "ischemic," "homogenizing," and "severe" forms were found. The cortex of the cerebellum is the most sensitive to O withdrawal, followed by the cerebral cortex; damage to the brain stem is always less. The prolonged hypoxia, which can be intensified locally by circulatory disturbances, is considered the most important cause of the development of the histopathological changes described.

RUTH BERGGREN (Chem. Abstr.).

Androgens in Mongoloid Deficiency. Bixby, Emily M., and Benda, Clemens E. [*Am. J. Mental Deficiency*, **49**, 138–48 (1944).]

The amount of androgen (I) present in a 24-hour urine specimen was determined in 13 male and 10 female mongoloid patients by extraction with CCl_4 and development of color by a semiconcentration modification of the Zimmermann reaction. The results were in agreement with 13 similar determinations by Talbot *et al.*

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(*C. A.*, **37**, 5479[1]) in showing no deviation from the normal range in male mongoloids from 8 to 18 years old. Above this age the (I) level was either in the lower part of the normal male range or in the female range, which is lower than the male. In the female subjects, most of whom were over 18 years old, a large proportion of the values were below the normal range, but two, from patients showing hirsutism, were abnormally high. The findings are considered to show that in mongoloids the formation of (I) in the adrenal cortex is normal, but no (I) is made in the male gonads. WARREN M. SPERRY (Chem. Abstr.).

The Role of Pyruvic Acid in Fatigue. Meyer, Nathaniel. [*N.Y. State J. Med.*, **45**, 1450–1 (1945).]

The blood pyruvic acid was lowered to normal levels in a group of fatigued individuals who received a nutritional concentrate comprised of a combination of several types of brewer's yeast and yeast extract. There was little or no significant reduction in the blood pyruvic acid in a control group, or in a group given a brewer's yeast extract. The progress of fatigue elimination was parallel to the reduction of the blood pyruvic acid content to normal.

RUTH BERGGREN (Chem. Abstr.).

Cholinesterase. I. Gold Salts and Cholinesterase. Frommel, Edouard, Herschberg, Alexandre D., and Piquet, Jeanne. [*Compt. rend. soc. phys. hist. nat. Geneve*, **60** (*in Arch. sci. phys. nat.*, **25**), 97–100 (1943); *cf. C. A.*, **39**, 2346[9]; **39**, 2333[9], 2518[1].]

Au Na thiosulfate (Sanocrysin) and Ca aurothioglycolate (Myoral) inhibited the cleavage of acetylcholine *in vivo* and *in vitro* by cholinesterase from horse serum or from leech muscle by 25–40 per cent., depending on concentration. Since the more dilute solutions were the more inhibitory, an ion effect was postulated. Eserine 1 : 1,000,000, employed as a standard for the inhibitory reaction, gave 90–95 per cent. inhibition.

II. *Influence of Arsenic and Lead on Enzymic Cleavage of Acetylcholine.* [*Ibid.*, 100–4.]

Arsenic in the form of neoarsphenamine partially inhibited cholinesterase *in vivo*. Pb tetraethyl gave 25–75 per cent. inhibition *in vivo* and *in vitro*.

III. *Three Other Inhibitors of Cholinesterase: Aluminum, boron, zinc.* [*Ibid.*, 123–8.]

Salts of Al, B and Zn gave 15–37, 20–30 and 18–48 per cent. inhibition, respectively, *in vitro*. In the case of Al and B salts a 1 : 100,000 solution was more inhibitory than a 1 : 1,000 solution, while the reverse was the case with Zn. *In vivo* the effects were more marked; Zn salts gave 55 per cent. inhibition. Ni inhibited or accelerated cholinesterase activity, depending on concentration.

IV. *So-called Desensitizing Medicaments and Their Relation to Cholinesterase.* [*Ibid.*, 128–35.]

Na hyposulfite, $MgCl_2$, Ca galactogluconate, and ascorbic acid activated cholinesterase. The first two were true activators, and the others appeared to be reactivators of previously destroyed enzyme.

V. *Action of Ionized Inhibitors and Activators on the Cholinesterase of Snail Lymph.* [*Ibid.*, 175–8.]

Cholinesterase from the hemolymph of *Helix pomatia* was inhibited by Au, As, Pb, Zn, B, Hg, H, Sb, Cu and Na hypophosphite, activated by Mg, Ca, and Na hyposulfite, and inhibited or activated, depending on concentration by ascorbic acid. In general this cholinesterase behaved like the mammalian enzyme, except for differences in degree of inhibition or activation.

VI. *Action of Antimony, Bismuth, Mercury, Barium, Copper, and Phosphorus Ions on the Enzymic Cleavage of Acetylcholine.* [*Ibid.*, 179–84.]

Cholinesterase from horse or guinea-pig serum was more or less strongly inhibited by Sb, Bi, Hg, Ba, Cu and P. Through *Chem. Zentr.*, 1944, (1), 1387–8.

MARION HORN PESKIN (Chem. Abstr.).

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Comparative Action of Histamine and Acetylcholine on Secretion of Adrenaline, and the Action of Atropine on Cholinesterase and Histaminase. Danielopolu, D., Popesco, M., and Mezincesco, Ed. [*Comp. rend. soc. biol.*, **138**, 381–2 (1944).]

In dogs anesthetized with phenobarbital the injection of histamine or acetylcholine directly into the adrenal capsule produced an immediate marked hypertension from adrenaline discharge. Pre-treatment with atropine intensified the effect. Histamine injected intravenously produced marked hypotension; histamine after atropine produced hypertension in intact dogs, but not in adrenalectomized dogs. Acetylcholine injected intravenously produced first hypotension, then a mild hypertension, due to adrenaline discharge; acetylcholine after atropine produced immediate hypertension in intact dogs, but not in adrenalectomized dogs. Hence it appears that acetylcholine and histamine provoke adrenaline discharge by direct action on the chromaffin tissue of the adrenal medulla, and atropine intensifies the effect by inhibiting the destruction of acetylcholine by cholinesterase and possibly of histamine by histaminase.

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

The Effect of Drugs on Cholinesterase. Nachmansohn, David, and Schneemann, Helen. [*J. Biol. Chem.*, **159**, 239–40 (1945).]

The inhibitory effect of various drugs was studied on four enzyme preparations. Two representing specific cholinesterase were prepared from electric tissue, and from the nucleus caudatus of ox brain. Unspecified esterase preparations were prepared from horse serum and from guinea-pig pancreas. The first three preparations were purified. Of the drugs studied (caffeine, quinine, quinidine, cocaine, lobeline) only caffeine acted exclusively on cholinesterase. It shares this property with theobromine. The other drugs showed only quantitative differences. Nicotine was found to be a weak inhibitor of both types of esterases, and strychnine and veratrine were found to be strong inhibitors of both.

MARJORIE ANCHEL (Chem. Abstr.).

Influence of Vagotonin on the Cholinesterase Activity of the Blood Serum of the Dog. Bovet, D., and Santenoise, D. [*Compt. rend. soc. biol.*, **135**, 844–7 (1941).]

In normal and depancreatized dogs the intravenous injection of 1 mgm./kgm. of vagotonin causes a marked decrease in serum cholinesterase activity lasting several hours. Insulin free from vagotonin has no such action.

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

Cholinesterase Activity of Peripheral Nerves. Boell, Edgar J. [*J. Cellular Comp. Physiol.*, **25**, 75–84 (1945).]

The favorable influence of frozen-dried nerves on the growth of nerve fibers during regeneration led to study of the biochemistry of such preparations. The cholinesterase (I) activity was chosen as probably characteristic. It was not affected by the freezing-drying process when the freezing temperature was below — 130°. Above that temperature there was an inverse relation between (I) activity and freezing temperature. Degeneration of fresh and frozen-dried nerves caused a marked reduction of (I) activity. Unlike brain tissue, peripheral nerves contained both (I) and pseudo-(I). Measurement of (I) activity gave an accurate indication of the biochemical state of nerves under various conditions and of the effects of variations in the technique of processing. H. L. MASON (Chem. Abstr.).

Cholinesterases. Augustinsson, K. B. [*Nature*, **156**, 303 (1945).]

Results of electrophoresis experiments support the view that the cholinesterase of blood serum and that of the erythrocytes are not identical.

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

Fumaric Acid Oxidation by Ground Preparations of Pigeon Brain. Long, C. [*Biochem. J.*, **39**, 143–8 (1945).]

Fumarate added in small amounts increases the O uptake of dialyzed pigeon-brain suspension but not of minced brain tissue. Pyruvic acid is formed in the presence of arsenite, this being catalyzed by inorganic phosphate, inhibited by malonate, and unaffected by adenine nucleotide. *l*-Malate seems to behave like fumarate.

S. MORGULIS (Chem. Abstr.).

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Nervous Transmission. (1) *The Axon. Kellaway, Peter E.* [*Rev. Can. biol.*, **4**, 295–320 (1945) (*in English*).]

The dynamics of the propagation of excitation along thin chemically alterable interfacial films in non-living polyphasic systems is considered in relation to the problem of nervous transmission in peripheral nerve fibers. From the experimental evidence it is concluded that the propagation of the axonal impulse depends upon travelling waves of re-excitation which are electric in nature, and such that the potentials arising in each active region along the fiber are responsible for the initiation of activity in resting adjacent regions.

A. PAPINEAU-COUTURE (Chem. Abstr.).

The Effect of Augmenting the CO_2 Intake on the Blood Supply and Oxygen of the Brain and the Extremities Under Conditions of Hypoxemia. Ardashnikova, L. I., and Aronova, G. N. [*Byull. Eksptl. Biol. Med.*, **18**, *Nos.* 1–2, 34–7 (1944).]

Experiments with dogs in which the O_2 supply was lowered and the CO_2 supply raised resulted in a decrease in the O_2 consumption of the brain and the muscle extremities. Under these conditions the arterio-venous difference in O_2 was unchanged in the brain and decreased in the muscle extremities. The effect of these changes on the amount of blood supplied to the brain and muscle extremities is also discussed.

S. GOTTLIEB (Chem. Abstr.).

The Interaction Between the Hormones of the Ovary and the Hypophysis. Eskin, I. A. [*Byull. Eksptl. Biol. Med.*, **18**, *Nos.* 1–2, 68–72 (1944).]

The effect of the administration of adrenaline and ergotoxine on the development of luteinizing activity by folliculin benzoate was studied on rabbits. These results, together with those obtained by the study of the administration of atropine and acetylcholine, are discussed in the light of the mechanism of the interaction of the hormones of the ovary and the hypophysis.

S. GOTTLIEB (Chem. Abstr.).

Mechanism of Glycolysis in the Brain of Animals During Different Stages of Ontogeny. IV. Inhibition of the Glycolytic Capacity of the Brain by Glycerol Aldehyde. Khaikina, B. I. [*Biochem. J. (Ukraine)*, **17**, 359–68 (*in Russian*, 369–70; *in English*, 370–2) (1941); *cf. C. A.*, **35**, 7014[8].]

Addition of 0·25 per cent. of glyceraldehyde under anaerobic conditions to the brains of rabbits and chickens, in embryonic and postnatal stages, blocked the formation of lactic acid from the glucose substrate, but not in presence of hexose phosphate.

BORIS GUTOFF (Chem. Abstr.).

Is Cerebrospinal Fluid an Ultrafiltrate? Ambard, L., and Trautmann, S. [*Compt. rend. soc. biol.*, **138**, 187–8 (1944).]

Human spinal fluid contains 0·43–0·44 per cent. of Cl. Blood plasma containing 0·36 per cent. of Cl gives an ultrafiltrate containing 0·39 per cent. by the usual method of ultrafiltration. The difference between 0·43 and 0·39 is larger than can be explained by the difference in protein content of spinal fluid and plasma. Experiments show that when a protein solution containing chloride is well stirred during ultrafiltration, the Cl of the ultrafiltrate is about 10 per cent. higher than without stirring as in the usual procedure.

L. E. GILSON (Chem. Abst.).

Remarks on Ultrafiltration. [*Ibid.*, 227–9.]

As the ultrafiltration of serum or plasma continues the successive portions of ultrafiltrate contain less and less Cl. Since blood flows rapidly, the physiological ultrafiltration through the capillary walls is like ultrafiltration with stirring; hence the ultrafiltrate should contain about 10 per cent. more Cl than the classical value of 0·39 gm. per 100 c.c. This makes it possible to regard spinal fluid as an ultrafiltrate.

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

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The Transfer of Penicillin into the Cerebrospinal Fluid following Parenteral Administration. McDermott, Walsh, and Nelson, Russell A. [*Am. J. Syph., Gon., Ven. Dis.*, **29**, 403–15 (1945).]

With dilution techniques of bio-assay (sensitive to 0·02 units), no penicillin (I) was demonstrable in the cerebrospinal fluids obtained from 70 patients who had received (I) in usual dosages by parenteral routes. The presence of neurosyphilis and tuberculous meningitis did not alter these results. Approximately 0·02 per c.c. units of (I) was found in the cerebrospinal fluids of patients who had received one or two intramuscular injections of 300,000 to 500,000 units of (I) 3–4 hours previously. At concentrations of 0·078–1·25 units per c.c. of serum, (I) is diffusible through artificial membranes *in vitro* and into ascitic fluid *in vivo*. Thus the failure of (I) to appear in the cerebrospinal fluid is not because it is bound to non-diffusible elements in the serum. The interpretation of these findings with respect to the (I) treatment of neurosyphilis and purulent meningitis is discussed.

A. Dietz (Chem. Abstr.).

Changes of the Cerebrospinal Fluid and Blood in Closed Traumas of the Central Nervous System. I. Study of the Cerebrospinal Fluid and Blood Pressures. Mandel'boim, A. B. [*Byull. Eksptl. Biol. Med.*, **17**, *Nos.* 1–2, 22–6 (1944).]

Thirty-five patients were studied: (Group 1) those with cerebral contusion of 3–6 months' duration; (Group 2) those with spinal contusion of 3–9 months' duration; (Group 3) those with commotio-contusion syndrome of 3–8 months' duration. The cerebrospinal fluid was clear and colorless; its pressure was not constant and varied greatly. In patients with cerebral contusion two types of initial fluid pressure were observed: (1) Low (60–100 mm. of H_2O); (2) high (280–390 mm. of H_2O). The low pressure was characteristic of patients with general retardation, increased somnolence and persistent disorders of the sympathetic nervous system. The high pressure was characteristic of patients with various forms of hyperkinesis. The fluid pressure changed with the change in the clinical picture. All the patients had normal blood pressure, and the pulse rate was 68–100 per minute. In patients with spinal contusion, increased initial fluid pressure was observed (190–350 mm. of H_2O). The pressure varied slightly. Blood pressure was normal; pulse rate, 66–105 per minute. Patients with commotio-contusion syndrome had variable values for the initial and final fluid pressure. Blood pressure was normal; pulse rate, 90–110 per minute.

II. Chemical Variations of the Cerebrospinal Fluid and Blood. [*Ibid.*, *No.* 3, 13–16.]

Morphological changes have not been observed in cerebral and spinal contusions or in commotio-contusion syndrome. Pandy's and Nonne-Apelt globulin tests were negative. The total protein content, 0·16–1·33 per cent., was determined by the Roberts-Brandberg-Stol'nikov method. Reducing substances in the cerebrospinal fluid and blood were investigated by the Hagedorn and Jensen method (*cf. C. A.*, **17**, 2721). Electrolytes in cerebrospinal fluid and blood were determined: K by Kramer's method; Ca by de Vaard's method; Cl by the modified method of Bang. Colloidal reactions, Takata-Ara and Goldsol (Lange) were carried out in some cases. In cerebral contusion the content of electrolytes in the cerebrospinal fluid and blood varied widely. In patients with general retardation and a sharply decreased motor initiative, an increased Ca content in the cerebrospinal fluid was observed. The improvement in the condition of the patients was accompanied by a slow decrease of the Ca content in the cerebrospinal fluid to normal. In patients with cerebral contusion the sugar content in the cerebrospinal fluid was increased; the blood sugar was also increased. No change in Cl was observed. In the presence of various forms of hyperkinesis there was an increase of K in the blood and an increase of the K/Ca index in the cerebrospinal fluid. The sugar contents in the cerebrospinal fluid and the blood were decreased. Colloidal reactions, goldsol (Lange) and takata-ara in the cerebrospinal fluid showed curves of a distorted type. In patients with spinal contusion an increase of K in the blood was usually observed and, in some cases, also of the K/Ca index. The blood-sugar content was normal. Colloidal reactions in the cerebrospinal fluid showed distorted curves. In patients

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with commotio-contusion syndrome the electrolyte content varied. The K content was increased in most cases. The ratio of K/Ca was not constant. The sugar index was normal or slightly decreased. Colloidal reactions had a Leuszacke-type curve and, in rare cases, curves of the type lues cerebrospinalis.

SONYA G. MACHELSON (Chem. Abstr.).

Permeability of Hemato-encephalic Barrier in Spinal Cord Traumas. Kirichenko, A. M., Lukina, T. S., and Freidin, Kh. M. [*Byull. Eksptl. Biol. Med.*, **17**, *No.* 6, 13–15 (1944).]

The investigation of the permeability of the hemato-encephalic barrier and of the composition and pressure of the spinal cord fluid disclosed a considerable number of pathological changes in the fluid. It seems that these changes are fundamentally connected with results of an injury of the membrane characterized as a chronic process after hemorrhages into membranes and into cerebral substance. In some traumas, especially in the lower section of the spinal column, the constant influence of the infection from the adjacent osteomyelitic nidus of the spinal column ought to be taken into consideration. SONYA G. MACHELSON (Chem. Abstr.).

Oxidation of Pyruvate and Glucose in Brain Suspensions from Animals Subjected to Irreversible Hemorrhagic Shock, Carbon Monoxide Poisoning, or Temporary Arrest of the Circulation: A Study of the Effects of Anoxia. Rosenthal, Otto, Shenkin, Henry, Drabkin, David L., Parkins, Wm. M., and Gibbon, Mary H. [*Am. J. Physiol.*, **144**, 334–47 (1945).]

Experimental findings suggest that a destruction of respiratory enzymes or a critical deficiency of co-enzymes in the brain is not a primary consequence of anoxia, nor do such factors account for the development of irreversible functional and histologic alterations that may follow anoxia. E. D. WALTER (Chem. Abstr.).

Excitant Action of Ascorbic Acid on the Nervous System. Chauchard, Paul. [*Compt. rend. soc. biol.*, **135**, 1574–7 (1941); *cf. C. A.*, **38**, 1770[9].]

In normal rats and guinea-pigs the intraperitoneal injection of ascorbic acid produces a decrease in chronaxia, probably by a direct action on the nervous system. L. E. GILSON (Chem. Abstr.).

Chronaximetric Study of the Neuromuscular Disturbances Accompanying Avitaminosis E. Lecoq, Raoul, Chauchard, Paul, and Mazoue, Henriette. [*Compt. rend. soc. biol.*, **138**, 408–9 (1944); *cf. C. A.*, **38**, 2078[4].]

When young rats were given a diet low in vitamin E and containing 22 per cent. of salad oil, they showed, after 25 days, changes in chronaxia which indicated excitation of the brain and medulla, hence these are sites of action of the tocopherols. The changes in chronaxia were prevented if wheat germ and yeast were added to the ration, or if the salad oil was reduced to 7·7 per cent. Apparently a high lipide intake accentuates the effect of vitamin E deficiency.

L. E. WILSON (Chem. Abstr.).

Pharmacodynamics of Thiamine. Action on Nerve Conduction (Neuromuscular and Ganglionic Transmission). Chauchard, Paul. [*Compt. rend. soc. biol.*, **135**, 869–72 (1941); *cf. C. A.*, **36**, 2594[5].]

A 0·5 per cent. concentrate of thiamine in Ringer solution acts like a very dilute solution of strychnine on the frog nerve-muscle preparation.

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

Inhibition by Thiamine of the Drop in Vestibular Chronaxia Provoked by Thyroxine. Mouriquand, G., Coisnard, J., and Edel, Mme. V. [*Compt. rend. soc. biol.*, **138**, 552–3 (1944).]

In pigeons the large drop in chronaxia produced by 66γ of thyroxine as previously described (*C. A.*, **39**, 3342[8]) is prevented by 2 mgm. of thiamine. In children the effect of 1 mgm. of thyroxine on chronaxia is antagonized by 15 mgm. of thiamine.

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

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Pharmacological Study of Various Drugs in Relation to Their Influence on So-called Vestibular Chronaxia and on Disorders of Chronaxia. Mouriquand, G., and Coisnard, J. [*Ibid.*, 563–5; *cf. C. A.*, **37**, 4137[7,8].]

In pigeons and in children, acetylsalicyclic acid or caffeine, or both together produce a large decrease in chronaxia. Thiamine inhibits this action. In pigeons, 0·5 gm. of antipyrine causes a large decrease in chronaxia followed by death; 0·1 gm. pyramidone causes a large decrease, which is prevented by intramuscular injection of 2 mgm. of thiamine; 0·05 mgm. of strychnine sulfate causes a large drop in two hours followed by a return to normal in 7 days; and 10 mgm. of quinine sulfate a large drop within 3 hours, with return to normal in 5 days. One mgm. of thiamine counteracts the action of 10 mgm. of quinine sulfate. Phenylethylmalonylurea in moderate doses has no effect on chronaxia in pigeons or children. Insulin produces a large drop in chronaxia in pigeons and in diabetic children; in the latter 40 units daily maintains the chronaxia at a low level.

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

A Special Reaction of Neurons, Especially in the Sympathetic System and the Motor Endings of Central Neurons. Champy, C., Coujard, R., and Coujard, C. [*Compt. rend. soc. biol.*, **135**, 938–40 (1941).]

An osmic-acid alkali iodide reagent (*cf. J. anat. physiol.*, **1913**, 323) stains sympathetic nerve-endings a more intense black than other tissues. It blackens certain parts of each sympathetic motor neuron. It darkens only the adrenaline-containing cells of the adrenals of birds and bactrachians. The black coloration is probably due to reduction of the reagent by adrenaline or an adrenaline-like substance.

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

Action of Calcium Chloride on the Nerve-ending of the Skeletal Muscle. Yudenich, N. A. [*Byull. Eksptl. Biol. Med.*, **17**, *Nos.* 4–5, 55–7 (1944).]

Tests were made on the sciatic nerve and gastrocnemius muscle of a frog. A weak solution of $CaCl_2$ in Ringer solution (concentrate 0·05–0·3 per cent.) was used. In some cases the solution contained KCl. The changes in the nerve-endings were achieved by perfusion of the muscle. Two stimulations rapidly following each other were applied to the nerve at various intervals, or were applied to the nerve at the rate of 5–500 per second. The muscular contractions were recorded. In muscle perfused with $CaCl_2$ solution the end of the absolute and the beginning of the relative refractory phases are characterized by a slight and slow increase in the summation contractions, not exceeding the sum of heights of contractions from two separate stimulations. By use of tetanic stimulation the action of $CaCl_2$ is more evident than in individual stimulations. In muscle perfused with a 0·05 per cent. $CaCl_2$ solution the magnitude of the contractions caused by individual maximum stimulations over a period of 8 hours or more does not decrease. The thresholds of stimulation are not changed. With tetanic stimulation, changes occur 20–30 minutes after the beginning of perfusion (pessimum phenomena). When perfused with Ringer solution pessimum phenomena develop at 100 (sometimes 50) stimulations per second. When K is removed from the Ringer solution and the Ca content is increased to 0·5 per cent. pessimum phenomena develop at weaker and less frequent stimulations. The functional ability of the nerve-muscular combination to respond to a stimulation after a pessimal reaction is decreased for a while.

SONYA G. MACHELSON (Chem. Abstr.).

Origin of Hyperglycemia Under Action of Substances Stimulating the Central Nervous System. Lerman, I. A. [*Byull. Eksptl. Biol. Med.*, **17**, *No.* 6, 23–5 (1944).]

The method used consisted of the preliminary introduction of barbiturates in order to elucidate the origin of hyperglycemia under the influence of poisons stimulating the central nervous system. Injections of strychnine, caffeine and picrotoxin were given to dogs, in some cases during phenobarbital narcosis. A preliminary introduction of phenobarbital causes the disappearance of hyperglycemia brought on by strychnine, caffeine and picrotoxin; this makes it possible to assume that hyperglycemia from stimulating poisons and the decrease of sugar in the blood by barbiturates is of central origin. Hyperglycemia, developed under the action

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of substances stimulating the central nervous system, does not depend on convulsions and asphyxia; hyperglycemia is absent in dogs in which one suprarenal gland has been removed and the other denervated, although convulsions and other symptoms of poisoning with picrotoxin are evident.

SONYA G. MACHELSON (Chem. Abstr.).

Effect of Eserine and Prostigmine on a Nerve Absolute Refractory Phase. Babskii, E. B., and Kovyrev, I. G. [*Byull. Eksptl. Biol. Med.*, **17**, *No.* 6, 30–3 (1944).]

Acetylcholine formed in nerve centers and fibers is a resulting component of the nerve impulse and is a factor for the excitability of the nerve tissue. The effect of eserine and prostigmine, i.e. substances paralyzing cholinesterase, was investigated in order to elucidate the role of acetylcholine in the development of absolute refractoriness. The experiments were carried out with sciatic nerve-gastrocnemius muscle of *Rana temporaria*. Eserine was used in concentrations of 1 : 10,000, 1 : 5,000 and 1 : 2,000; prostigmine in concentrations of 1 : 5,000, 1 : 3,000, 1 : 1,000 and 1 : 500. Under the action of eserine the duration of the absolute refractory phase increased; eserine (1 : 2,000) caused prolongation of the absolute refractoriness 2–5 times; on prolonged washing of the eserinized nerve section with Ringer solution, the duration of absolute refractoriness returned to a value approaching the initial. In a concentration of 1 : 5,000 the change of the absolute refractory phase of the nerve was slighter, and in a concentration of 1 : 10,000 no change was observed. The effect of prostigmine is less strong; in a concentration of 1 : 500 it increased the absolute refractoriness of the nerve 1·5–3 times. Eserine and prostigmine inactivate cholinesterase, and thus inhibit the hydrolysis of acetylcholine formed in the nerve on stimulation. Acetylcholine accumulates in the nerve and causes prolongation of the absolute refractoriness. In large concentrations, acetylcholine decreases excitability of the nerve tissue.

SONYA G. MACHELSON (Chem. Abstr.).

Some Effects of Acetylcholine, Eserine and Prostigmine when Injected into the Hypothalamus. Emmelin, Nils, and Jacobsohn, Dora. [*Acta Physiol. Scand.*, **9**, 97–111 (1945).]

Injections of acetylcholine into the hypothalamic region affect respiration and intestinal motility in the same manner as was observed with electric stimulation of the hypothalamus. Similarly, injections of eserine and prostigmine into the third ventricle produce apnea and inhibit the motility and tone of the intestine and bladder, as was observed in electric stimulation. It is suggested that the hypothalamic cells of that region constitute a sympathetic center, and that they are affected by acetylcholine, eserine and prostigmine.

S. MORGULIS (Chem. Abstr.).

The Appearance of Acetylcholine and Other Changes in the Blood and Spinal Fluid of Man During Electric Shock. Brecht, B., and Kummer, H. [*Klin. Wochschr.*, **22**, 741–2 (1943); *Chem. Zentr.*, **2**, 34 (1944).]

The acetylcholine content of the blood and spinal fluid of man during electric shock is not increased, as was demonstrated in the lung preparation of the frog. Neither was there a change in the spinal fluid in its content of cells and NaCl, nor in the blood in protein and sugar. The Wassermann reaction was not influenced. The blood showed leucocytosis.

A. E. MEYER (Chem. Abstr.).

Spread of Acetylcholine-induced Electrical Discharges of the Cerebral Cortex. Forster, Francis M., and McCarter, Robert H. [*Am. J. Physiol.*, **144**, 168–73 (1945).]

The application of acetylcholine (I) to the cortex resulted in a diminution in the electrical activity, which was rapid in onset. This was followed by the appearance of (I) discharges which varied in type and tended to remain sharply localized to a small region. Spontaneous spread of (I) discharges occurred along anatomical structures and followed neuronal paths in dromic fashion. Secondary (I) discharges were possibly neuronal and not axonal discharges. Certain differences between primary, secondary and tertiary (I) discharges were discussed.

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

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A Note on the Action of Lobeline, Nicotine and Acetylcholine on the Afferent Nerves of the Tongue. Zotterman, Yngve. [*Acta Physiol. Scand.*, **8**, 377–9 (1944).]

Lobeline, nicotine and acetylcholine act on the chemo-receptive mechanism of the carotid body. Their action is shown to be specific, because they have no effect at all when introduced intra-arterially upon the afferent mechanism of the tongue. S. MORGULIS (Chem. Abstr.).

Formation of Acetylcholine in the Nerve Axon. Nachmansohn, David, and John, Hedda M. [*Science*, **102**, 250–1 (1945); *cf. C. A.*, **38**, 5513[6].]

Choline acetylase was determined in the axon of sciatic nerves of rabbits by a previously described method. The esterase formed about 50γ acetylcholine per hour. Acetylcholine production diminished about three days after section, and was considered responsible for the conduction of the nerve impulse.

HELEN LEE GRUEHL (Chem. Abstr.).

Detection of Lecithin in the Acetylcholine Complex of Brain Tissue by the Actions of Cobra Venom and Bile Salts. Gautrelet, J., Corteggiani, Elisabeth, and Carayon-Gentil, Mme. [*Compt. rend. soc. biol.*, **135**, 832–5 (1941); *cf. C.A.*, **33**, 8299[7], 9402[2].]

As previously shown, brain contains acetylcholine bound in a phosphatide complex. When cobra venom is heated at 100° for 20 minutes all its proteinase is inactivated, but its lecithinase is not. This heat-treated venom liberates acetylcholine, lysolecithin, and a fat acid from brain tissue suspension. A concentrated solution of bile salts also liberates acetylcholine from brain suspension.

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

Factors Influencing the Formation of Acetylcholine in Cell-free Extracts from Brain. Feldberg, W., and Mann, T. [*J. Physiol.*, **104**, 17P, 8–20 (1945); *cf. C. A.*, **39**, 972[1].]

Adenosinetriphosphate (ATP) can be replaced by citrate and fresh boiled juice from brain. The activator in the latter was not identical with either ATP or choline, since the synthesis of acetylcholine in the presence of citrate and the juice was not influenced by glucose. If all three activators, ATP, citrate and boiled juice, were added together, the rate of formation of acetylcholine rose to 1,200γ (rat) and 1,800γ (guinea-pig) per gm. acetone powder per hour at 37°. The corresponding values for ATP alone were 300 and 700γ; for ATP and boiled juice, 700 and 900γ; and for ATP and citrate, 1,000 and 1,200γ. Citric acid could not be replaced by succinic, fumaric or tartaric acids; malonic, glutamic and aconitic acids were slightly effective. Brain extract lost its ability to synthesize acetylcholine during dialysis, which activity could be restored by the addition of citrate and boiled juice or ATP, but not by citrate or boiled juice alone.

H. L. WILLIAMS (Chem. Abstr.).

Acetylcholine and the Mechanism of Nerve Activity. Nachmansohn, David. [*Exptl. Med. Surg.*, **1**, 273–7 (1943).]

MARION HORN PESKIN (Chem. Abstr.).

2. Pharmacology and Treatment.

Synthetic Anticonvulsants. 5,5-Disubstituted Hydantoins Containing a Hetero Atom in the Side Chain. Merritt, H. Houston, Putnam, Tracy J., and Bywater, W. G. [*J. Pharmacol.*, **84**, 67–73 (1945).]

A series of 62 5,5-disubstituted hydantoins containing O or S in one alkyl side chain were tested for anticonvulsant activity in the cat. Some were inactive. The 5-phenyl-5-alkoxymethyl- and 5-phenyl-5-alkylthiomethylhydantoins possess pronounced anticonvulsant activity. The two most promising derivatives from a standpoint of anticonvulsant activity with a minimum of hypnotic effect are 5-phenyl-5-propoxymethyl- and 5-phenyl-5-isopropoxymethylhydantoin. The last named, in cats, affords full protection against electrically induced convulsions in doses of 33–37 mgm./kgm. in acute experiments, and gives a lasting and consistent rise in the convulsive threshold in chronic tests. It is recommended for clinical trial. L. E. GILSON (Chem. Abstr.).

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The Chemical Basis of Marihuana Activity. Loewe, S. [*J. Pharmacol.*, **84**, 78–81 (1945).]

The interrelation between the two main pharmacology actions of cannabis, motor ataxia and corneal areflexia, still remains obscure. Experiments on rabbits with hemp-resin fractions indicate that in the resin these two biological actions of the drug are in part combined in the same molecule and in part embodied independently in separate molecules. While the identification of the substances of the former type, the areflexia and ataxia active isomeric tetrahydrocannabinols, is well advanced, the principles having only areflexia activity are as yet unidentified. They may be either unknown tetrahydrocannibinols or compounds of entirely different structure. L. E. GILSON (Chem. Abstr.).

Barbituric Acid Derivatives. Pharmacological Relationship of a Series of Butenylalkylbarbituric and -thiobarbituric Acid Compounds. Swanson, E. E., Fry, W. E., and Reagen, O. W. [*J. Am. Pharm. Assoc.*, **34**, 183–7 (1945); *cf. C. A.*, **35**, 3334⁹.]

A study was made of disubstituted barbituric and thiobarbituric acids in which one of the substituents in the 5-position was 1-, 2-, or 3-methylallyl, and the other substituent was ethyl, allyl, propyl, isopropyl, butyl, *sec*-butyl, isobutyl, amyl, *sec*-amyl, or isoamyl. As the number of C atoms increases in the substituted alkyl chain, the duration of action decreases. In the isomeric butenyl compounds, as the Me radical changes from position 1 to 2, to 3 in the carbon chain, the duration of action becomes shorter. Many of the thiobarbiturates are stimulating or convulsive in action, particularly (1-methylallyl)isobutylthiobarbituric acid, which is a severe convulsant to warm-blooded animals and a depressant to cold-blooded animals. A. PAPINEAU-COUTURE (Chem. Abstr.).

Cocaine and Excitability of the Cerebral Cortex. Chauchard, A., Chauchard, B., and Chauchard, Paul. [*Compt. rend. soc. biol.*, **136**, 492–3 (1942).]

Effects of cocaine on chronaxia under various conditions are discussed.
L. E. GILSON (Chem. Abstr.).

Liberation of Phosphate by the Cerebrum of the Dog Excited by Convulsant Drugs. Cicardo, Vicente H. [*Rev. soc. argentina biol.*, **21**, 54–62 (1945); *cf. C. A.*, **39**, 3345¹.]

In dogs, after destruction of the spinal cord, brain stimulation by metrazole or picrotoxin causes an increase in the total acid-soluble P of the plasma of blood withdrawn from the superior longitudinal sinus exposed by trepanation. Samples of blood withdrawn from the femoral artery or vein do not show this increase. The increase in the P of the blood from the brain may continue for as long as 15 minutes after the stimulation. The above effect is not seen in curarized dogs treated with metrazole or picrotoxin, perhaps because of the central action of the curare. Sometimes in curarized dogs a progressive decrease in blood P is observed.
L. E. GILSON (Chem. Abstr.).

Effects of Alcohol and Sodium Amytal on Intelligence-test Score. Sargant, Wm., Slater, Patrick, Halstead, Herbert, and Glen, Margaret. [*Lancet*, **1**, 617–18 (1945).]

Na amytal in doses of 1–3 grains is a more efficient and less toxic sedative than the EtOH equivalent of a double whisky (20 c.c. abs. EtOH) and has no greater effect than EtOH on intelligence-test scores. Small doses of Na amytal are preferable to EtOH for prophylactic sedation in times of acute stress.
E. R. MAIN (Chem. Abstr.).

Action of Inhibiting Substances on the Autonomic Nervous System. Danielopolu, D., Popesco, M., and Mezincesco, Ed. [*Compt. rend. soc. biol.*, **138**, 380–1 (1944).]

The antagonistic action of small and large doses of atropine, ergotamine, yohimbine, diethylaminomethylbenzodioxan (F 883), piperidylmethylbenzodioxan (F 933) and N-dimethylaminoethyl-N-benzylaniline (Antergan RP 2339) toward adrenaline, acetylcholine and histamine is discussed. L. E. GILSON (Chem. Abstr.).

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A Method for the Determination of Analeptic Activity. Goodwin, L. G., and Marshall, P. B. [*J. Pharmacol.*, **84**, 12–15 (1945).]

A modification of Chakravarti's " mouse-awakening " analeptic test (*C. A.*, **33**, 9442[4]) is described, in which adequate controls are used in each experiment. Effects of several widely used stimulants on mice anesthetized with Na pentobarbital are compared. L. E. GILSON (Chem. Abstr.).

Stimulation and Depression of the Central Nervous System by Derivatives of Barbituric and Thiobarbituric Acids. Knoefel, P. K. [*J. Pharmacol.*, **84**, 26–33 (1945).]

The effects of numerous barbiturates in intact and decerebrate animals were studied. 5-(1,3-Dimethylbutyl)-5-ethyl-barbituric acid produces in intact animals a state of hyperactivity of the central nervous system. Its lethal dose can be raised three times by the previous administration of a depressant barbiturate, but the reverse antagonism is not marked. It augments the respiratory minute volume when this is reduced by barbital or morphine. It augments the flexion and crossed-extension reflexes of decapitated, decerebrate and anesthetized animals. The knee-jerk of the intact anesthetized dog is reduced by small doses and increased by larger doses. All related compounds studied, where other alkyl groups were substituted for the 1,3-dimethylbutyl group, had a purely depressant action on the spinal-flexion reflex. In comparing the stimulant and depressant properties of barbiturates, use of thiobarbiturate instead of barbiturate may develop central-nervous-stimulant reactions, but if these are already present they may be reduced. Introduction of a double bond may develop stimulant properties. Presence of a 5-benzyl group, but not a phenyl or phenethyl group, favors the presence of stimulant properties. In several instances a change in chemical structure which increases the potency of a stimulant compound also increases the potency of a depressant compound. The spinal-flexion reflex may be augmented or reduced by the same compound, depending on the dose. Phenomena of central-nervous stimulation may be produced in the intact animal by compounds which are purely depressant to the spinal-flexion reflex. L. E. GILSON (Chem. Abstr.).

Local Action of Penicillin and Sulfamethazine and a Penicillin-sulfamethazine Mixture on Rabbit Brain. Russell, Dorothy S., and Beck, Diana J. K. [*Lancet*, **1**, 497–8 (1945); *cf. C. A.*, **35**, 7653[1].]

Local applications of Na penicillin had an irritating effect on the brain. Powdered sulfamethazine had no damaging action. Mixtures of Ca penicillin and sulfamethazine were less irritating than penicillin but more irritating than sulfamethazine alone. The injurious action of penicillin may be caused by the impurities known to form a considerable part of the best samples available.

E. R. MAIN (Chem. Abstr.).

Modification of the Vascular Effects of Papaverine by Certain Poisons of the Autonomous Nervous System. Bariéty, Maurice, and Kohler, Denyse. [*Compt. rend. soc. biol.*, **135**, 706–8 (1941).]

In dogs the hypotensive effect of small doses of papaverine-HCl (1–2 mgm./kgm. intravenously) is notably increased by pre-administration of sympathomimetic compounds (adrenaline, ephedrine, norephedrine) in doses ordinarily sufficient to produce hypertension. After cocaine (5–8 mgm./kgm.) or β,β-diphenoxyethylamine (JL 408) (10–20 mgm./kgm.) the hypotensive action of small doses of papaverine is slightly increased. After atropine (2 mgm./kgm.) the hypotensive action is also increased and the subsequent injection of adrenaline or ephedrine causes a further drop in pressure. After sympathicolytics, such as yohimbine (2 mgm./kgm.) or piperidinomethylbenzodioxan (5–10 mgm./kgm.) the hypotensive action of papaverine is moderately increased, and here ephedrine causes a further drop, but adrenaline does not.

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

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The Nature of the Action of Benzedrine. *Gubar, V. L.* [*Byull. Eksptl. Biol. Med.*, **18**, *Nos.* 1–2, 51–4 (1944).]

Experimental data are presented to show that benzedrine (I) stimulates the brain centers to quicken the heart, but does not have a primary action on the heart and blood vessels. In its effect on the peripherae of the brain in the region of the cross-shaped bend, (I) increases the tonus of vasoconstriction. Other effects are described. S. GOTTLIEB (Chem. Abstr.).

(*Action of*) *Amphetamine* (*Benzedrine*) *Sulfate Upon Higher Nervous Activity Compared with Alcohol. II. Human Experiments.* *Finkelstein, Nathaniel, Alpern, E. Bryce, and Gantt, W. Horsley.* [*Johns Hopkins Hosp Bull.*, **76**, 61–74 (1945).]

Amphetamine sulfate, 10–15 and 20–30 mgm. orally in healthy young subjects, increased the systolic and diastolic blood pressures, did not alter pulse rate, increased respiratory rate, caused slight improvement in differentiation between positive and negative conditional reflex stimuli, had no effect on the threshold of sensation to electric shock, auditory acuity, or performance in problem tests. A respiratory *cr* (conditioned reflex) was observed. Alcohol (1·5 c.c./kgm.) had a pronounced effect on motor *crs* as compared with amphetamine. Alcohol tends to convert inhibitory to excitatory reactions, interferes with inhibition, favors excitatory reactions, impairs the respiratory *cr*, and markedly increases the threshold for perception and pain. The *cr* test was better for detecting changes in higher nervous function than the verbal tests used. *Cf. C. A.*, **38**, 584[8]. A. EDELMANN (Chem. Abstr.).

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